Software Requirements Specification

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TEAM #23

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Group #23

Team Members

Index Number	Name	Signature
16001591	O.V Wijegunawardana	
16001567	N.N Wickramanayaka	
16000986	K. Nivethan	
16001311	P. Senanayake	

Project Supervisor

Dr. Noel Fernando

Project Mentor

Ms. Chobodi Padmaperuma

1.   Introduction

1.1   Purpose

This document reflects the Software Requirement Specifications for system – "iGoviya". This documentation is made before the development and implementation of the system to identify the purpose, functions and expectations of the system. Therefore the end release software may vary slightly to what is depicted in this document.

This document contains the data related to analysis, design and development of the system throughout its development cycle.

1.2   Document Conventions

SRS - Software Requirement Specification
AWS - Amazon Web Services
GCP - Google Cloud Platform

1.3   Intended Audience and Reading Suggestions

This document is mainly intended for developers and the supervisors of this system. Chapters 2 and 3 are recommended for parties who do not possess the technical knowledge (such as Clients, Customers) but wish to know the process and the design of this system. For developers and supervisors, it is recommended to refer the whole document as it contains all the technicalities of the system throughout this document.

1.4   Problem Domain

Each season, when selecting which crops to grow, farmers have little information on the current supply and demand of the market. As a result, there tends to be a surplus of one type of crop and a deficit of another kind.

Additionally, when a particular season sees high demand for one type of crop, more farmers tend to try to grow more of that crop, resulting in the following season seeing a large excess in that yield. Thus, owing to this surplus of food, more waste is accumulated, as well as many resources were wasted in growing the excess.

Also the farmers do not have a convenient and a reliable resources to get new information regarding the agro-industry (new techniques, machinery, plant diseases etc) and to discuss their concerns as a farming community.

All this stems from a lack of information and communication between farmers. Working in the dark results in either a harvest that far exceeds the requirements of the consumers or a large undersupply and ultimately leading to the downfall of agriculture in Sri Lanka.

1.5   Current Solution

Currently there's no viable solution whatsoever. Although there have been previous attempts in other countries which ultimately resulted in failure, no solution have been offered yet in Sri Lankan context.

But, some systems have been provided a buying and selling system as a solution to this problem. This system is working similar to a listing of the yield that's available from different farmers and offers only that functionality.

1.6   Limitations of the Current Solution

- There's no method to connect the agro-retailer and the farmer in more interactive manner so that they can work together in synergy rather than making it a "just another transaction"

- Farmer still produces yield blindly without any assurance of demand for his yield and ultimately end up under or over producing as they list their yield after harvesting the yield

- Does not facilitate any support for farmers in their cultivations in terms of knowledge which is a problem for farmers today

- Cannot gather information regarding demand and supply of each crop and provide statistical data

- Does not keep the farmer updated with the latest developments in the industry

- Most systems offer only English language and none offers sinhala and tamil language options which is prominent in Sri Lanka

1.7   Vision

Our vision is to make each and every farmer use iGoviya for their cultivation and making it an industry standard all over Sri Lanka, leading to a much more sustainable and efficient agro-industry and making Sri Lanka self sufficient once again.

1.8   Goals and Objectives

Our primary goal is to uplift agro-industry in Sri Lanka and restoring it to a the glorious state it was back in the past by facilitating and helping the traditional farmer through technology and transforming them to much more efficient, modern, farmer in the 21st century restoring agriculture in Sri Lanka to the glorious state it was back then. We intend to achieve this through following objectives.

- Providing an online marketplace for agro-products and eliminating the middleman/brokerage

- Incorporating technology to traditional agricultural practices and making them more efficient.

- Building a community of farmers and expanding them to uplift farming industry.

- Bringing agro-retailers and farmers closer allowing them to work in synergy to prevent huge price fluctuations in the industry.

- Gather real-time data in agro-industry and analyzing them to make accurate predictions regarding the agro-economy, produce and labor force etc.

- Digitalizing the traditional "aththam" process where farmers exchange their resources and machinery.

1.9   Proposed Solution

iGoviya is a platform which uplifts the agro-industry by incorporating technology among the farmers, agro-retailers and other parties and help them to produce the most optimal yield maintaining a balance between the demand and supply of agro-products and thus reducing the price fluctuations in the agro-industry. For in-depth details please refer to chapter 2.
This system will be beneficial for our end users as follows.

- Farmers can come to agreements with retailers before the season starts and they can cultivate based on that agreement knowing that there's a market for their produce. At the same time, retailers can predict their stocks beforehand and plan accordingly giving stability to price for agro-products.

- Since iGoviya directly connects the farmer with the retailer, no third-party or middleman is involved in the process. This will allow both farmers and retailers to get better prices in their transaction as the brokerage is eliminated

- iGoviya also builds a community of farmers and retailers allowing an open forum for discussion for their concerns and as a community they stand a better chance to uplift agro-industry together as opposed to an individual approach.

- This system will also provide information regarding cultivations as to how to get an optimal yield from their crop
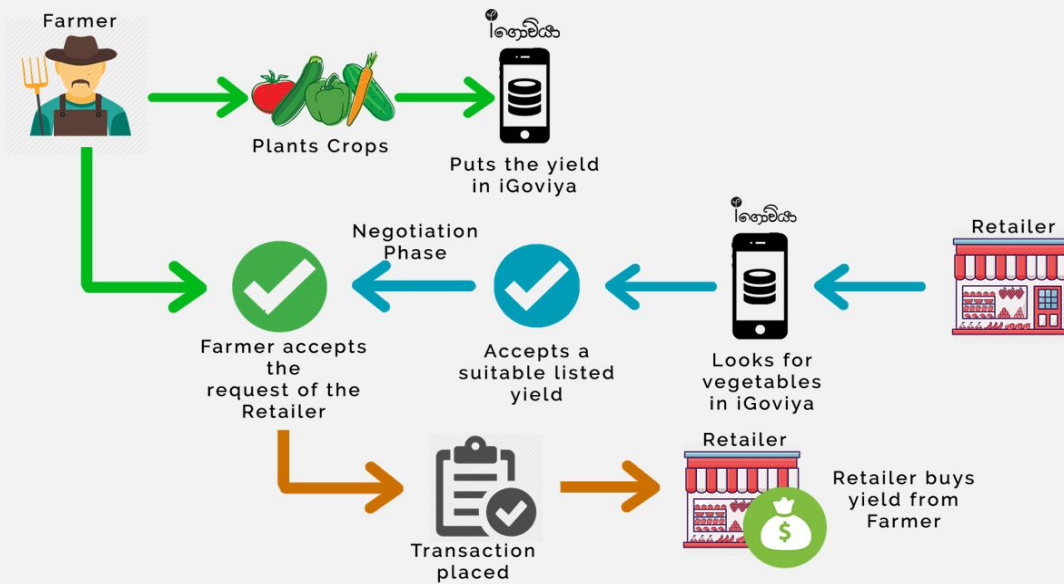
iGoviya process - Farmer puts a listing after getting his yield

iGoviya process - Retailer puts a listing and farmer accepting it before season

1.10 Scope

In-Scope

- Buying and selling platform for crops is only consisted with connecting the buyer and supplier in form of a listing
- Discussion forum for farmers and retailers
- Resource sharing feature
- User rating system
- Information hub for farming where farmers can get personalized recommendations
- Tracking previous and current orders
- View statistical data related to demand and supply in agro-industry

Out-Scope

- Handling payments for agreements and orders listed in the buying and selling platform
- Providing infrastructure such as transport and logistics for orders

1.11 References

- System Analysis and Design Methods - Jeffrey L Whitten and Lonnie D Bentley (Chapter 11 - Feasibility Analysis and the System Proposal)

2.   Overall Description

2.1   Product Perspective

iGoviya is a new, self-contained product which intends to uplift the agricultural industry in Sri Lanka by providing an ecosystem for farmers, agro-retailers and all the stakeholders of the agro-industry in Sri Lanka which they can interact and plan with each other and produce yields in a much more efficient and orderly manner which will help to reduce food wastage as well as price fluctuations in agro-industry.

It is divided into 3 sub-systems as follows,

1. Buying and Selling platform
    This is a system which farmers can list their yield after the season and retailers can list their demanded produce before or after the season on the online system. Through this platform, the farmers and retailers can come to an agreement on what they buy and produce thus reducing overproduction of yield as they can plan beforehand.

2. Agro-knowledge Hub
    This is an online forum for farmers, retailers, agro-support parties so that they can discuss their concerns and use the forum to get agro-related knowledge as well. Also this will provide personalized suggestions for different cultivations based on the demand, location and the season.

3. Agro-resource sharing hub
    This system will allow farmers to share their machinery, resources among other farmers at a cost or for free. Through this users can look for required machinery and find the closest source for that particular machine.

iGoviya will be available as an android application as well as a web application. Therefore our system will be accessible through any internet enabled device.

2.2   Product Features

- Allows users to sell or buy agro-products by posting them as a listing
- Getting recommendations for an optimal yield
- Agro-resource sharing among farmers (machinery, fertilizer, chemicals, etc.)
- Online forum of discussion for farmers, suppliers and other parties in the industry
- User-based rating system for both farmers and suppliers
- Track user's previous and current agreements/orders
- View statistics and predictions(*if time permits) related to plantations and demand etc.

2.3   User Classes and Characteristics

Four types of users will be using our system.

- System Administrator
- Moderator
- Unregistered user
- Registered Farmer/Retailer

System Administrator

This user is responsible for overall management of the system and has the highest level of privileges among all the user types. They can add or remove any element from the community.

Moderator

Moderators play the role of controlling the community inside the system. They are authorized to remove or alter content uploaded into the system by the other users to ensure the safety and to safeguard standards inside the system. Usually this role is played by the "Grama Sevaka" of a region and officials from Department of Agriculture.

Registered Farmer/Retailer

Bothe registered farmers and retailers will be considered in the same group of users as there could be farmers who maybe buying from other farmers which make them both a retailer and a farmer.

Unregistered User

These users will be the ones who just visit the website or the app without the need of buying or selling or to be a part of the community. Still these users can access the information in the forums if they are need of such knowledge. But, they cannot interact with any users or forums they can only view information.

2.4   Operating Environment

iGoviya will mainly operate as a web application. It will be implemented to be responsive for whether its a PC, mobile or a tablet device so that it can be accessed via any internet enabled device. As a secondary measure it will also be operating as an Android application on Android platform as our surveys suggested that most of the targeted users prefer Android OS over any other mobile operating system. Both implementations require a working network connection (2G or higher)
Since we are dealing mostly with farmers and retailers who may lack knowledge in english language, the application will be offered in all three languages Sinhala, Tamil and English to enhance accessibility.

2.5   Design and Implementation Constraints

Implementation Constraints

- Farmers/retailers are not very tech savvy people, so they may be reluctant to incorporate a completely new technology and to change the way they did things from a long time.
- Users may need training as to how the system works as they are not very intuitive when it comes to technology.
- Farmer/retailers should have access to the internet to interact with the system.
- Certain rural areas still lacks network coverage which may inhibit the operation of the system.
- Android users should have a google play store account to install the android app to the android devices.
- This system could perceive as a threat by the middleman who is also a retailer which could make the retailers not use this system which forces the farmer to go back to the traditional method.
- System is only responsible for the making of the agreement between the farmer and the retailer. It does not offer payment options or delivery of goods which the parties in the agreement will have to arrange by themselves.
- When a farmer and retailer accept an agreement, it is their duty to adhere to the terms and conditions of the nature of agreement. The system provides a proof of such agreement, but it does not hold any legal value/claim in the face of law.

Design Constraints

- Most of the users may not be using high-end devices, so it is necessary to design the system to use as less resources as possible.
- We should strike a balance between the language usage of three languages inside the system, since some Sinhala/Tamil technical terms can be overly complex and might be better off using the English term instead.
- Most of the rural areas have very low network reception, so it is essential that we design the system to use less network bandwidth as possible.
- The application caters to many requirements which makes it rather complex, but at the same time we have to make sure that the system is simple enough for the users to operate.
- An **Amazon Web Services** server will be the backbone of the system and the system will have downtime if the servers fail in someway.
- Firebase free-tier, which is the database system that we incorporates, allows 50,000/20,000 of reads/writes per day. But it can be increased with the growth of this system by shifting to higher tiers.

2.6   Assumptions and Dependencies

Assumptions

- All the users will have access to the internet.
- Users will enter valid information when posting an order.
- Farmers and retailers will adhere to the agreement of the order and will fulfill their part of the agreement to the very end.
- Moderators will constantly monitor the content in the system in a daily basis.
- Users will continuously update their information like stocks, forums etc.
- Members will act responsibly when posting in forums which include not posting fake information, not using profanity language etc.
- System will not slow down after a foreseeable amount of time.

Dependencies

- The web application will be hosted on the AWS server
- Google Firebase will be used as the backend for all the services in iGoviya

3.   Feasibility Study

3.1   Operational Feasibility

Here, we measure how well iGoviya solves the addressing problem and how well it satisfies the system requirements identified from users.

- We have surveyed over 100 farmers and retailers from different backgrounds about the idea of this system and whether they think it would be useful them in their field. Over 80% of the participants of this survey gave a positive feedback saying they were interested in such idea and it would solve most of their problems.

- The price fluctuations in agro products and the wastage of yield/food becomes more and more increasing from coming years due to the miscommunication between the farmer and the market. Our system intends to address that very own problem bringing the farmer and market to a close synergy which solves these fluctuations to a most point.

