University of Puerto Rico
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Introduction to Software Engineering:

Homework 1

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Domain Description

1.1 - Domain Entities

a. **Atomic**
   i. **Merchant:** Person that has a name, manages at least one kiosk, and gains profit from purchases.
   ii. **Customer:** Person that has a name, can view and buy articles from kiosks.
   iii. **Article:** Single product with a price, amount in stock, and description. Articles can be purchased from kiosks by customers or added by merchants.

b. **Composed**
   i. **Categories:** is composed of many articles with similar properties or descriptions.
   ii. **Placita:** is composed of many kiosks, each with its respective owner and articles to sell.
   iii. **Kiosks:** specific area on where to buy articles. Is composed of a merchant, article entities divided by categories.
   iv. **Cart**: a set of articles to be paid.

1.2 - Domain Functions

Abbreviations: K = Kiosk, M = Merchant, A = Article, Cat = Categories, P = Placita, Cus = Customer, CART = Cart, Prop = Property, Qty = Quantity

a. **Observing:**
   i. Given a Plaza del Mercado, view the set of all kiosks.
      - **observe_Kiosks**(P) → **K-Set**
   ii. Given a kiosk, return a set of all of the categories that kiosk has.
      - **observe_Cat**(K) → **Cat-Set**
   iii. Given a kiosk, return a set of all of the articles for sale.
      - **observe_Article**(K) → **A-Set**
   iv. Given a category and a kiosk, return all articles of the given category at the kiosk.
      - **observe_Article**(K, Cat) → **A-set**
   v. Given a set of kiosks and an article property (i.e. text describing the item), return a set of articles matching that property. If no kiosk set is given, search within all available kiosks.
      - **observe_Article**(K-Set, Prop) → **A-Set**
   vi. Given an article, return its price.
      - **observe_Price**(A) → **A-Price**
   vii. Given a merchant, return a set of the kiosks that merchant owns.
      - **observe_merchant_kiosks**(M) → **K-set**
   viii. Given a cart, return the total price of your items.
      - **observe_TotalPrice**(CART) → **Float**
   ix. Given a cart, yield a receipt for successful purchase.

- **observe_Receipt**(CART) → **Purchase summary**

b. Mutating:

i. Given a cart, article, and quantity, mutates cart to include articles and its associated quantity and yields a boolean indicating if the mutation was successful.
- **add_to_cart**(CART, A, Qty) → **Bool**

ii. Given a cart, article, and quantity, mutates cart to remove articles and its associated and yields a boolean indicating if the mutation was successful.
- **remove_from_cart**(CART, A, Qty) → **Bool**

iii. Given a merchant, article, quantity, and kiosk, mutates the Article's quantity attributes and yields a bool indicating if the change was successful
- **reduce_stock**(M,A, Qty, K) → **Bool**

iv. Given a merchant, article, qty, and kiosk mutates the Article's quantity attributes and yields a bool indicating if the change was successful. If the article doesn't exist in the kiosk, creates the item.
- **increase_stock**(M, A, Qty, K) → **Bool**

v. Given a merchant, a set of categories, and kiosk information, add a new kiosk to the plaza. Yields a boolean if the operation is successful.
- **add_kiosk**(M, Cat-Set, K)→ **Bool**

vi. Removes a kiosk given a merchant and a kiosk. Yields a boolean if the operation is successful.
- **remove_kiosk**(K, M) → **Bool**

vii. Given a Kiosk an article set and a category information, create a new category in the given kiosk. Yields a boolean if the operation was successful.
- **add_category**(K,A-set, Cat) → **Bool**

viii. Mutates price of Article A. Yields a boolean if the operation was successful.
- **change_price**(A,new Price) → **Bool**

ix. Change the merchant associated with the kiosk given. Yields a boolean if the operation was successful.
- **change_merchant**(K, M, new M) → **Bool**

x. Given a Kiosk an Article Set and a Category info remove a Category in kiosk
- **remove _category**(K,A-set, Cat)→ **Bool**

1.3 - Domain events

i. Customer chooses articles for possible purchase triggers **add_to_cart()**

ii. Merchant finishes choosing articles to increase or add stock triggers **increase_stock()**

iii. Merchants decides to hand away kiosk to another merchant triggers **change_merchant()**

iv. Merchant defines new categories for kiosk triggers **add_category()**

v. Merchant decides to remove articles from kiosk trigger **reduce_stock()**

vi. Customer decides to observe entity attributes triggers respective observable functions(**see 1.2.a**)

vii. Customer decides not to buy article triggers **remove_from_cart()**
viii. Merchant decides to remove a category from his/her kiosk triggers **remove_category()**.

