

SUPPLY CHAIN PROJECT

Ethereum DApp for Tracking Items through Supply Chain

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Introduction

This document contains the explanations that will let the reader understand how the DApp will work, what functionality it will offer, the main actors, how the collaboration with the main actors will happen and more.

Scope

This document will contain 3 main sections:

1. UML: Where the reader can understand how the system will work, from the supported scenarios to the collaboration between the classes. The following diagrams will be provided:
 - 1.1. Use Cases
 - 1.1.1. Actors
 - 1.1.2. Use Cases
 - 1.1.3. Use Cases Diagram
 - 1.2. Class Diagrams
 - 1.3. State Diagrams
 - 1.4. Activity Diagrams
 - 1.5. Sequence Diagrams
2. Libraries: This section will explain the 3rd party libraries used to accomplish the desired functionality.
3. IPFS: This section will contain details about how IPFS within this project.

SECTION #1: UML

1.1 - UML Diagrams

1.1.1 - Actors

The following actors have been identified:

- + FARMER
- + DISTRIBUTOR
- + RETAILER
- + CONSUMER

1.1.2 - USE CASES

The following scenarios will be covered by the Supply Chain system. Scenarios around setting up the system and users have been left out for the simplicity of the exercise.

ID/TITLE	UC#1 / MARK ITEM AS HARVESTED
Description	Mark an item as HARVESTED.
Preconditions	Metamask account has been registered as a valid FARMER in the supply chain dapp.
Associated Actors	FARMER
Trigger	The FARMER marks the ITEM as harvested.
Main Flow	<ul style="list-style-type: none">• Open Website and login as FARMER• Search for the ITEM to mark• Mark the ITEM as harvested• The ITEM remains marked as HARVESTED. The Harvested event was triggered.
Extensions	-

ID/TITLE	UC#2 / PROCESS ITEM
Description	Mark the item as PROCESSED
Preconditions	The ITEM is in HARVESTED state. Metamask account has been registered as a valid FARMER in the supply chain dapp.
Associated Actors	FARMER
Trigger	The FARMER marks the ITEM as processed.
Main Flow	<ul style="list-style-type: none">• Open Website and login as FARMER• Search for the ITEM to mark• Mark the ITEM as processed• The ITEM now changed to PROCESSED. The Processed event was triggered.
Extensions	-

ID/TITLE	UC#3 / PACK ITEM
Description	Mark the item as PACKED
Preconditions	The ITEM is in PACKED state. Metamask account has been registered as a valid FARMER in the supply chain dapp.
Associated Actors	FARMER
Trigger	The ITEM is in PROCESSED state.
Main Flow	<ul style="list-style-type: none">• Open Website and login as FARMER

	<ul style="list-style-type: none"> ● Search for the ITEM to mark ● Mark the ITEM as ready to be sold. ● The ITEM now changed to PACKED state. The Packed event was triggered.
Extensions	-

ID/TITLE	UC#4 / SELL ITEM
Description	Mark the ITEM as ready for sale.
Preconditions	The ITEM is in PACKED state. Metamask account has been registered as a valid FARMER in the supply chain dapp.
Associated Actors	FARMER
Trigger	The FARMER marks the item as READY TO SELL .
Main Flow	<ul style="list-style-type: none"> ● Open Website and login as FARMER ● Search for the ITEM to mark ● Mark the ITEM as ready to be sold. ● The ITEM now changed to FORSALE state. The ForSale event was triggered.
Extensions	-

ID/TITLE	UC#5 / BUY ITEM
Description	Mark the ITEM as SOLD.
Preconditions	The ITEM is in FOR SALE state. Metamask account has been registered as a valid DISTRIBUTOR in the supply chain dapp.
Associated Actors	DISTRIBUTOR
Trigger	The ITEM has been PAYED AND SOLD to the distributor.
Main Flow	<ol style="list-style-type: none"> 1. Open Website and login as DISTRIBUTOR 2. Search for the ITEMS available to buy. 3. Select an ITEM 4. Pay the ITEM with your Metamask Wallet for the exact amount 5. The Sold event is triggered. The system is now in SOLD state.
Extensions	<p>Attempt to buy with more balance than the actual price 4.1. Pay to ITEM with an account with more balance than the actual price. The system sends the change back to the BUYER.</p> <p>Attempt to buy with less balance than the actual price. 4.1. Try to pay the ITEM with an account with less balance than the actual price. The system rejects the transaction. The state of the ITEM is still in FOR SALE state.</p>