- Because of the lack of support from other parties like government officials and other farmers, farming has become a deteriorating profession and it have caused us to import crops from other countries which was once been the "grainary of the east". iGoviya intends to create a whole community and an eco-system for agriculture where farmers feel like they are not alone and uplifting the entire agro industry.

Addressing these issues in agro industry which no other system/product have ever done possess a real challenge. But with proper planning and resources iGoviya is able to solve these issues and satisfy the stakeholders and users of this system.

3.2   Cultural or Political Feasibility

This is the measure of how people or community feel about a solution and how well it will be accepted.

- Agriculture is a very sensitive topic in Sri Lankan context as its one of the most oldest and prominent professions in the country. Through iGoviya we intend to make farmers feel more secure by making a whole community of farmers and increasing the overall bargaining power of farmers in face of retailer and empowering them. All this leads to an uplifting of a very sacred profession of farming in Sri Lanka and it is positively viewed by many Sri Lankans.

- One of the key goal in iGoviya is to eliminate the middleman in agro transactions which is the party which takes most of the cut from the transaction. By eliminating this party allows both farmers and retailers to gain more profits while keeping the costs low. Ultimately these low costs can be passed on to the consumer which reduces the price of the vegetable and fruits in the market. This is a win-win situation for all farmer, retailers and consumers and lot of people will get benefited in the end.

- However, cutting off the middleman will have a small impact on the wholesale retailers who act as the middleman and there's a possibility that they will be displeased with the implementation of the system. But, when weighing out the negative and positive impact, positive impact certainly takes prominence.

- Through iGoviya, government can involve more with the agro industry by appointing officials as moderators of the system. The system will also collect statistical data related to agriculture which helps government to analyze and predict the variations and agro industry and make decisions based on these variations to have a favorable impact on the economy.

Through these ways, it is safe to say that cultural feasibility among the community of Sri Lanka and the political feasibility for the Sri Lankan government is ensured by this system.
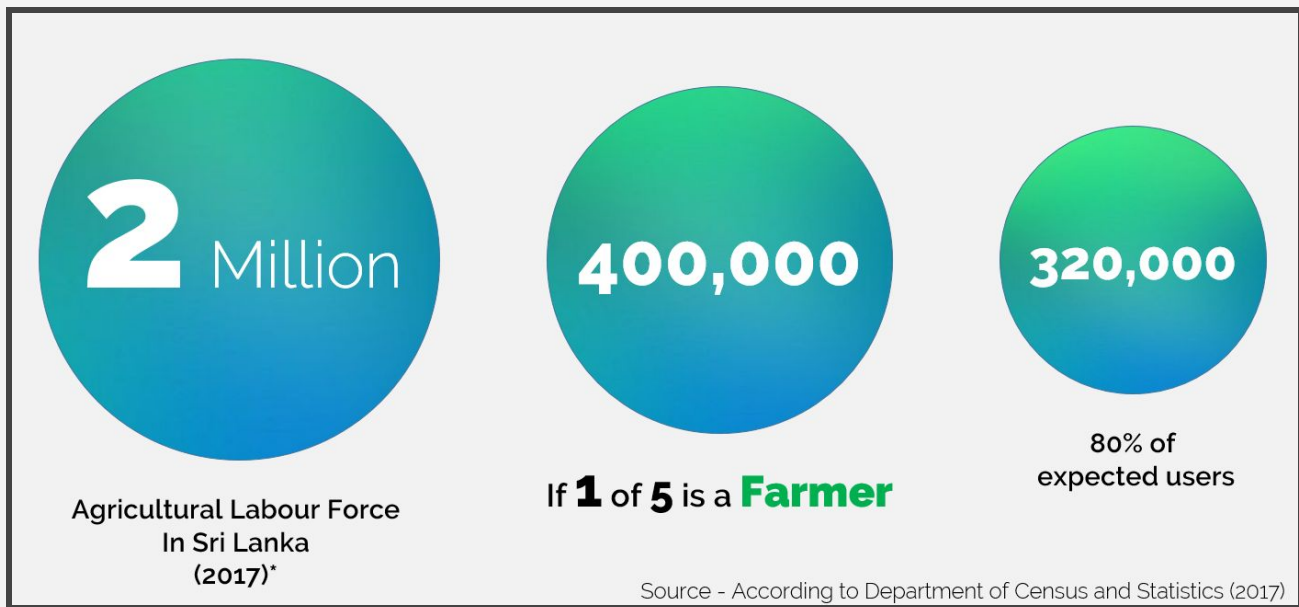
Expected amount users(Farmers) in Sri Lanka

3.3   Technical Feasibility

Technical feasibility is a measure of the practicality of a specific technical solution and the availability of technical resources and expertise to implement iGoviya and maintain it.

- The main product of iGoviya is a web application developed by using Angular JS, HTML, CSS and Javascript as the front end and for the backend we will be using Google Firebase database service. These technologies are available for development freely and although the team lacks knowledge and expertise in these technologies, over the time we will analyze and study these technologies and will be able to put into practice.

- The android application will be developed using Java/Kotlin with android studio and the same Google Firebase backend will be using for the android application as well. These technologies are also readily available for free and the team have certain amount of experience with android studio. Therefore android development is also possible within a reasonable amount of time.

- The web application is hosted using and dedicated AWS server which is also available for free for an year. After an year we will have to pay and upgrade or
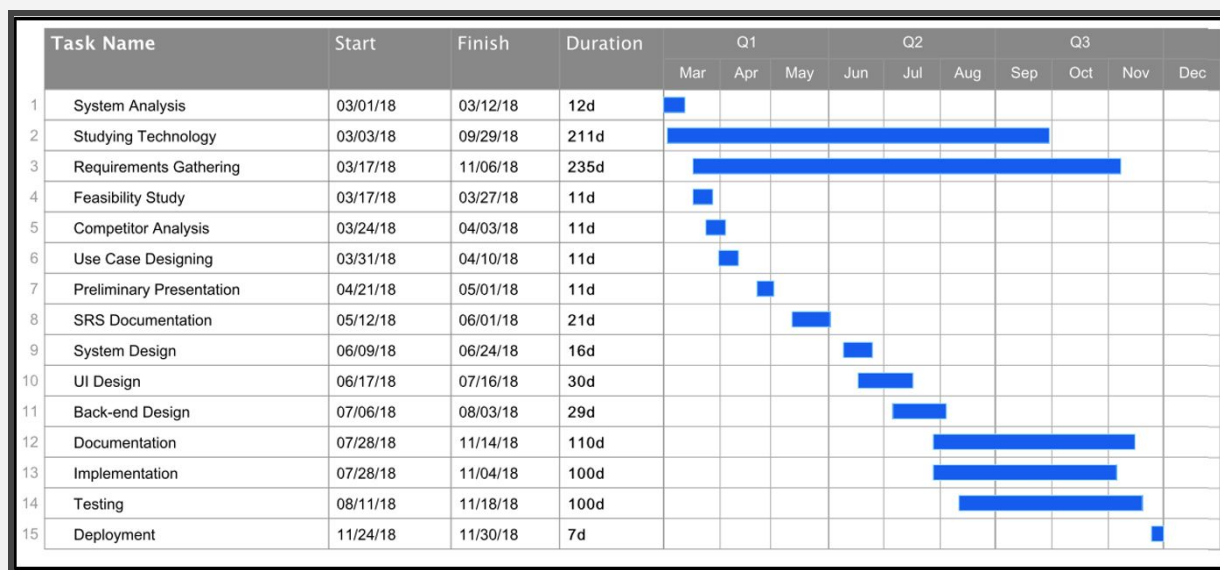
look for another server to host our application. The dedicated hardware of 1GB RAM and 1 core CPU will be sufficient in the start. But as the user base grows, we will have to opt for a more powerful server. But for development purposes these technologies are certainly sufficient.

Since all the technologies are readily available for development and that the team is willing to enhance their expertise on the areas that we are not that experienced of, the feasibility of the development of the system in technical terms seems to be in order.

3.4 Schedule Feasibility

iGoviya should finish development by the end of this year. and since we are following an agile methodology for development, requirement gathering also happening continuously parallel to the development. It means more and more features may get added from time to time. But in the current context, considering the amount of features that we have to implement as at now it will be possible.

Also it is worth noting that since we are using google platform and AWS it makes development much easier and hassle-free which accelerates the development time to make it possible to be done by the deadlines.

	Task Name	Start	Finish	Duration
1	System Analysis	03/01/18	03/12/18	12d
2	Studying Technology	03/03/18	09/29/18	211d
3	Requirements Gathering	03/17/18	11/06/18	235d
4	Feasibility Study	03/17/18	03/27/18	11d
5	Competitor Analysis	03/24/18	04/03/18	11d
6	Use Case Designing	03/31/18	04/10/18	11d
7	Preliminary Presentation	04/21/18	05/01/18	11d
8	SRS Documentation	05/12/18	06/01/18	21d
9	System Design	06/09/18	06/24/18	16d
10	UI Design	06/17/18	07/16/18	30d
11	Back-end Design	07/06/18	08/03/18	29d
12	Documentation	07/28/18	11/14/18	110d
13	Implementation	07/28/18	11/04/18	100d
14	Testing	08/11/18	11/18/18	100d
15	Deployment	11/24/18	11/30/18	7d

Project Delivery Timeline

3.5   Economic Feasibility

Economic feasibility is somewhat irrelevant as this system is developed for a group project with non-profitable motive. Even so, we can safely say this is a very cost-effective project due to following points.

- The web application is host on AWS free-tier server, which is provided by AWS for free of charge for one year and this bares zero cost for the first year of operation.
- Web application should have a domain and we will have to pay a small annual subscription for the domain. (**$12 per year**)
- The development tools like android studio and google firebase for the backend can be used free of charge for the project.
- Publishing an Android app requires a developer account which we will have to make a one time payment for the account. (**$25 one-off payment**)
- Since it is developed only by a team of university students, development cost also can be factored as none.

Therefore in the short-run, the development takes a very small cost (**$37**) (if we didn't factor the developers cost). But in the long-run as the system grows, we may have to bare a moderate cost for hosting fee in AWS as well as to allow more capacity in the Firebase backend. But these small costs can be covered by using subtle advertising on the system and as the system grows, we could even introduce a small subscription fee to the users of iGoviya.
Therefore, we can conclude that in the both short and long run, the system will be economically feasible.

3.6   Legal Feasibility

In legal terms there are no issues involved with this system as we our system does not break any rules or regulations under the laws in the country. However, there are certain steps that have to be taken to ensure that no such legal or ethical issues will no occur within the system once it is in place.

- **Privacy of information -** All the details of the users (contact no. etc.) will be visible to other users only at the user's discretion and will not be available to unregistered users
- **Handling user data -** The interest of the user within the system is confidential and will not be sold or used for advertising purposes (AdSense etc.)
- **Handling users -** Through our user rating system, we will ensure that only genuine users are within the system and the moderators will take strict action against offenses if recorded.

With all these six feasibilities in check, we can safely assume that this is a feasible project in both long and short run, thus we should proceed further with the development of this system.

4.   Requirements

4.1   Stakeholders

There are many stakeholders for this system such as,
- Farmers
- Retailers
- Officials of the Department of agriculture
- Government
- General public

But, here we will be focussing on the actual users of the system which can be categorized to mainly 4 types. The functionalities provided for each user group will be explained in detail in sub-chapter 4.2 and 4.3

- **Registered Users (Farmers/Retailers)**
  These are the actual end users who will get benefited most from the system. They are required to create an account and register into the iGoviya community. They are allowed to access all the features of the system. The iGoviya community is mainly consisting of this user group.

- **Unregistered User**
  Any person who visit the iGoviya website without an account falls into this category. Although they are not a part of the community, they can still access the iGoviya forums and the knowledge hub if they wish to do so. But they can only view. They cannot comment or interact with these elements. It is required to login to the android application, therefore unregistered users cannot use the android platform.

- **Moderator**
  Moderators could be "Grama sevakas", Government Officials or volunteered farmers/retailers. Moderators are responsible for maintaining the quality of the content in the system and also the discipline and order within the community. They have privileges to remove content if its not fit or not legit. Also they can approve members into the system when someone requests to join iGoviya. They will also ensure that the users will be putting up truthful information and prevention of scam.

- **Administrator**
  The most powerful user of all, typically an admin would be a very high ranking government official or a developer of iGoviya. They have given unrestricted access to take immediate action on almost any element in the system if required.

4.2   Use Cases and Use Case Diagrams

Since the system is too complex to implement at once it is divided into 3 sub-systems for convenience in developing the system. They are,

- **Buying and Selling** sub-system
  This is the main component in iGoviya, this is similar to a marketplace for fruits and vegetables but in biggers masses. Farmers can list their yield along with the amount, price, location etc.
  Retailer can list the amount of crops that they are buying and by when and where they want them.
  Users can browse these listings and whenever they seem something suitable, they can directly contact the lister and then come to agreement on the listed items/order.