1.4 - Domain behaviors

i. Purchasing articles causes:
   A. Observe articles to buy: **observe_Article()** and **observe_Price()**
   B. Customer adds item/s to the cart if desired: **add_to_cart()**
   C. Customer does not decide to buy: **remove_from_cart()**
   D. Removes articles bought from kiosk: **reduce_stock()**
   E. Receive a receipt from merchant: **observe_Receipt()**.
   F. Cart must be cleared for a next shopper: **remove_from_cart()**

ii. Merchant registers a new kiosk:
   A. A new kiosk is added to La Plaza del Mercado: **add_kiosk()**
   B. Categories are created for the kiosk: **add_category()**
   C. Articles are added to the new categories: **increase_stock()**

iii. Merchants decides to shut down kiosk consists of:
   A. Complete removal of articles from kiosk: **reduce_stock()**
   B. Remove kiosk from La Plaza del Mercado: **remove_kiosk()**

1.5 - Domain Requirements

- Ability to register a kiosk as an admin
- Admins must have full access to a list of their products
- Users will have limited access (view and interact) to a list of merchants and their products
- Regular users can also add articles to the *shopping cart* and therefore have the option to make a purchase
- The system must be able to use ATH Movil in order to make transactions with the merchants

1.6 - Interface Requirements

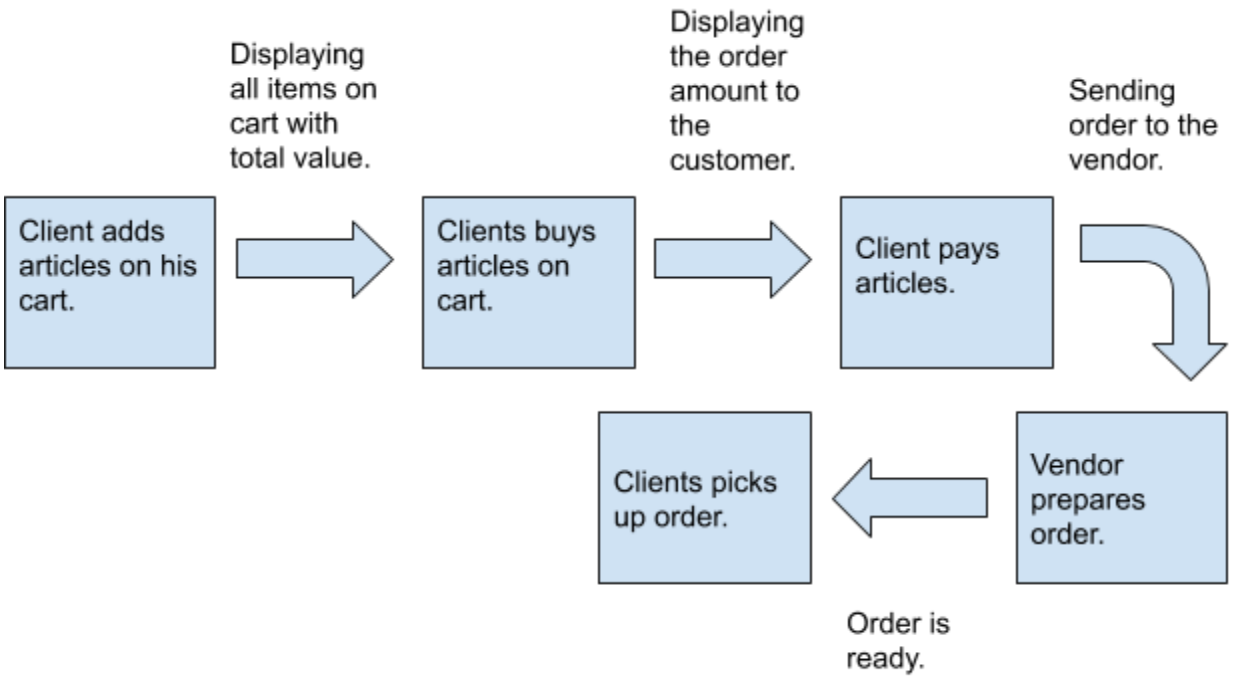
- Must incorporate Domain Requirements
- The ability to display articles and keep their info updated
    - Categorize these items
        - Option to filter articles
    - Option to search for products
    - Ability to interact
        - View information and/or add to cart
- Market admin abilities will exceed the users (editing product info, etc…)
- Must have a list of merchants/kiosks
- Must have a list of products per merchant/kiosk