ID/TITLE	UC#6 / Ship the ITEM
Description	Mark the ITEM as shipped once the ITEM has been sent to the retailers.
Preconditions	The ITEM is ready to be SOLD. Metamask account has been registered as a valid DISTRIBUTOR in the supply chain dapp.
Associated Actors	Distributor
Trigger	The Distributor mark the item as SHIPPED once it has been sent to the Retailers
Main Flow	<ol style="list-style-type: none"> 1. Open Website and login as DISTRIBUTOR 2. Search for the ITEMS available to ship. 3. Select an ITEM 4. Mark the item as SHIPPED. 5. The Shipped event has been sent.
Extensions	-

ID/TITLE	UC#7 / Receive Item
Description	Mark the item as Received once the item arrives to the Retailer (the buyer)
Preconditions	The ITEM has been marked as SHIPPED. Metamask account has been registered as a valid RETAILER in the supply chain dapp.
Associated Actors	Retailer
Trigger	The ITEM is marked as received by the Retailer.
Main Flow	<ol style="list-style-type: none"> 1. Open Website and login as RETAILER 2. Search for the ITEMS available to ship. 3. Select an ITEM 4. Mark the item as RECEIVED. 5. The Received event has been sent.
Extensions	-

ID/TITLE	UC#8 / Purchase an Item
Description	Purchase an item from a Supply Chain page
Preconditions	ITEM has been marked as RECEIVED. Metamask account has been registered as a valid CONSUMER in the supply chain dapp.
Associated Actors	Consumer
Trigger	The customer BUY an ITEM.
Main Flow	<ol style="list-style-type: none"> 1. Open Website as a customer 2. Search for the ITEMS available 3. Select an ITEM 4. Purchase the ITEM

	5. The Purchased event is sent.
Extensions	-

ID/TITLE	UC#9 / Open Supply Chain DApp with a new MetaMask account
Description	Open Supply Chain DApp with a MetaMask account that is not registered in the DApp.
Preconditions	Metamask account has not been used before in the system.
Associated Actors	All (Farmer, Distributor, Retailer and Consumer)
Trigger	The new user opens the Supply Chain DApp for the first time
Main Flow	<ol style="list-style-type: none"> 1. Open Website with new Metamask account 2. DApp check the account for a valid role 3. Present Registration Screen with all possible roles.
Extensions	-