Use case diagram for the **Buying and Selling** sub-system

- **Information Hub** sub-system

  This component is acting as a forum for farmer and retailers where they can discuss their concerns or post new information like new development and technologies in the agro industry so that the farmers can stay upto date on their field and make their cultivations more efficient and effective. This also allows the users to connect and get to know people of the same field.
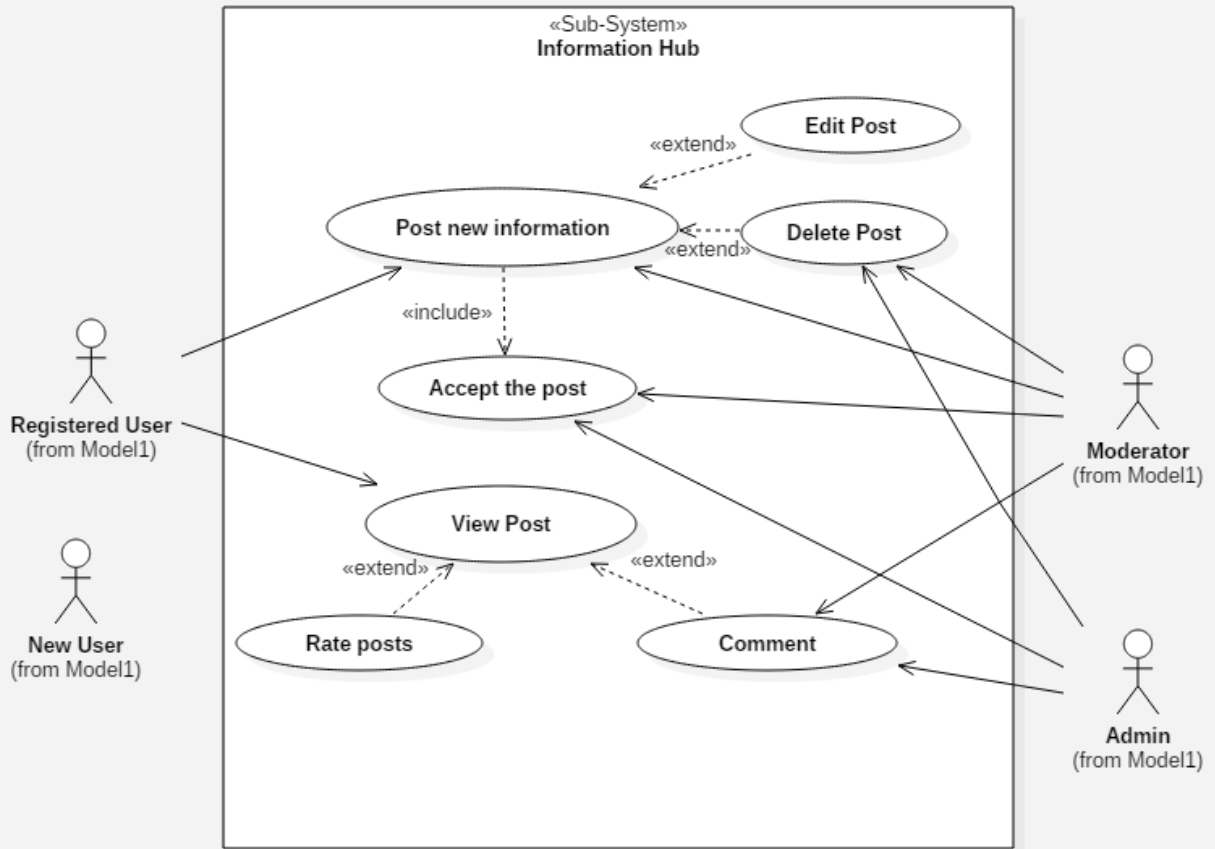
Use case diagram for the **Information Hub** sub-system

- **Resource Sharing Hub** sub-system

  This system will allow farmers to share their machinery, resources among other farmers at a cost or for free. Through this users can look for required machinery and find the closest source for that particular machine.
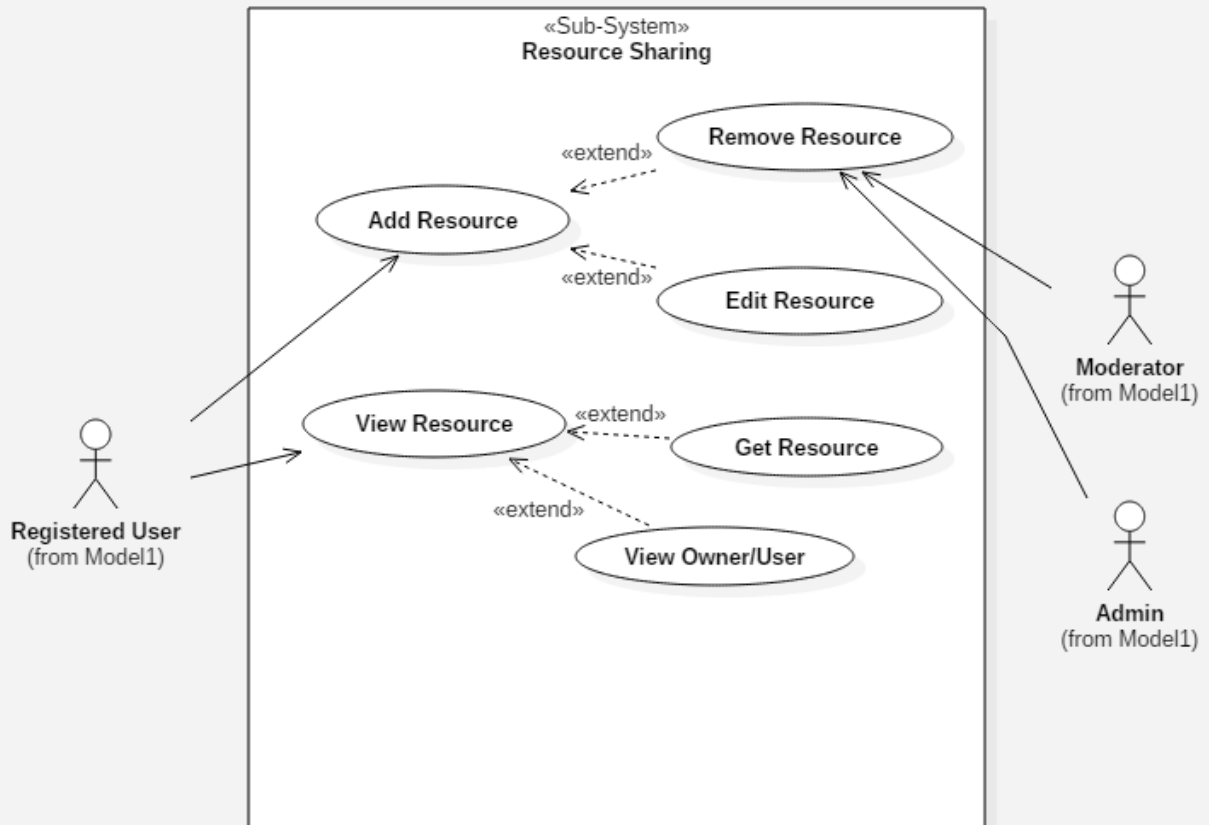
Use case diagram for the **Resource Sharing Hub** sub-system

4.3   Use Case Narratives

Buying and Selling sub-system

Use Case Name	**Login**
Use Case Description	This is where users enter the system
Participating Actors	Registered User Moderator Admin
Pre-Condition	-
Basic Flow	1. Go to the iGoviya application 2. Press Sign in 3. Enter login credentials 4. Press login

Use Case Name	**Register**
Use Case Description	This is where user can join the iGoviya community
Participating Actors	Unregistered User
Pre-Condition	-
Basic Flow	1. Go to the iGoviya application 2. Press Sign up 3. Enter personal/account details 4. Attach required documents (optional) 5. Press Register

Use Case Name	**Putting a demand/supply order**
Use Case Description	This is where the users will post a demand/supply order according to their requirement which will be listed in the marketplace.
Participating Actors	Registered User Admin (When necessary)
Pre-Condition	User should be logged into the system
Basic Flow	1. Navigate to the add order pane 2. Select the type of the order 3. Specify the information of the order 4. Press Confirm

Use Case Name	**View order**
Use Case Description	User can view other user's listed orders
Participating Actors	Registered User
Pre-Condition	User should be logged into the system
Basic Flow	1. Press marketplace button 2. Search/browse for order 3. Click on the order you wish to view

Use Case Name	**Update order**
Use Case Description	User who listed an order can update the details of it
Participating Actors	Registered User
Pre-Condition	User should be logged into the system
Basic Flow	1. Click My Profile 2. Click My order 3. Click the selected order from the list 4. Press Update Order button 5. Change Necessary details 6. Press Update

Use Case Name	**Delete order**
Use Case Description	Delete an existing listed order by the listed user
Participating Actors	Registered User
Pre-Condition	User should be logged into the system
Basic Flow	1. Click My Profile 2. Click My order 3. Click the selected order from the list 4. Press Delete Order button 5. Press Confirm

Use Case Name	**View My Profile**
Use Case Description	Users can view their own profile
Participating Actors	Registered User
Pre-Condition	User should be logged into the system
Basic Flow	Click on my profile button

Use Case Name	**Update/Delete own Profile**
Use Case Description	Users can alter their own profile
Participating Actors	Registered User
Pre-Condition	User should be logged into the system
Basic Flow	1. Click on my profile button 2. Click on update/delete profile button 3. Click confirm.

Use Case Name	**Contact/Rate user**
Use Case Description	Users can contact or rate other users who were involved in transactions with them
Participating Actors	Registered User
Pre-Condition	User should be logged into the system
Basic Flow	1. Click on my profile 2. Click on agreements 3. Click the agreement you wish to select 4. Click view other party 5. Click contact/rate user button 6. Click confirm

Use Case Name	**Accept/Reject order**
Use Case Description	User can accept/reject the offers they get for the orders they have listed
Participating Actors	Registered User
Pre-Condition	User should be logged into the system
Basic Flow	1. Click on my profile 2. Click on offers received 3. Click on an offer to see its terms and details 4. Press accept or reject based on preference 5. Press confirm

Use Case Name	**Remove User**
Use Case Description	Admins can remove users if they have lot of negative comments from other users or if they have been flagged for inappropriate behavior
Participating Actors	Admin
Pre-Condition	User should be logged into the system
Basic Flow	1. Select search user 2. Search user or browse for user 3. Click on the required users name 4. Select remove user button 5. Review users 6. Press confirm

Use Case Name	**Accept User**
Use Case Description	This is where moderator reviews a registration request and approves them as a member of iGoviya
Participating Actors	Moderator
Pre-Condition	User should be logged into the system
Basic Flow	1. Select on Registration Requests 2. Click on a request 3. Review the request 4. Click accept

Information Hub/Forums sub-system

Use Case Name	**Post New Information**
Use Case Description	Uses can post information/posts in the iGoviya forums/Information hub
Participating Actors	Registered User Admin Moderator
Pre-Condition	User should be logged into the system
Basic Flow	1. Go to iGoviya Forums 2. Press New Post button 3. Select the type of the post 4. Enter the post content 5. Select privacy settings 6. Click Confirm

Use Case Name	**Edit/Delete post**
Use Case Description	Users can edit or delete their own posts in the forum
Participating Actors	Registered User Admin Moderator
Pre-Condition	User should be logged into the system
Basic Flow	1. Go to My profile 2. Select my posts 3. Click the post you want to edit from the list 4. Press edit/delete post 5. Click Confirm
Alternate Flow (for admins/moderators)	1. Go to iGoviya Forums 2. Select on the post 3. Click update/delete 4. Alter the post 5. Click confirm

Use Case Name	**View Post**
Use Case Description	User can view the posts in the forums by different other users
Participating Actors	Registered User Unregistered User Admin Moderator
Pre-Condition	-
Basic Flow	1. Go to iGoviya forums 2. Browse/search/filter posts 3. Click on a post from the results

Use Case Name	**Rate/Comment posts**
Use Case Description	Users can comment or upvote or downvote posts in the forum
Participating Actors	Registered User Admin Moderator
Pre-Condition	User should be logged into the system
Basic Flow	1. Go to iGoviya forums 2. Browse/search/filter posts 3. Click on a post from the results 4. Click comment/rate boxes 5. Enter the details 6. Press confirm

Resource Sharing sub-system

Use Case Name	**Add Resource**
Use Case Description	Users can list if they have a resource or if the need one
Participating Actors	Registered User
Pre-Condition	User should be logged into the system
Basic Flow	1. Go to iGoviya Resource Hub 2. Press add resource 3. Select the type of listing 4. Enter details 5. Press Confirm

Use Case Name	**View Resource**
Use Case Description	Users can view resources available or resources needed
Participating Actors	Registered User
Pre-Condition	User should be logged into the system
Basic Flow	1. Go to iGoviya Resource Hub 2. Select view resources 3. Filter/search/browse resources 4. Select a resource listing and click on it 5. Press Confirm

Use Case Name	**Contact Resource owner/get resource**
Use Case Description	Users can get the resources available or contact the lister of that resource
Participating Actors	Registered User
Pre-Condition	User should be logged into the system
Basic Flow	1. Go to iGoviya Resource Hub 2. Select view resources 3. Filter/search/browse resources 4. Select a resource listing and click on it 5. Select contact owner or get resource button

Use Case Name	**Remove Resource**
Use Case Description	Users can get the resources available or contact the lister of that resource
Participating Actors	Registered User Moderator Admin
Pre-Condition	User should be logged into the system
Basic Flow	1. Go to My profile 2. Click my resources 3. Select the required listing 4. Press remove listing 5. Confirm
Alternate Flow (admins and moderators)	1. Go to iGoviya Resource Hub 2. Select view resources 3. Filter/search/browse resources 4. Select a resource listing and click on it 5. Press delete resource button

4.4   Functional Requirements

This chapter contains information about the functional requirements of different users as to how and what they expect from a system like i Goviya.