1.7 - Machine Requirements

- Shelf machine: A machine capable of showing the customer all the items available with the prices. Performance wise, it must be able to show updated prices and dynamically show the availability of these articles.
- Cart machine: A ordering machine that will allow the customer to add the articles they want to buy. This device would have to be able to show each ingredient chosen by the customer along with the total price of the order. In terms of performance, the machine must be able to handle at least 20 orders from multiple clients of the farmer's market simultaneously. It must show orders made in less than 7000 ms to the seller so he can start preparing the order.
- Payment machine: A payment device capable of connecting with the ordering device. It will display the price of the order and give the option to the customer for different payment methods.

Software Design

1.8 - Software Architecture Design



1.9 - Software Component Design

- The articles on a shelf will be represented as a list of articles divided by sub-lists that are sorted by category (meats, lactose, etc.). The list can sort each sub-list by alphabetical order of category or by number of articles in each category. Each category sub-list can be sorted by alphabetical order, by price of article, or by quantity of article.
- In order to represent the line at checkout, a queue can be used. Each object in the queue would represent a shopper in order of payment.
- The cart is represented as an unsorted list composed of articles to be paid.

2.1 - Informative Domain Development Documents

1. **Name, Place and Date**
    a. Name: Placita to go
    b. Place: Mayagüez P.R.
    c. Date: TBD

2. **Partners**
    a. Owners and Merchants from Placita del Mercado.

3. **Current Situation**
    a. The current customer experience in the plaza del mercado is too underwhelming because prices are not fixed, and the process of shopping is intimidating and slow due to the large amount of kiosks and merchants.

4. **Needs and Ideas**

Needs	Ideas
Sell their products in an innovative way	Develop centralized platform that enables merchants to sell their goods and compare prices online
Prices of articles fluctuate based solely on the merchants judgement	Regulate prices for fair experience to shoppers

5. **Concepts and Phenomena**
    a. **Concepts**
        i. Category - can be represented as a set of articles with similar characteristics. It is defined by the merchant.
        ii. Item - Physical object that the client wants to buy.
    b. **Phenomena**
        i. Kiosks/store - can be represented as a location inside “La Plaza del Mercado” which is managed by a Merchant and contains a set of articles

items into different categories.

ii. Merchant - can be represented as an entity which manages one kiosk by selling articles to customers and organizing said articles in their respective categories. Our main client.

iii. Customer - Entity which views or buys a collection of articles.

iv. “La Plaza del Mercado”/farmer’s market - Place where various local kiosks/stores sell products (particularly tubercles).

6. **Scope and Span**
    a. **Scope** - Understand and facilitate interactions between customers and merchants in the Mayagüez farmer’s market (placita).
    b. **Span** - Create Network of Customers and merchants for the purpose of “Grocery Ordering and Shopping” in La Plaza del Mercado. Now busy people can buy groceries from local vendors easier by modernizing local kiosks in La Plaza del Mercado Mayagüez, P.R.

7. **Assumptions and dependencies**
    a. **Assumptions**
        i. The Developers have the appropriate tools, technology and facilities to start with the project.
        ii. Merchants in la placita are willing to accept the reengineering of the current process of grocery shopping.
        iii. Developers have access to merchants with enough knowledge of the respective parts of their domain such as how they manage shoppers needs and how products are organized.
    b. **Dependencies**:
        i. All assumptions must be fulfilled in order to better the grocery shopping experience.

8. **Implicit/Derivative Goals**
    a. Economy of Puerto Rico is positively affected by improving local commerce in Mayagüez.
    b. Less crowded local markets and more sales in less time.
    c. Serves as advertisement for local supermarkets.