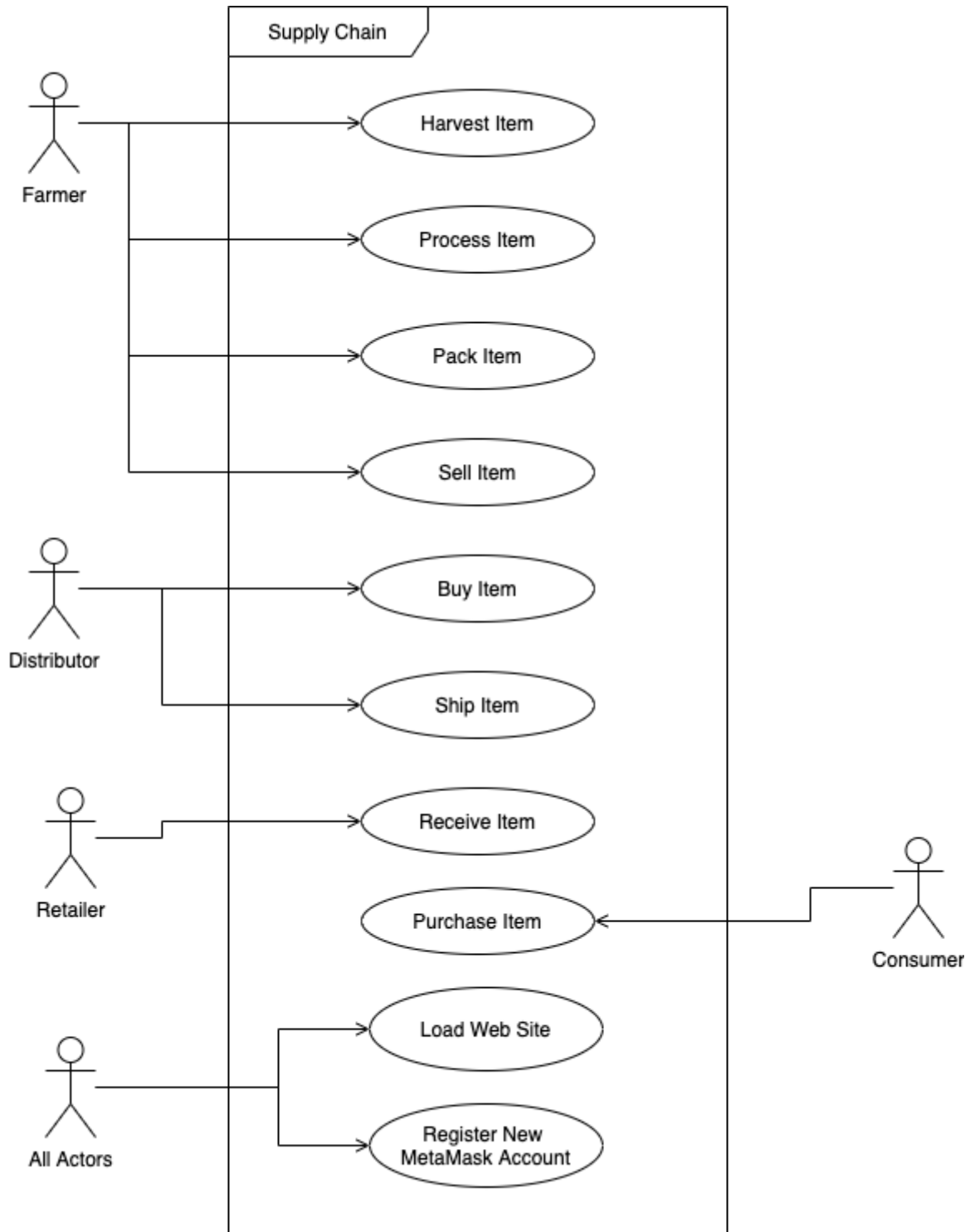
ID/TITLE	UC#10 / Register new MetaMask account in Supply Chain DApp
Description	Register a new MetaMask account that hasn't been registered in the DApp before.
Preconditions	Metamask account has not been used before in the system.
Associated Actors	All (Farmer, Distributor, Retailer and Consumer)
Trigger	The new user register account with the selected role.
Main Flow	<ol style="list-style-type: none"> 1. Open Website with new Metamask account 2. User chooses the role and Register 3. Metamask Wallet is presented so the user can confirm the operation 4. Options will be presented to the user depending on the role.
Extensions	<p>4.1 OPTIONS FOR FARMERS</p> <ul style="list-style-type: none"> - Farmer's Detail information is presented - Field to enter the UPC - Option to conduct HARVEST operation. - Option to mark an item as PROCESSED. - Option to mark an item as PACKED - Option to mark an item as 'FOR SALE' - List of items associated with the current farmer per state so each option can only be applied to items in the right state. <p>4.2 OPTIONS FOR DISTRIBUTORS</p> <ul style="list-style-type: none"> - Option to BUY an item. - Option to mark an item as SHIPPED as it has been sent to the retailer. - List of items associated with the current distributor per state so each option can only be applied to items in the right state. <p>4.3 OPTIONS FOR RETAILERS</p> <ul style="list-style-type: none"> - Option to mark an item as RECEIVED.

- List of items associated with the current retailer per state so each option can only be applied to items in the right state.

4.4 OPTIONS FOR CONSUMERS

- Option to PURCHASE items sold by different retailers. .
- List of items available for PURCHASE and those that have been PURCHASED.