4.4.1 Registered Farmer/Buyer

- **Post and view demand or supply listings**
  Both farmer and retailers can list what they have or what they want in the listing page, the users can use filters to narrow down the results they want among the listing and view them. The listings will be mainly categorized as "For sale" and "Wanted". There will also be several other filters to narrow down results.

- **Accept or reject listings**
  Once a user have seen a listing they need, they can send a request for that listing which the lister can either accept or reject that request.

- **Track their previous and current orders/listings**
  Once and order/listing has accepted, they can track the progress of the order if its a demand order (order from retailer to the farmer) and check previous orders etc.

- **Interact with the information hub forum**
  Information hub is an open forum for all the users in the system to discuss, share information and address and solve concerns of them as a whole. Any registered user are eligible to interact with info hub which includes viewing, posting, commenting posts,notifications etc.

- **Contact and rate other users in the system**
  iGoviya have a rating system that user can rate other users according to their preference. this is a security measure to prevent fraud or misleading transactions within the members of the system. With rating progression, highly rated users are more recognized whereas low rated users will be removed from the system by moderators or admins.

4.4.2 Moderator

- **Review and Accept registration requests to join the iGoviya community**
  To join the community as a farmer or a buyer, it is required to present some
  proof (business license for a retailer or a land deed for a farmer) that they are a
  legit farmer or a retailer to prevent scams. Since a moderator is a grama sevaka
  in that area, it is safe to assume that he/she have some knowledge about the
  people within that area and that the grama sevaka is in a position to review and
  accept if that person is a legit farmer or a buyer.

- **Review and Remove elements in the Resource Sharing Hub**
  Resource Sharing Hub is a very critical element as we are dealing with
  machinery which are quite expensive. Therefore it is important to maintain
  order and that users are listing legit resources. Thus, moderators will review the
  listings in the resource hub and remove them if they do not seem fit the
  criteria.

- **Review, Comment, Pin and Remove posts in the Information Sharing Hub**
  Information hub is all about discussing and sharing agro-knowledge and the
  moderators who are more experienced in the agro-industry can look into posts
  in the info hub and check for its legitimacy and remove them if they are
  misinformed or misleading. At the same time, moderators can also post,
  comment and view just like a normal user would. They also have the ability to
  pin up posts if they seem more important than the rest of the posts so that it
  always gets the attention of the users.

- **Contact Users**
  Moderator can look into contact details of any user and can contact them via
  the system or by any other means if it is required to do so.

4.4.3 Administrator

- **Remove Users**
  Admins have the power to remove or block users from iGoviya in case of any offenses were reported by other users or if the rating user becomes too low (less that 1 star)

- **View, Remove posted orders**
  When there's a posted order which is not suitable for the community (misinformation, profanity language and so on), admins have the ability to take it down and remove those posted orders.

- **Change the rating of users**
  Admins have authority to change the rating of the user as they wish. This is in place because if a high rated user for a long time is receiving bad feedback, it takes a lot of negative reviews to bring down the user's rating organically, which takes a lot of time. To prevent this, if the admins and moderators are receiving lot of bad reviews from such user, admins should have the ability to change the rating of user as a penalty.

- **View, Remove any element posted by users**
  Admins have the power to remove any post or change made by any registered farmer/retailer if it seems fit.

- **Contact User**
  Like moderators, admins also have the ability to contact any user in the system if the need arises.

4.4.4   Unregistered User

- **Submit Registration Request**
  Unregistered users can submit a registration request asking to join in to the iGoviya community

- **View posts in the Information Hub**
  Unregistered users can visit the web app and refer to the postings in the information hub and forums. But they can only view. They cannot interact with the information hub.

- **Contact Moderators**
  These users can also contact moderators if they wish to know more information about iGoviya and for any other inquiries.

4.5   Non-Functional Requirements

- **Availability in all 3 languages**
  Our surveys have shown that most farmers prefer Sinhala and Tamil language, for expandability we have included English language as well. But, we also have to consider that including technical terms in Sinhala or Tamil would be overly complex and might be better to use common English terms in such places.

- **Simple and easy to use interfaces**
  Since the user base (farmers and retailers) are not very tech savvy it is required to build the system with an user interface that is simple and intuitive to use with larger icons and fonts to improve visibility.

- **Accuracy and reliability**
  The system is monitored by the moderators and the admins for accuracy and legitimacy of information. Also the filtration and rating system of users ensures that the users of the system will be genuine and reliable. All these factor will result in more quality information with proper reliability.

- **Portability**
  The web platform of the system will be made responsive to any device whether its PC, mobile or tablet. This enables users to access iGoviya with any internet enabled device without a hassle. Also the Android application will backward compatible even for older devices ensuring compatibility.

- **Robustness**
  Firebase backend uses a very little bandwidth and will work even in a 2G network. This will also store information offline when there's a connection drop making it a very robust system.

- **Performance**
  Firebase database will update its data almost instantly when a change is made. So, the users will get real-time information from the database always. Also the angularjs components will ensure that the data displayed is being updated without not need to refresh the web page constantly.

5.   Proposed System Architecture

5.1   High-Level Architecture
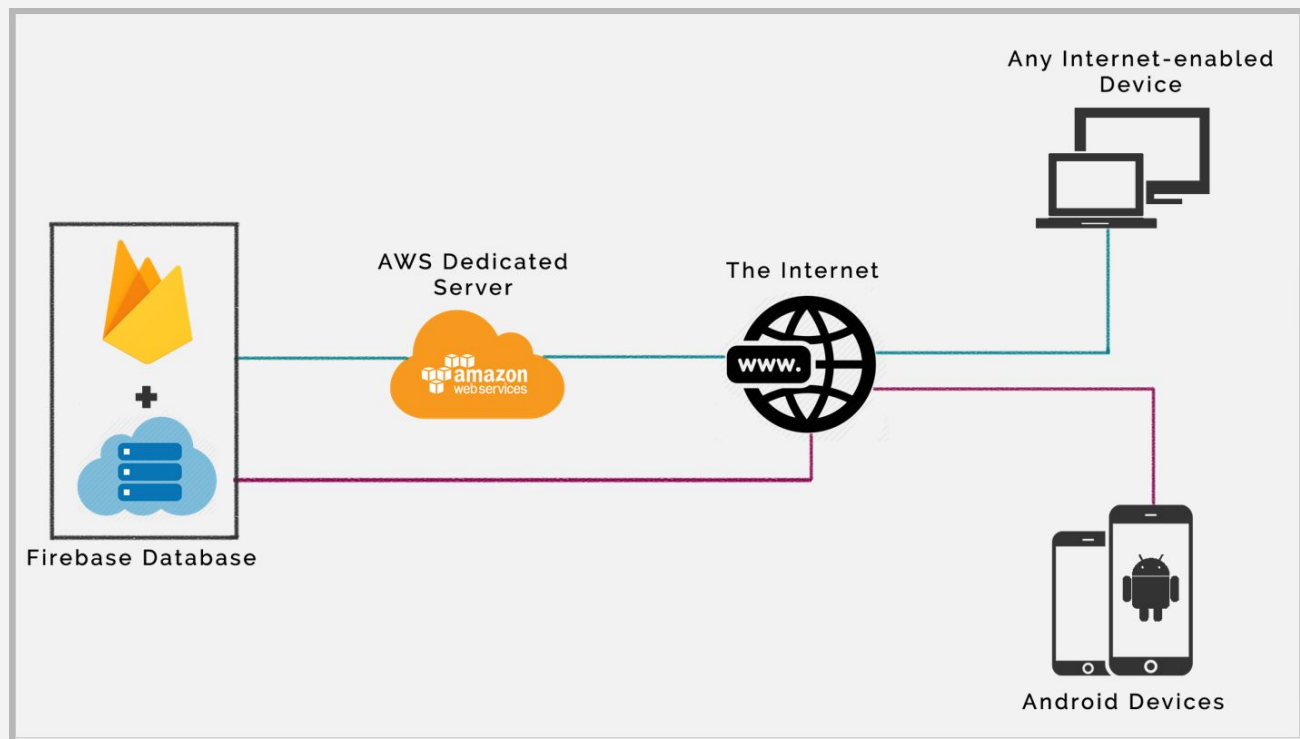
Diagram of **high-level architecture** of iGoviya

As seen in the above diagram, both web application and android application requires **network connectivity**. But only web app will go through the **AWS Dedicated Server** as the web app is hosted in that server. Ultimately, both application connects to the Google **Firebase Database** which is a cloud based database which acts as the back-end for the whole system. The application communicates with firebase using API calls.

5.2   Components and Their Responsibilities

Component	Responsibility
Farmer/Retailer(user) Component	- Add new users - Edit user details - Post demand/supply orders - Track current/past orders - Post available/required resources
Forum Component	- Add new posts to forum - Edit posts in the forum - Upvote/downvote posts - Comment on posts - Filter posts
Resource Hub Component	- Maintain details about resources - Lending/borrowing of resources - Tracking resource information
Admin Component	- Accept/reject joining requests - Add/remove elements - Change rating of users - Block/remove users
Community Component	- Rate users - Contact users - Grouping users with similar interests - Providing recommendations to users
Marketplace Component	- Manage listed orders - Search/filter orders - Track agreements between users - Predict prices on items (crops/resources)
Notification Component	- Notify users on their agreements - Notify users for special/emergency messages
Statistical Component	- Gather market information of past/present - Analyze trends in agro market/industry - Make predictions based on analysis
Security Component	Verifies users based on their credentials

5.3   Component Interactions
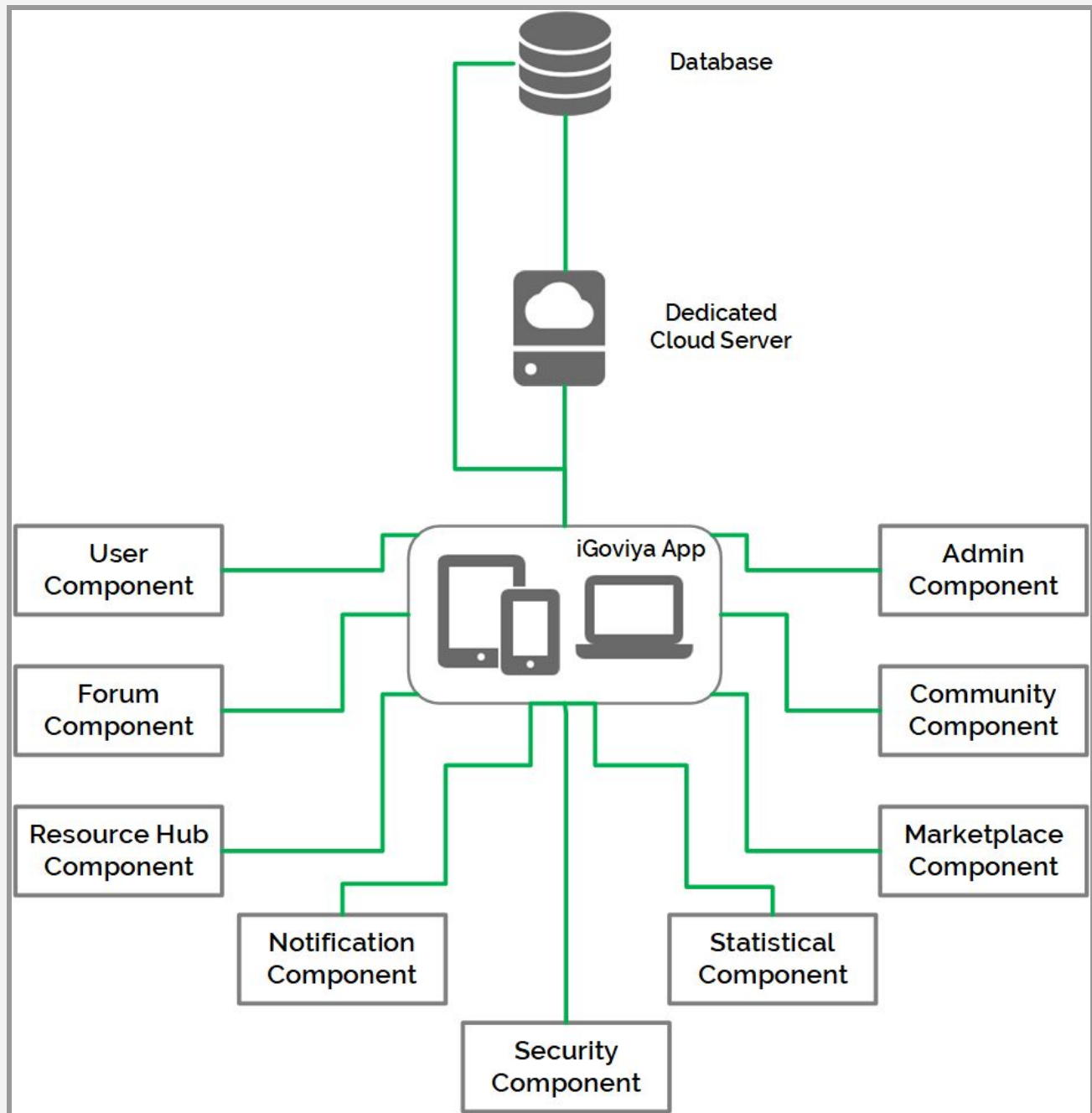
Diagram depicting component interactions

6.   System Design

6.1   Class Diagram

For the overall functionality of iGoviya, several class associated can be identified as follows.

- **Registered User** - This class holds information that are common to both farmers and retailers. Such as their personal information. This is a super class of Farmer and Retailer classes.

- **Farmer** - This class contains information that are specific to farmer user group such as the land area and the type of crops they cultivate.

- **Retailer** - This class contains information that are specific to retailer user group such as the business license number, store locations etc.

- **Administrator** - This class is having the admin credentials and their possible functions to handle the system.

- **Moderator** - This class contains moderator's credentials as well as their designation since moderators are appointed from government officials.

- **Posts** - This class is relating to a post posted in the information hub. For each and every post, there will be such object created.

- **Listings** - This class is responsible for the listing that are listed in the buying and selling platform and the resource sharing hub. This is the superclass for any kind of listing.

- **Order Listing** - This class represents the "order" type specialization from the listing superclass and is a subclass of **Listing class.**

- **Demand Order** - This class represents even a further level of specialization of the Listing class where this is a subclass of the **Order class** described above. This class describes the orders posted for buying a certain crop from another user.

- **Supply Order** - This is also a subclass of **Order class**, but for orders which are posted by farmers to sell their crops.

- **Resource Listing** - This is subclass of the **Listing class** which is specialized for posts posted in the Resource Sharing platform which contains details of the resources listed.

- **Required Resource** - This is a subclass of **Resource Listing class** which is responsible for the posts which are put up when a farmer is required a certain resource from the community.

- **Available Resource** - This is a subclass of **Resource Listing class** which is responsible for the posts which are put up when a user is having resources to spare and share. They can either charge for the resource or provide it free of charge.
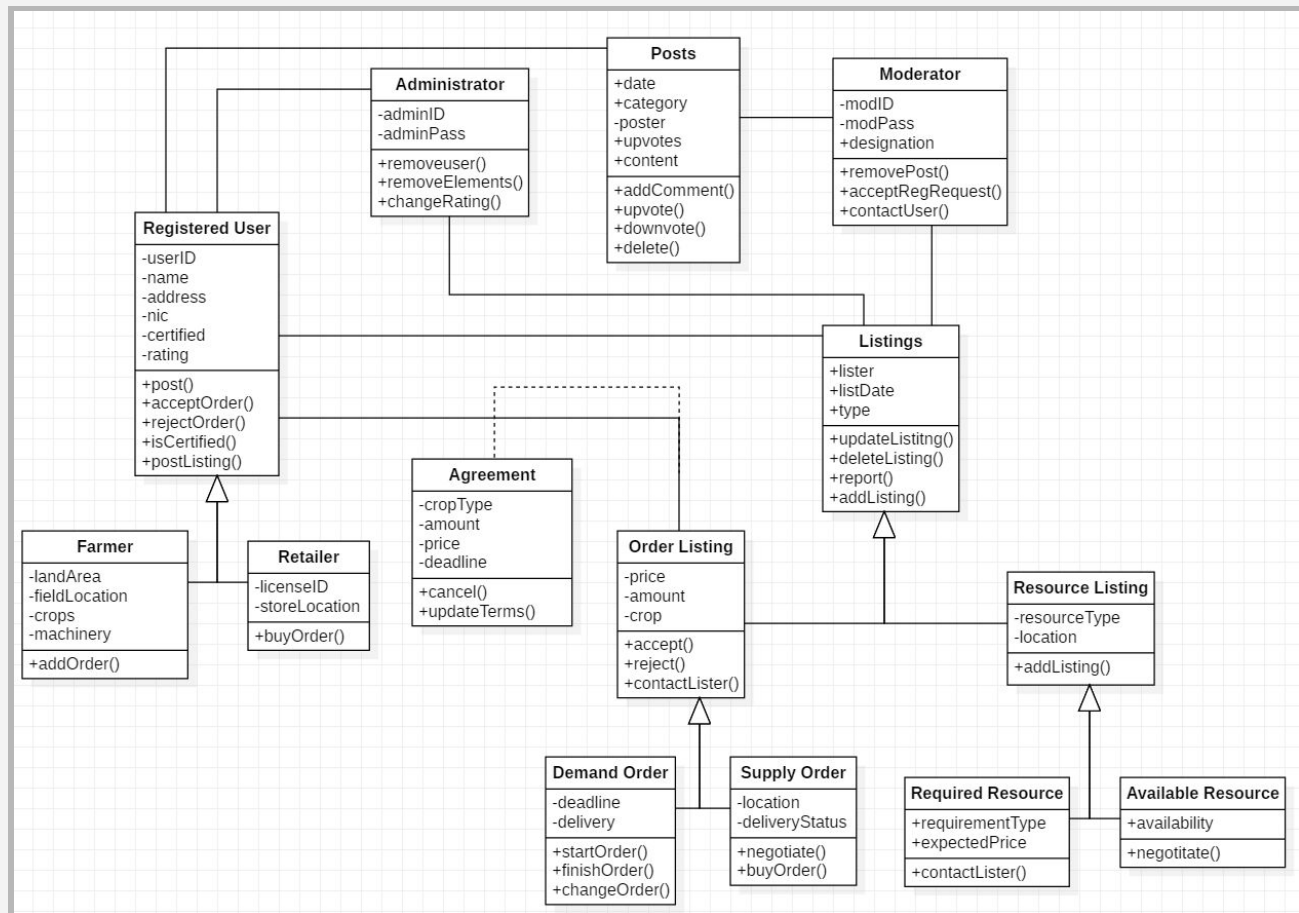
Proposed Class Diagram for iGoviya

6.2   Sequence Diagram
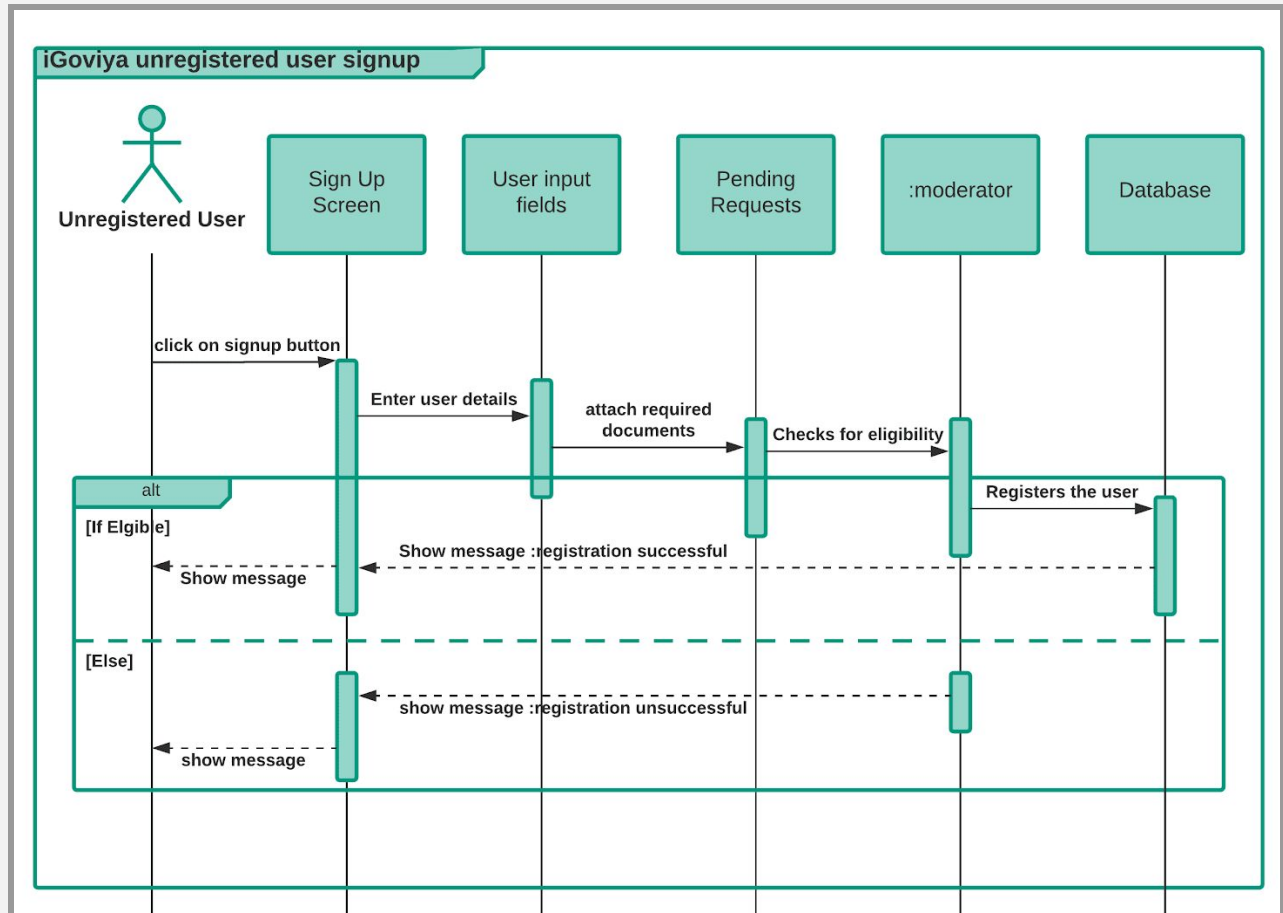
Sequence Diagram for signup process in iGoviya

This represents how an unregistered user can go through the signup process to enter in to the iGoviya community.
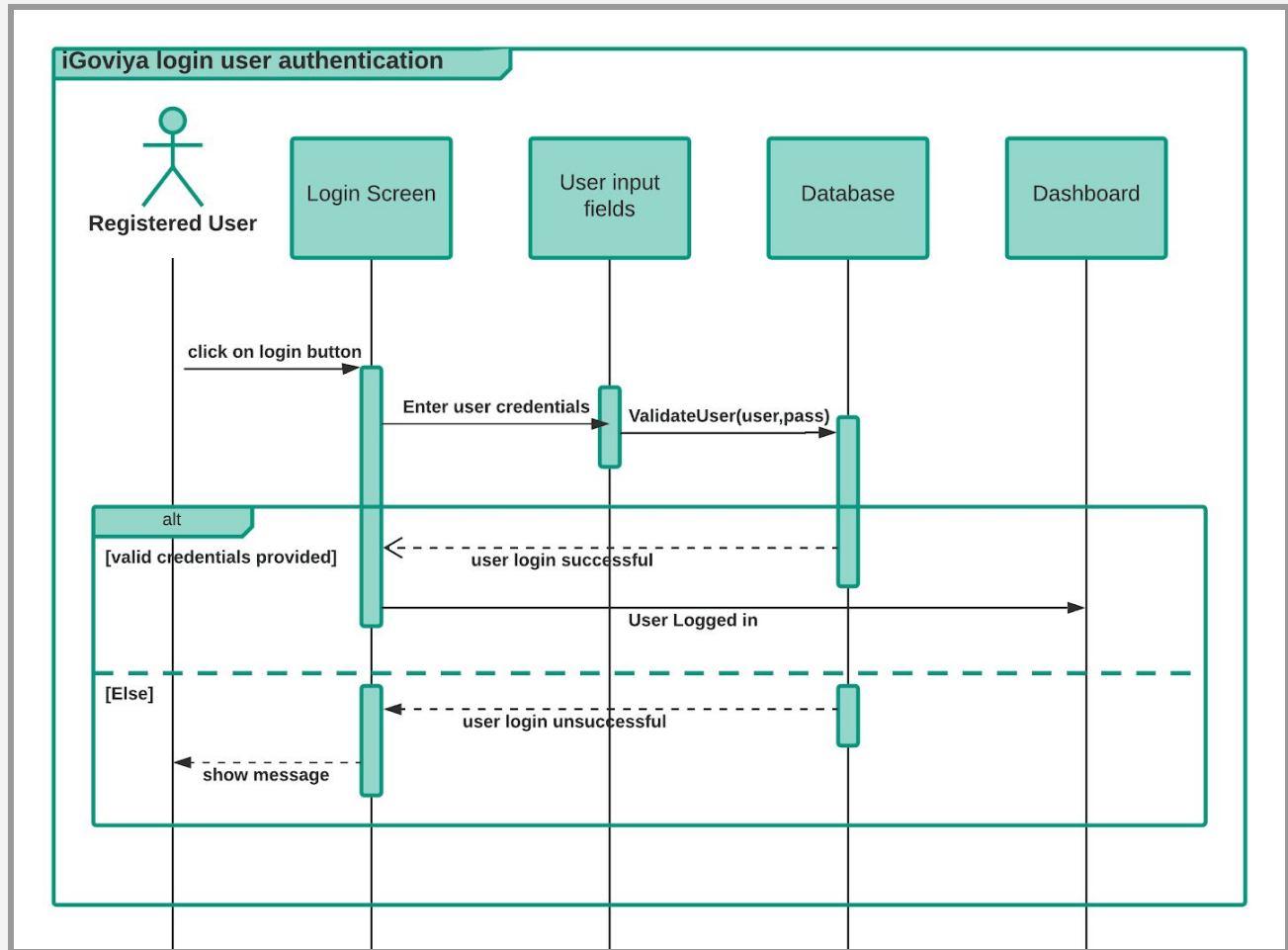
Sequence Diagram for login process in iGoviya