1.1.3 - USE CASES DIAGRAM



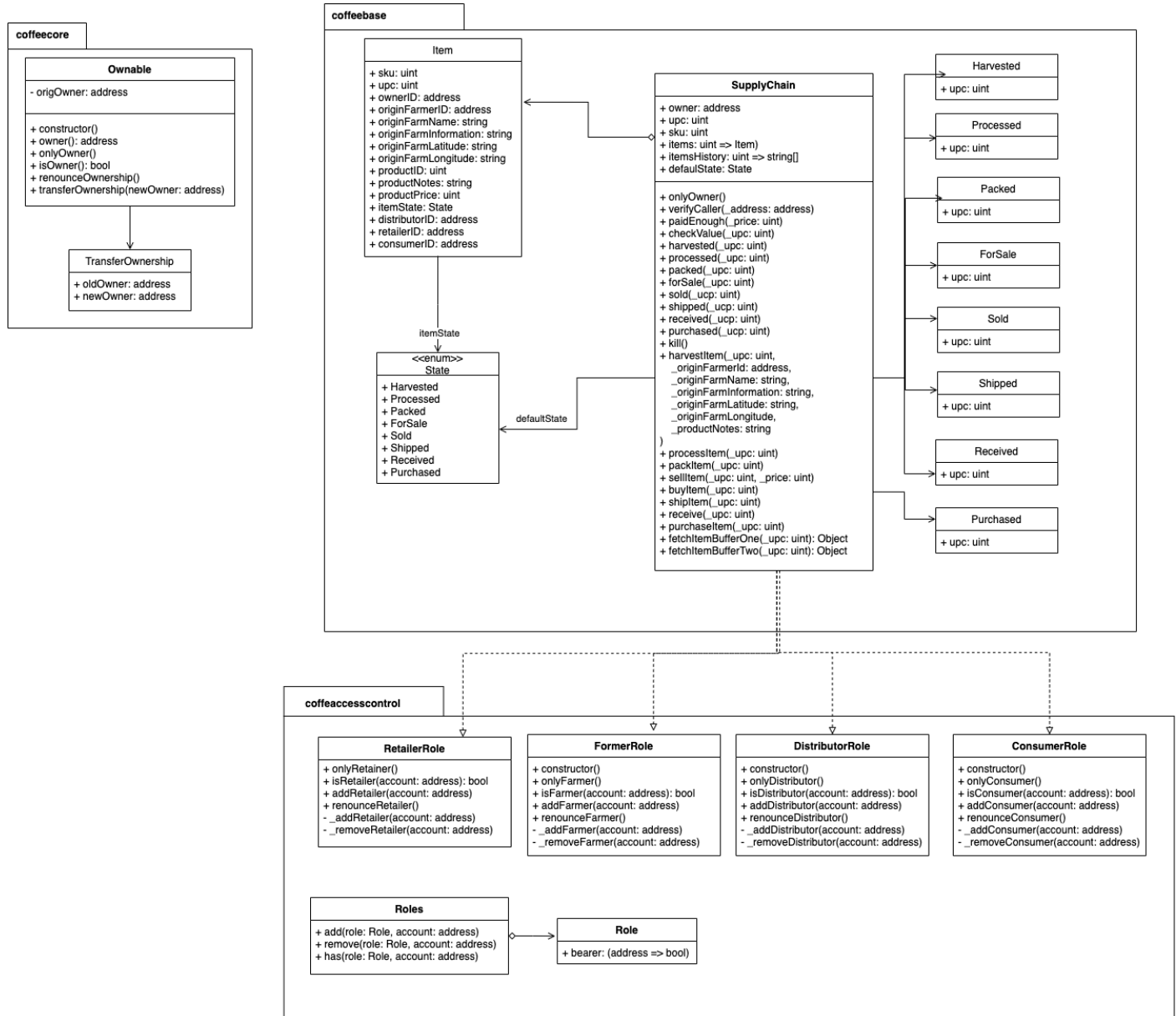
1.2 - CLASS DIAGRAM

<check how to model the modifiers and the _; in the contracts>

The functionality used for this project is grouped in 3 packages:

Package	Description
coffeeaccesscontrol	Contains the contract and classes responsible for handling access control over the items handled by the supply chain contract.
coffeebase	Contains the main contract offered by the Supply Chain system.
coffeecore	Group the functionality involving owners of items.

The diagram showing the packages, classes and its attributes is the following:



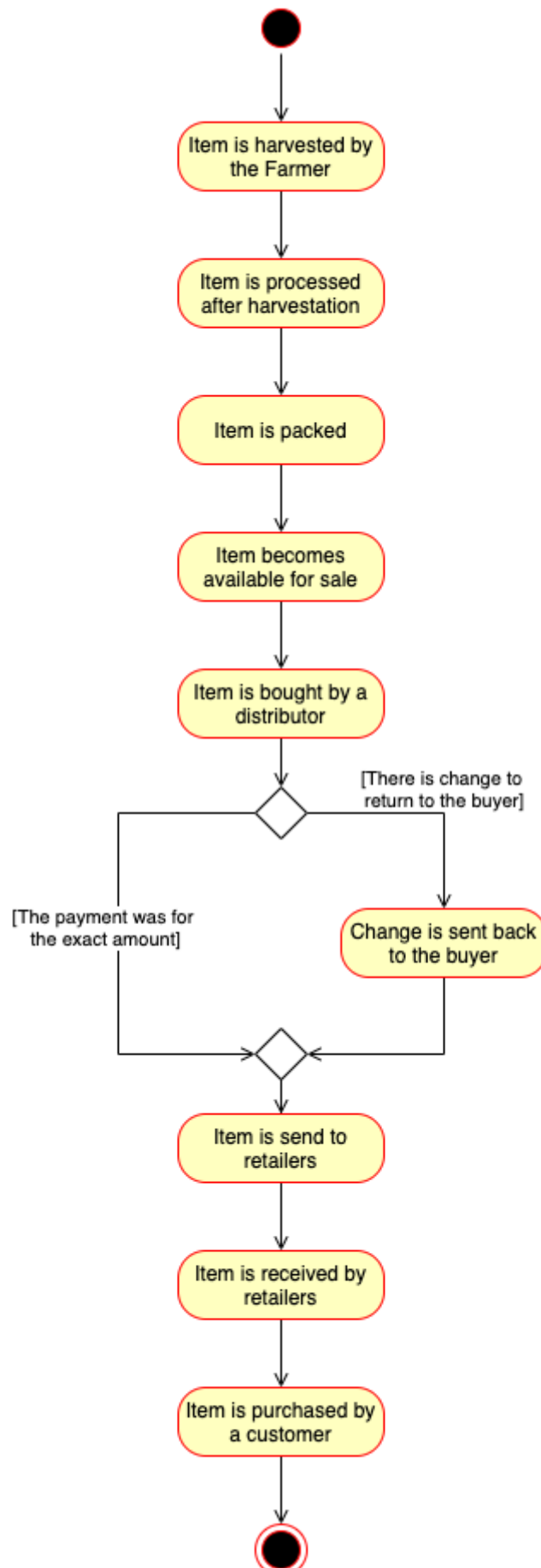
1.3 - STATE DIAGRAM

The following state diagrams represent how the internal state of an ITEM changes during its life depending on the different operations executed in the main Supply Chain contract.