This diagram represents the login procedure for a user who wish to sign in to iGoviya. This procedure is common for all registered users including Admins and moderators.
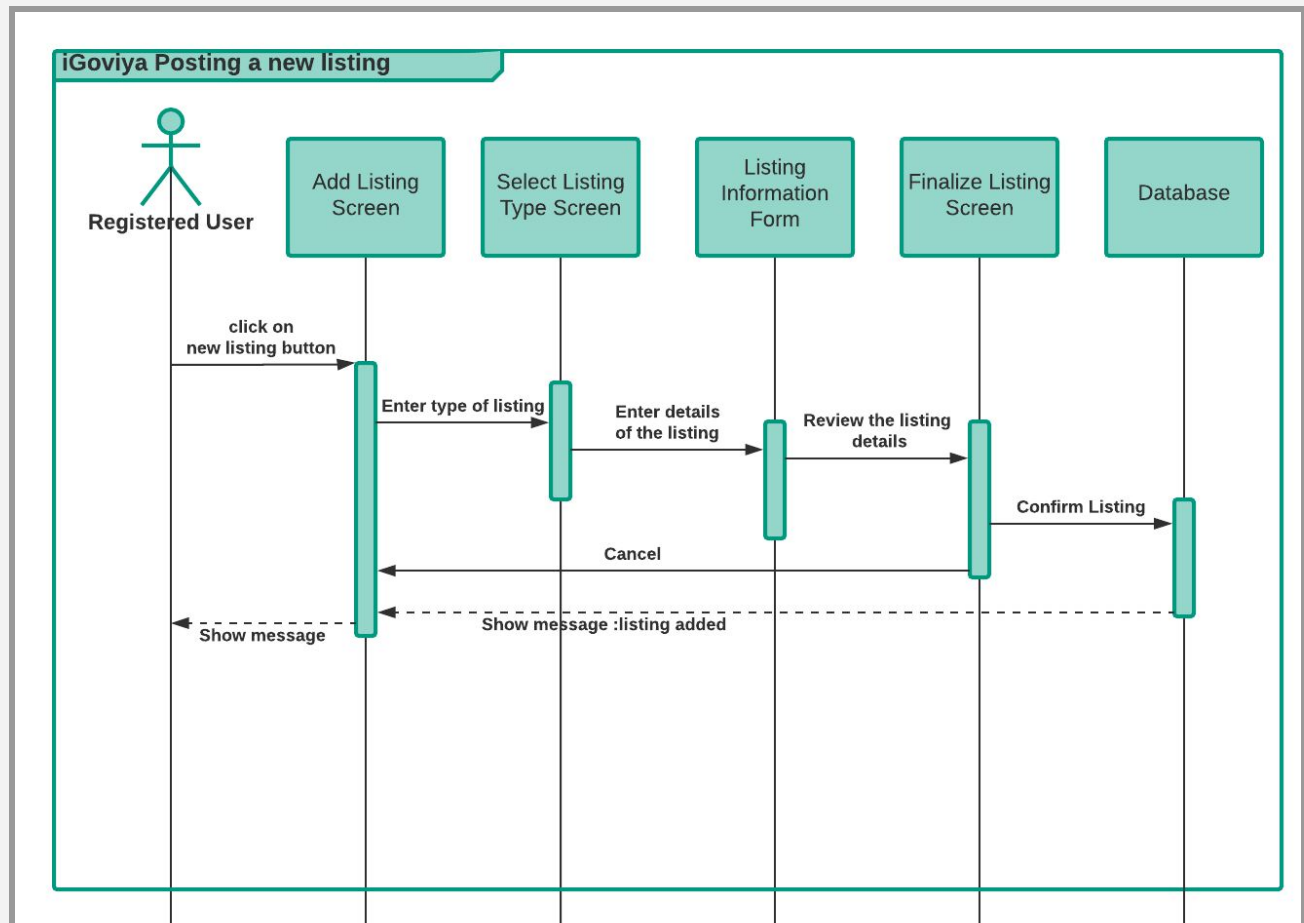
Sequence Diagram for posting a new listing in iGoviya

This diagram represents the process of adding a new listing (order listing or resource listing) by a registered user of the system which is visible to all the users of the system.
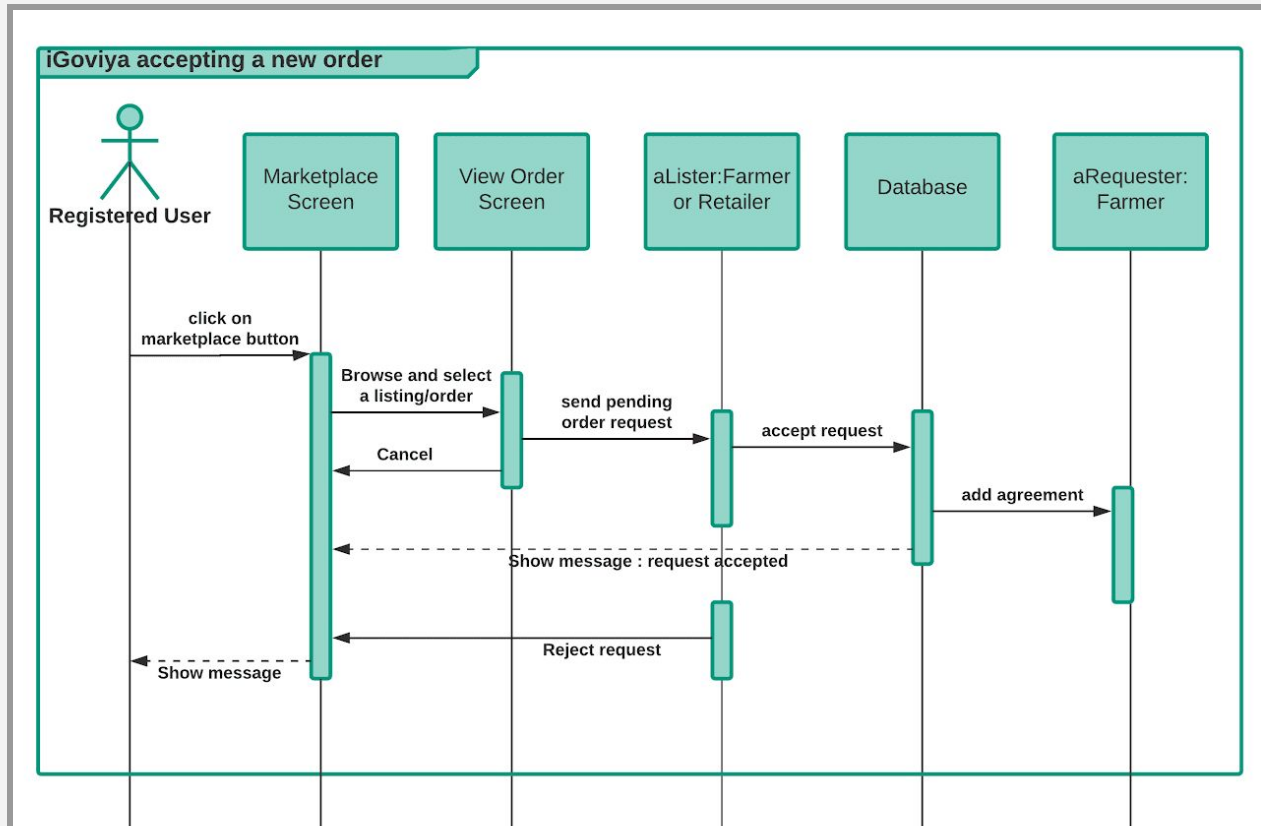
Sequence Diagram for accepting a listed order in iGoviya

This represents a process where have seen a listing they like and they send a request for the lister (which is also another user) to make an agreement to that listing. This request is sent to the lister where the lister can accept or reject according to their preference.

6.3   Activity Diagram
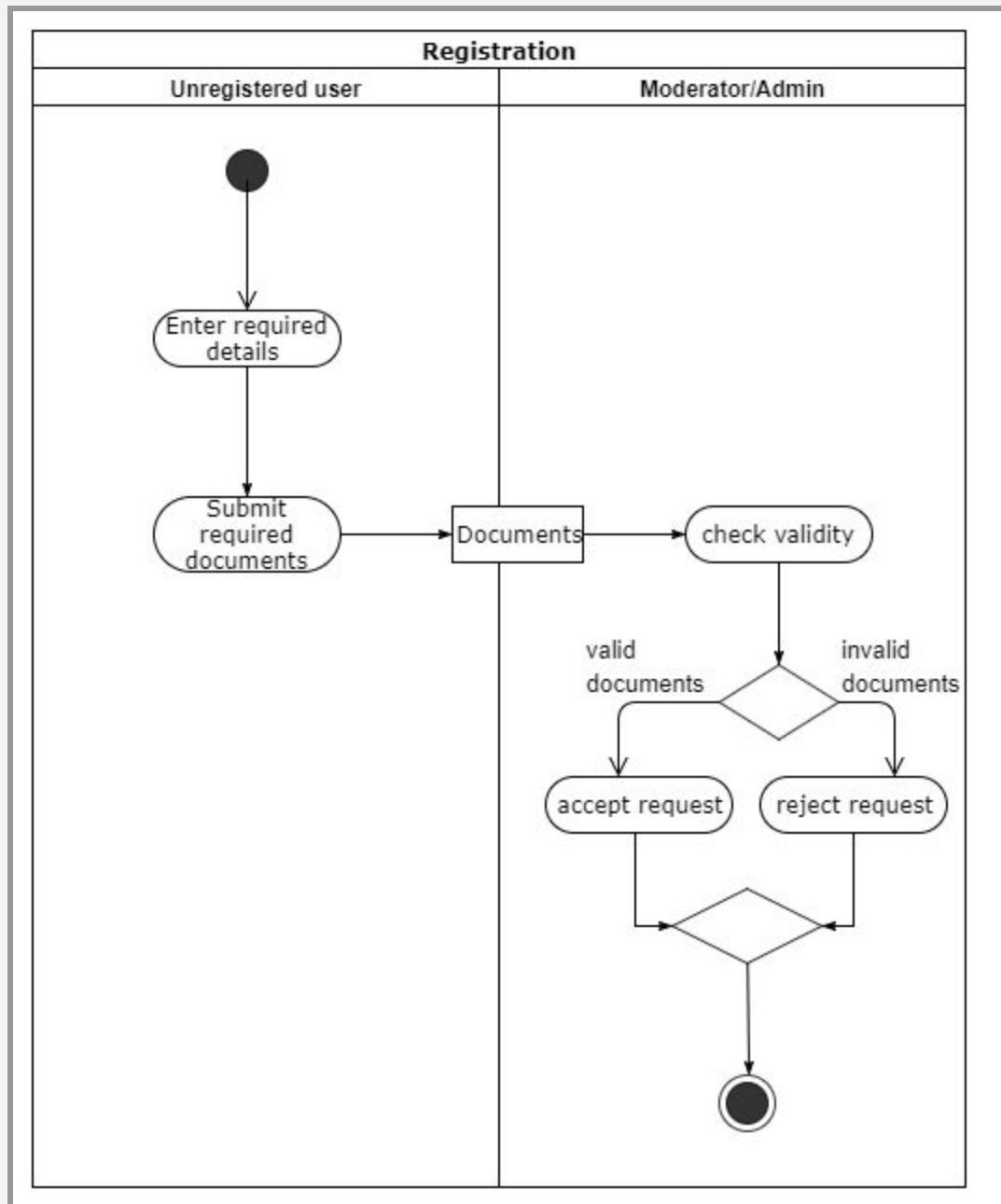
Activity Diagram for Registration in iGoviya
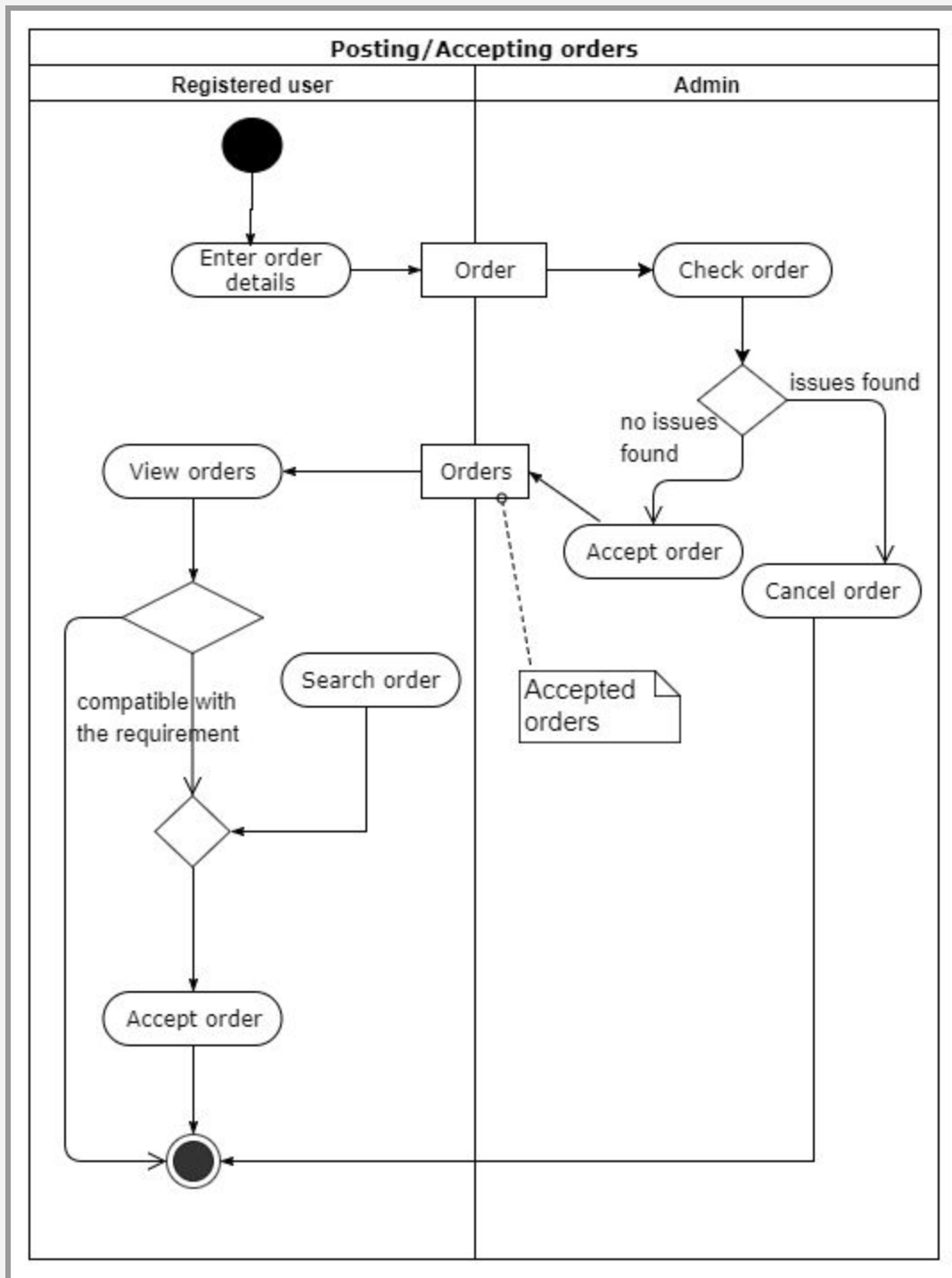
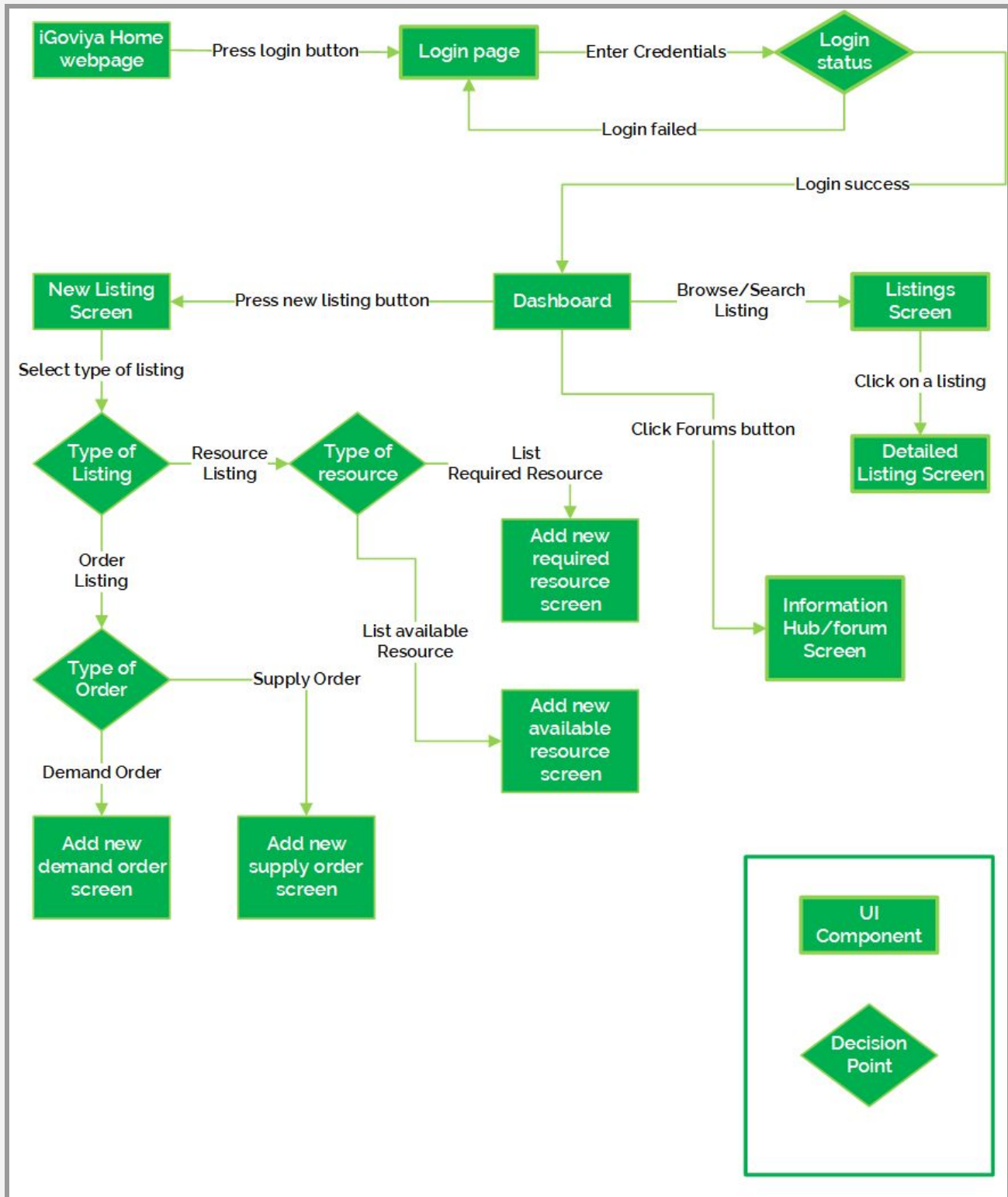**Activity Diagram for posting and accepting posted orders**
(Buying and Selling Platform)
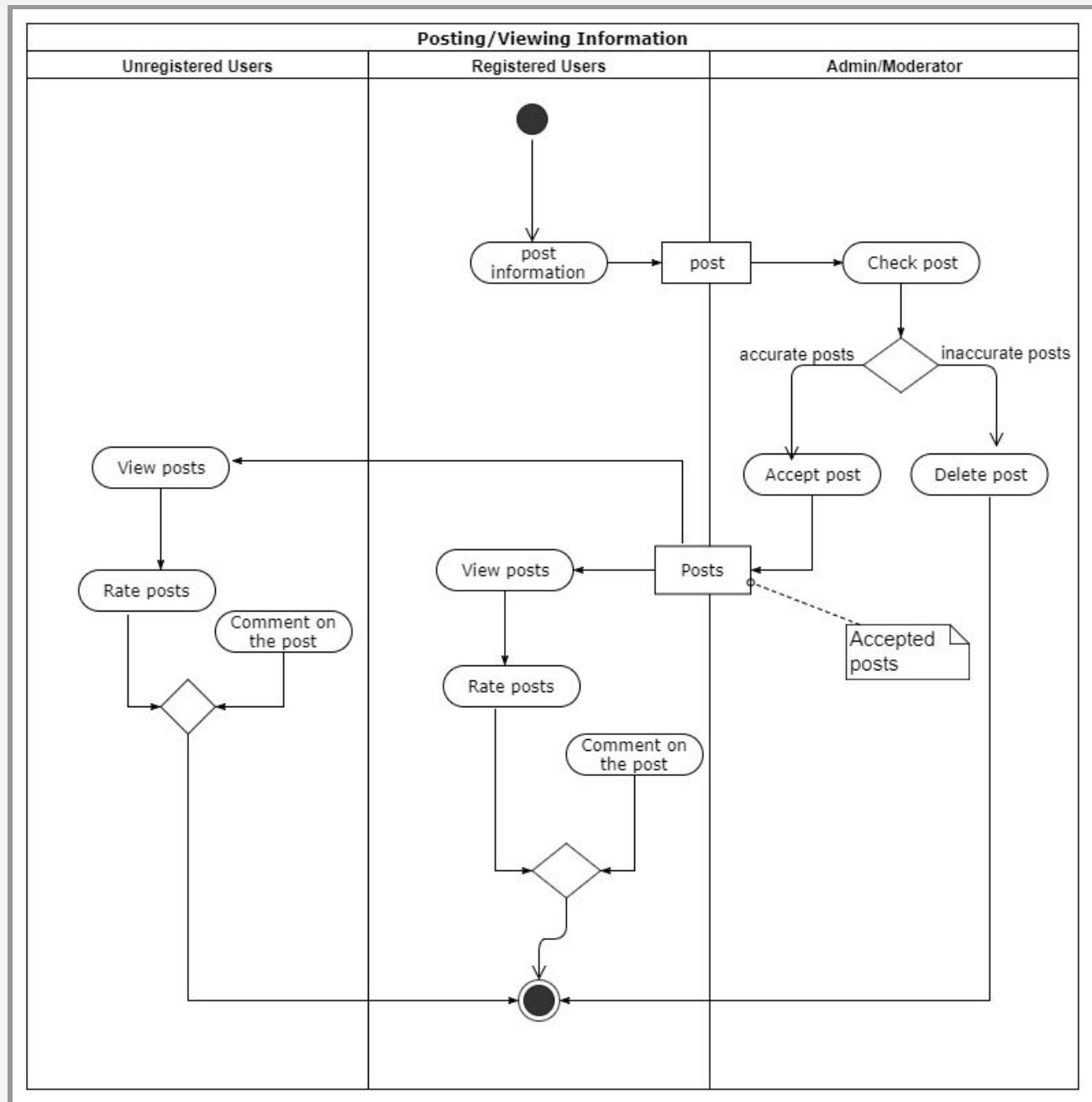
Activity Diagram for posting and view posts
(Information Hub/Forums)
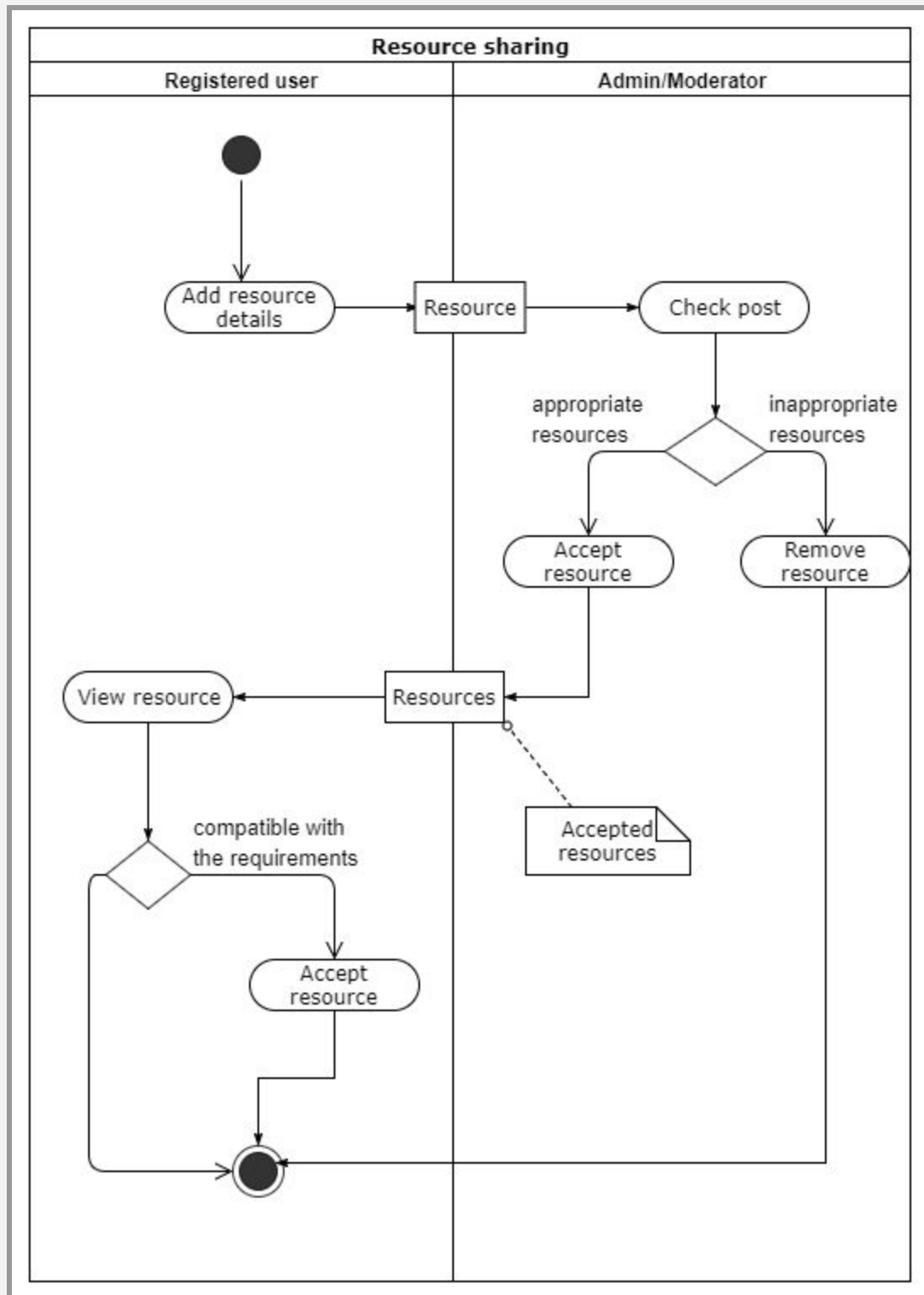
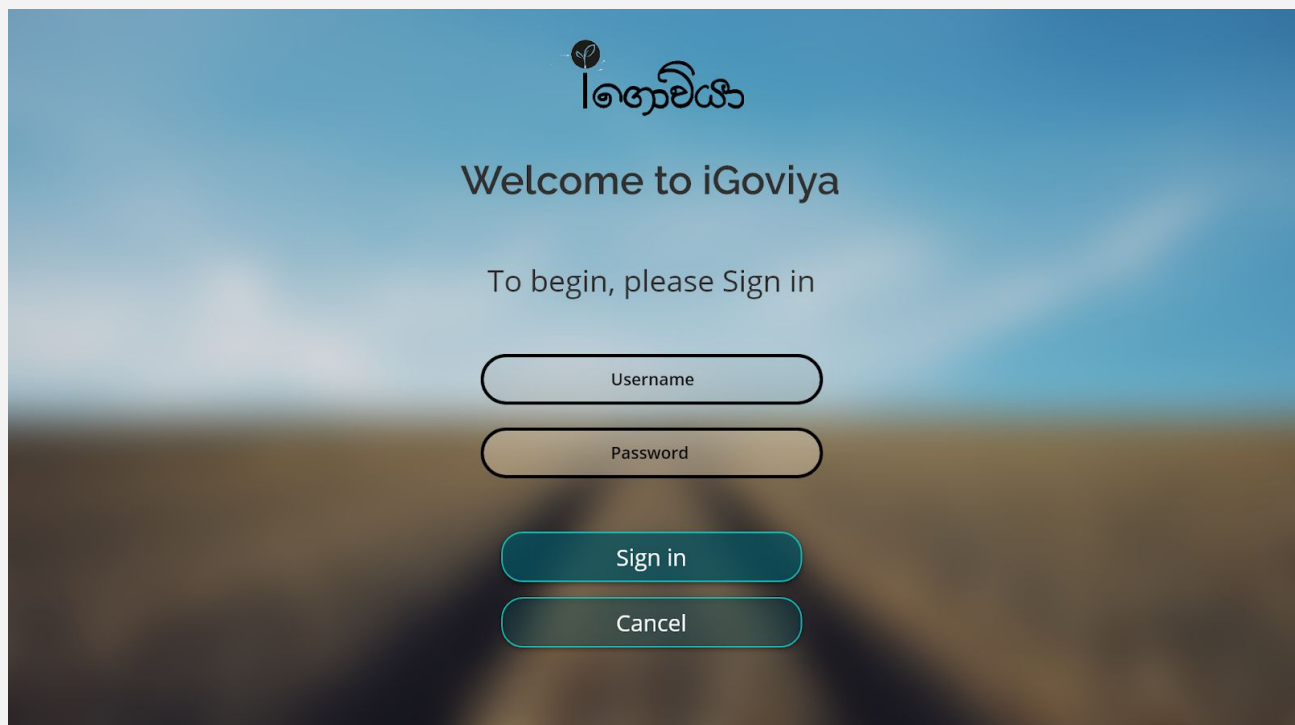**Activity Diagram for Resource Sharing Process**
(Resource Sharing Hub)