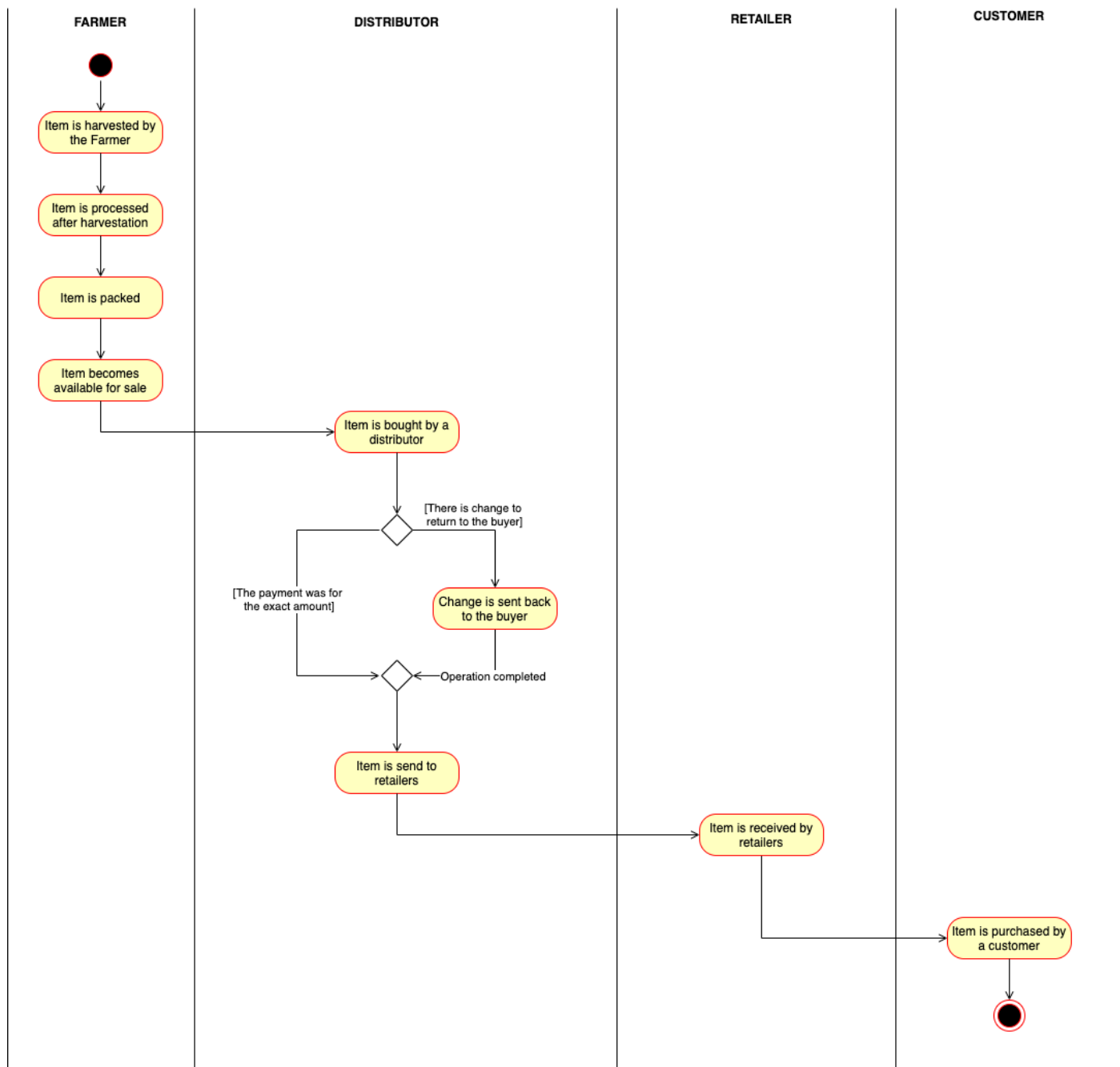


1.4 - ACTIVITY DIAGRAM

The diagram describing the operations available in the supply chain modeled in this exercise is the following:



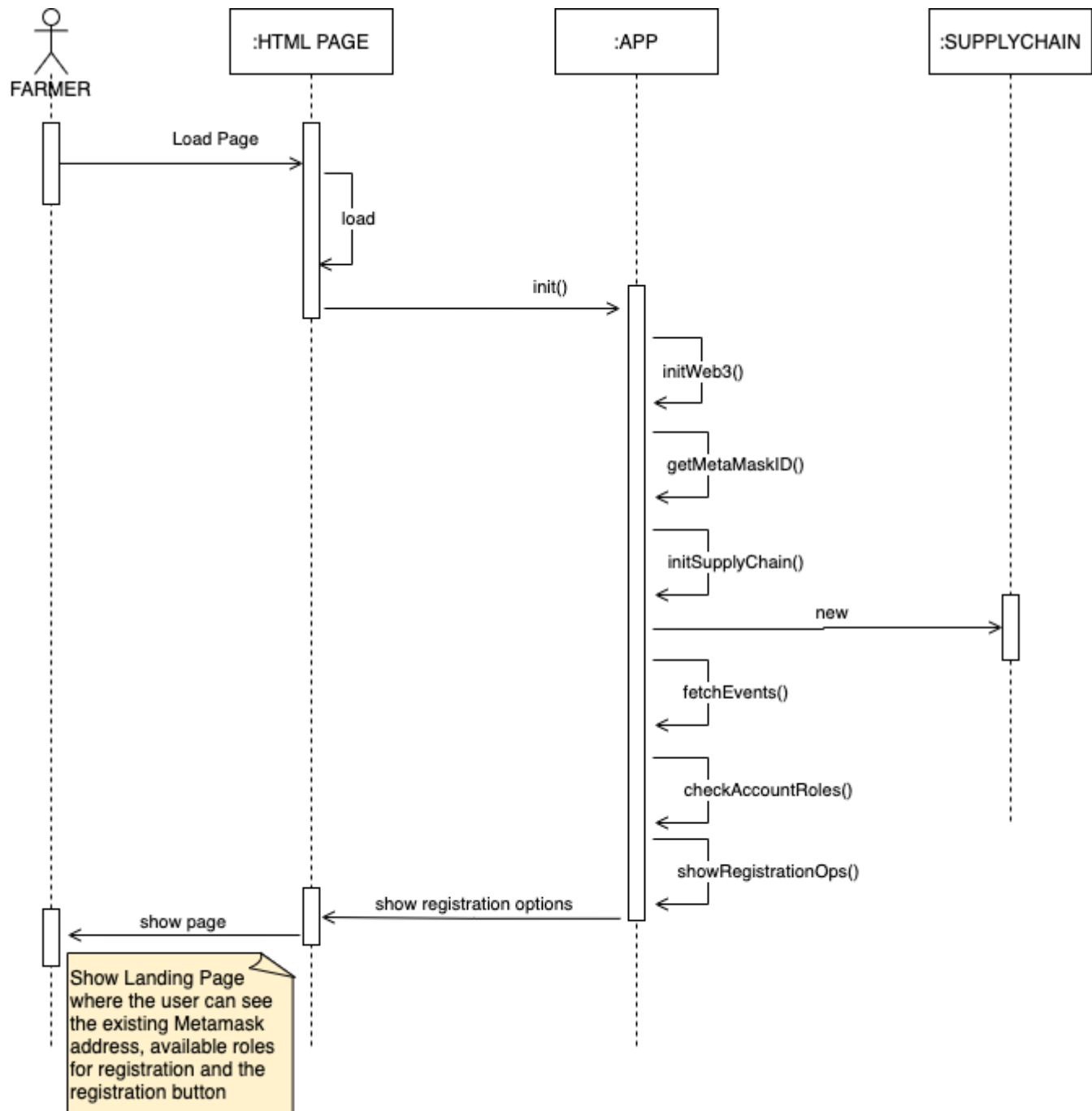
And if now we factor in the existing actors, the diagram will look as follows:



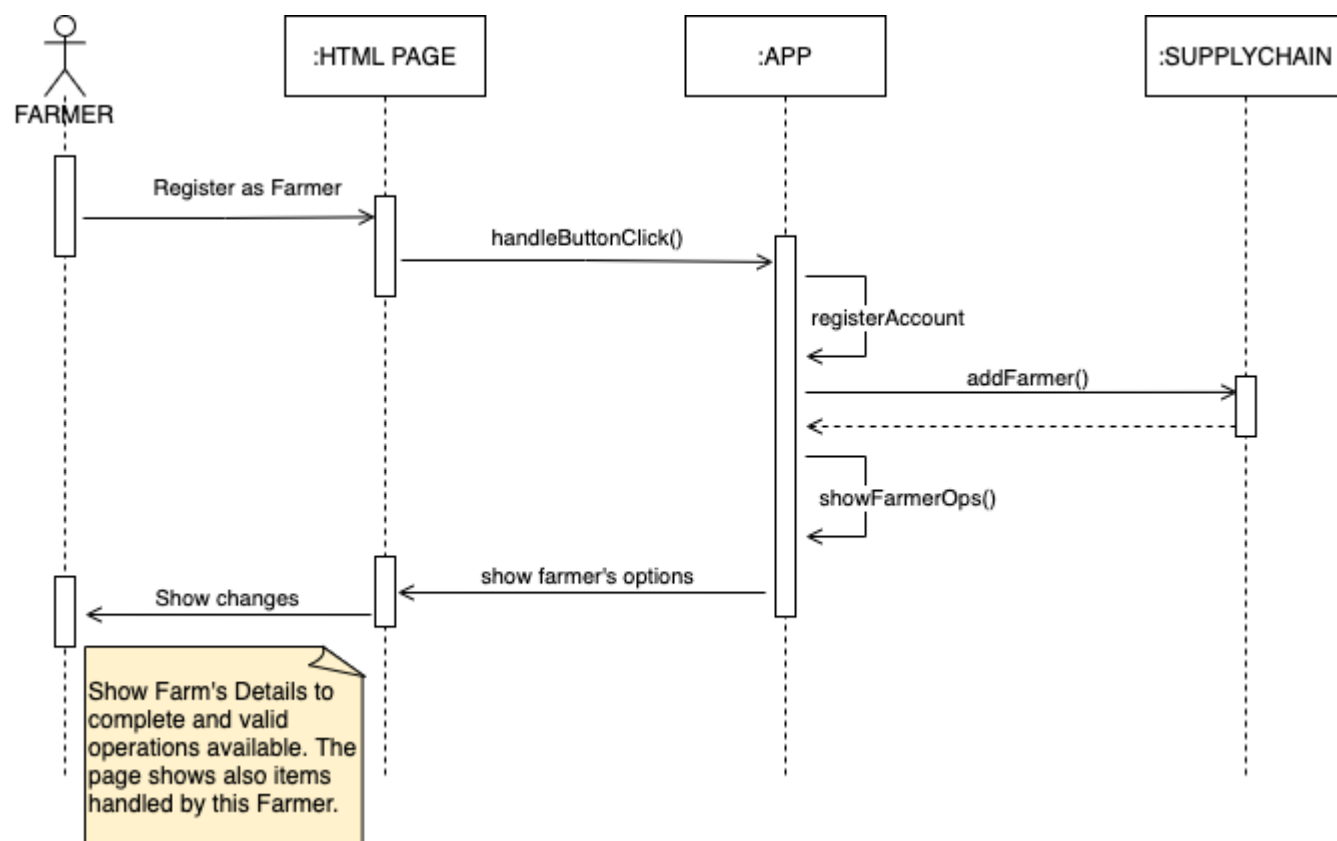
1.5 - SEQUENCE DIAGRAM

In this section, I will present the sequence diagram for 3 scenarios: Load Supply Chain Web Page, Register Metamask Account and Harvest Item

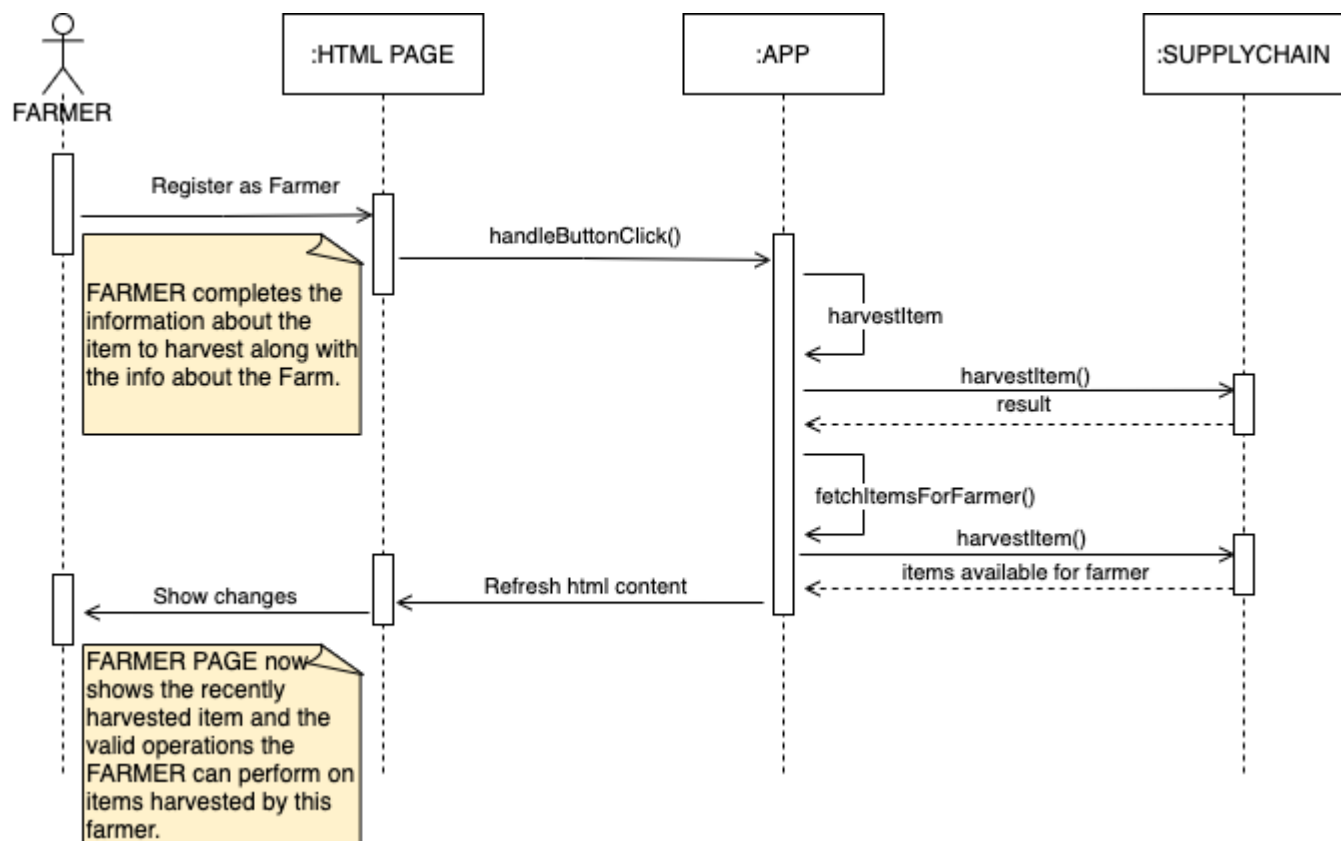
1.5.1 - Load Supply Chain Web Page with unregistered account



1.5.2 - Register New Metamask Account



1.5.3 - Harvest Item



2 - Third Party Libraries

No special libraries have been used outside of those available in the Project Template

3 - IPFS

DApp was not integrated with IPFS