7.   User Interface Flow Diagram

8. User Interface Mockups
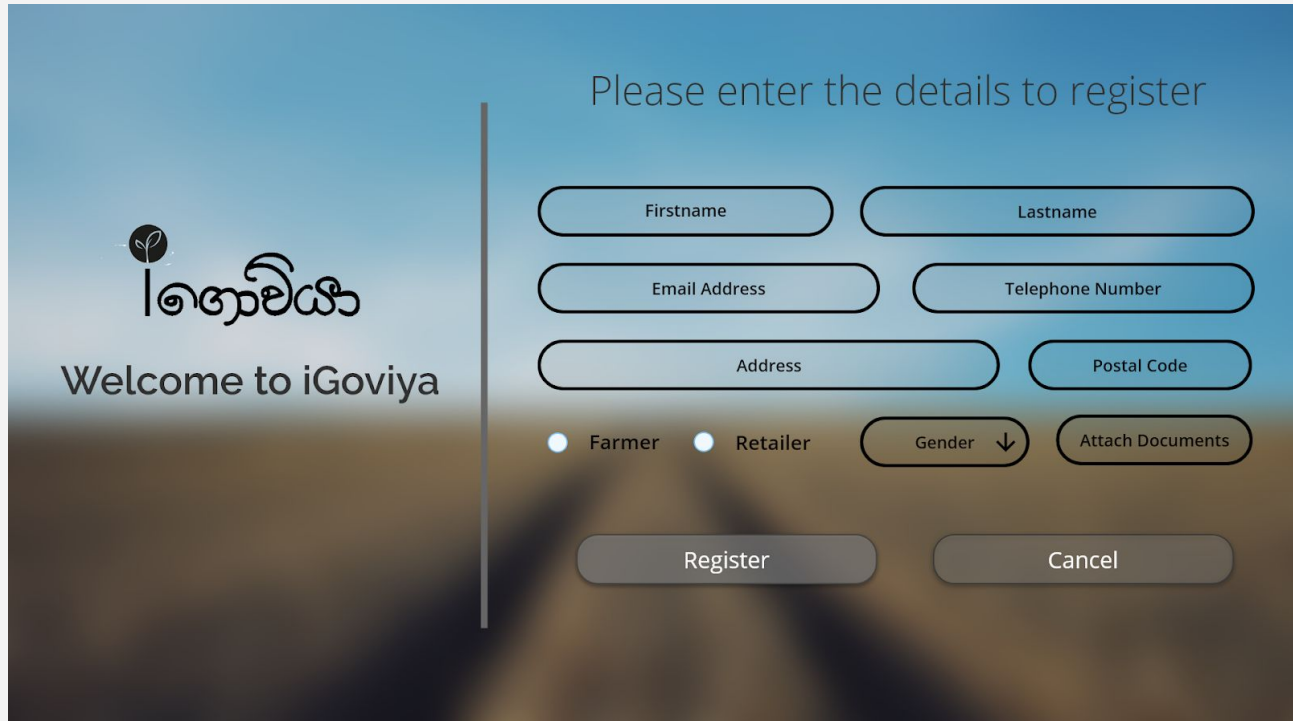

iGoviya Welcome Screen

iGoviya Login Screen
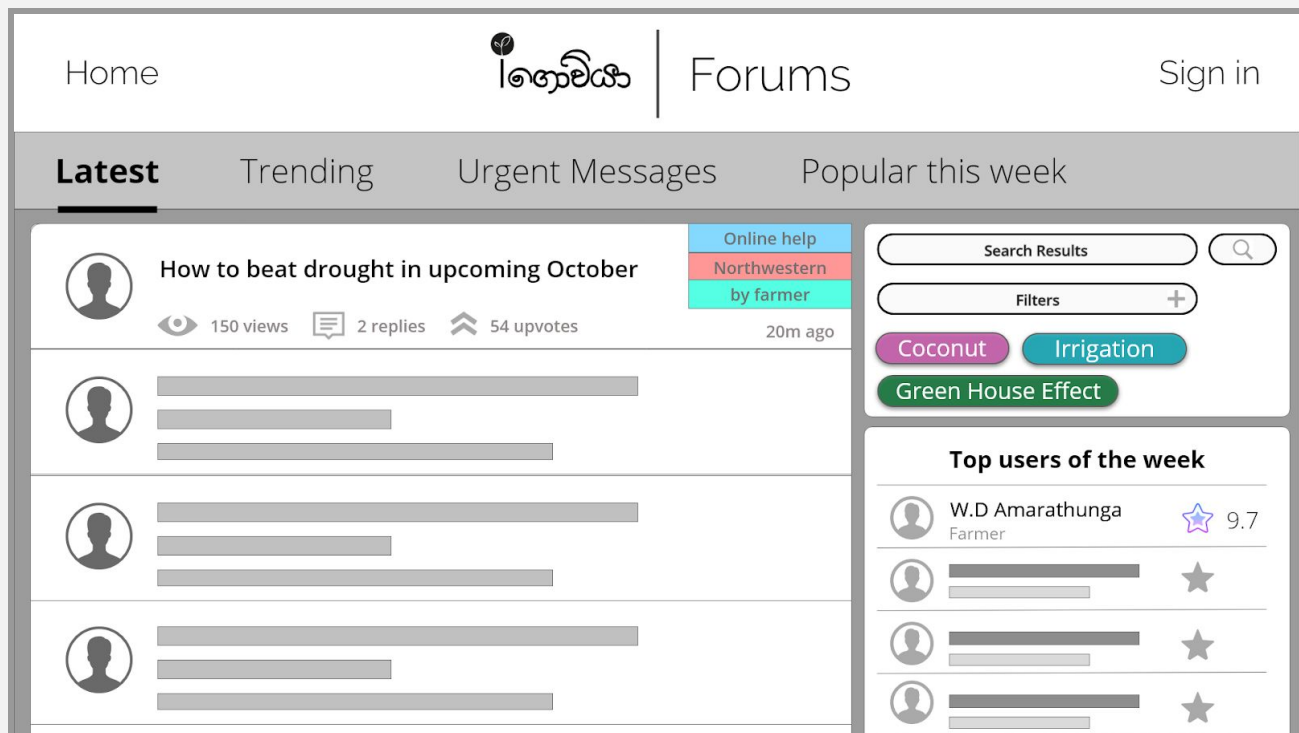
iGoviya Registration Screen

iGoviya Forums/Information Hub Screen

Home	iGoviya	Marketplace	My Profile

Selling   Buying   Search Results   🔍

Fruits

Ambul Kesel
500Kg
Rs. 150/Kg
Anuradhapura

Papaya
300Kg
Rs. 200/Kg
Kandy

Vegetables

Carrot
2300Kg
Rs. 80/Kg
Hatton

Potato
300Kg
Rs. 100/Kg
Nuwara Eliya

Add New Order

Filters

Price Range

☐ Fruits
☐ Vegetables

Preffered Location
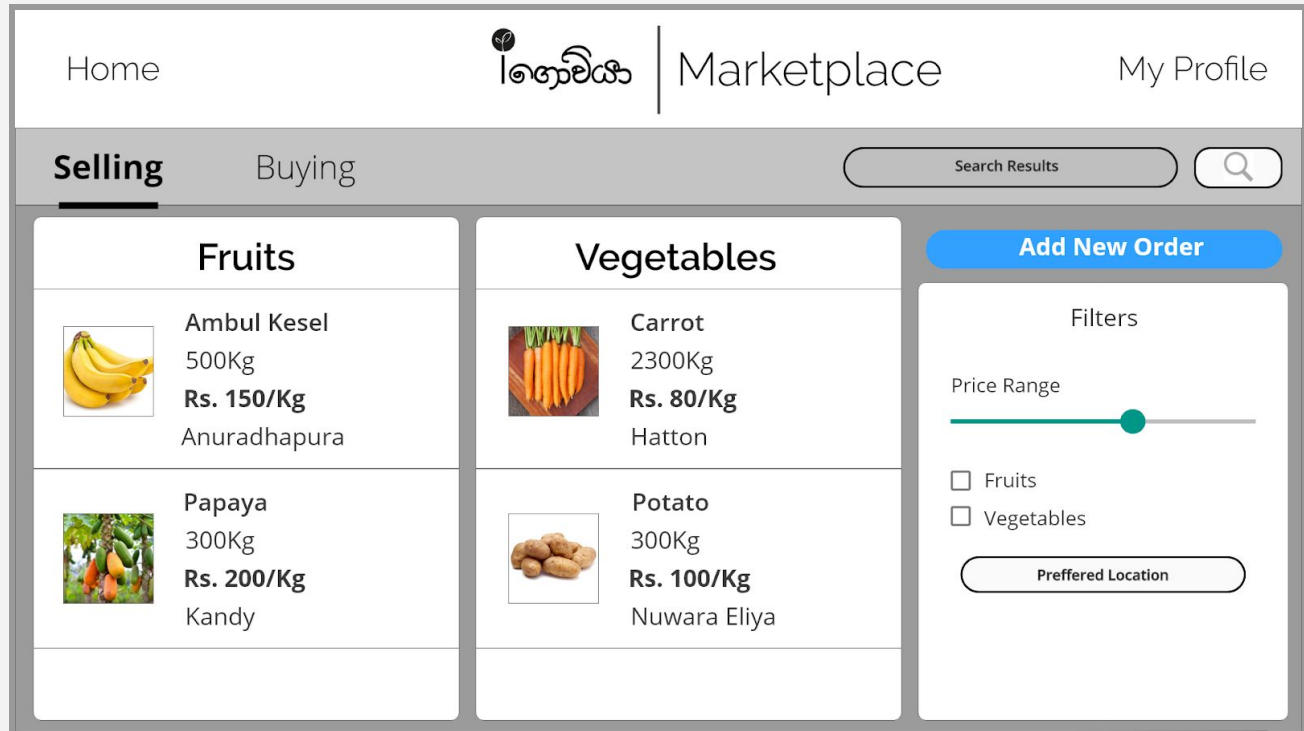
iGoviya Marketplace Screen

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