9. **Synopsis**

Currently, the Plaza del Mercado (Farmer’s market) at Mayagüez suffers from a lack of customers due to the difficulty of accessing its current location and its outdated underwhelming customer experience. The overall customer experience consists of visiting the plaza and finding a large amount of local merchants competing to sell you different or similar products. There is a need for a centralized platform that facilitates the shopping experience at La Plaza del Mercado. The idea of the new system consists of creating a network between customers and merchants that removes the burden of

arriving at the Plaza del Mercado by displaying the articles in our platform and being able to purchase them directly from the said platform. When arriving at the Plaza del Mercado, your only burden is going to the kiosks to pick up your items.

10. **Teams**
    a. **Developers**
        i. Jose A. Rivera Morales
        ii. Brandon D. Fung Rivera
        iii. Jose L. Vera Colon
        iv. Jose D. Maldonado Torres
        v. Kenneth J. Rosario Acevedo
    b. **Consultants**
        i. Marko Schütz-Schmuck

2.2 - Informative Requirements Development Documents

1. **Name, Place and Date**
    a. Name: Placita to go
    b. Place: Mayagüez P.R.
    c. Date: TBD

2. **Partners**
    a. Merchants from Placita del Mercado.

3. **Current Situation**
    a. La Plaza del Mercado requires an update on how their products reach customers, in order to expand their audience for better profit.

4. **Needs and Ideas**

Needs	Ideas
Attract new customers	Create a service to facilitate shopping experience for grocery shoppers
Local merchants need to reach more people and motivate them to buy their goods	Pay with services like ATH Movil
Monitor change of stock and its prices	Through the platform, shoppers can see the prices of articles and potential discounts

5. **Concepts and Phenomena**
    a. **Concepts**
        i. Category - can be represented as a set of articles with similar characteristics. It is defined by the merchant.
        ii. Item - Physical object that the client wants to buy.
    b. **Phenomena**
        i. Kiosks/store - can be represented as a location inside “La Plaza del Mercado” which is managed by a Merchant and contains a set of articles items into different categories.
        ii. Merchant - can be represented as an entity which manages one kiosk by selling articles to customers and organizing said articles in their respective categories. Our main client.
        iii. Customer - Entity which views or buys a collection of articles.
        iv. “La Plaza del Mercado”/farmer’s market - Place where various local kiosks/stores sell products (particularly tubercles).

6. **Scope and Span**
    a. **Scope** - Develop a platform (web-app) to purchase articles from merchants as an easier way in La Plaza del Mercado.
    b. **Span** - The platform to be developed will be used by merchants from La Placita del Mercado and customers. The merchants must have the ability to create their own market in the platform in order to sell their products and the customers will be able to view these products in order to realize purchases using the web-app.

7. **Assumptions and dependencies**
    a. **Assumptions**
        i. The Developers have the appropriate tools, technology and facilities to start with the project.
        ii. Merchants in la placita own a device that can support the platform
        iii. Merchants will maintain their stock updated when a change has occurred such as change of price or increase of stock.
    b. **Dependencies**:
        i. Merchants must have access to the app through a supported device in order to appear on the platform.
        ii. Developers must be able to build the application using a web-based environment.

8. **Implicit/Derivative Goals**
    a. Economy of Puerto Rico is positively affected by improving local commerce in Mayagüez.

b. Less crowded local markets and more sales in less time.
c. Serves as advertisement for local supermarkets.

9. **Synopsis**

La Plaza del Mercado currently needs a service to facilitate grocery shopping in the store. As a solution for this problem is to develop a platform where customers can view and purchase articles faster, easier, and more efficiently. Developers will work on this platform that requires knowledge and experience on web-based development.

10. **Teams**
    a. **Developers**
        i. Jose A. Rivera Morales
        ii. Brandon D. Fung Rivera
        iii. Jose L. Vera Colon
        iv. Jose D. Maldonado Torres
        v. Kenneth J. Rosario Acevedo
    b. **Consultants**
        i. Marko Schütz-Schmuck

2.3 - Descriptive Rough Domain Sketch

By grocery shopping in Farmer's Market we mean shopping in "La Plaza Del Mercado at Mayagüez". Consequently, "La Plaza del Mercado" can be seen as a structure of entities, behaviours and functions that interact with each other to make grocery shopping possible. At the highest level it can be seen as a binary tree structure where one of its children contains the set of all Kiosks and the other children contains the Customer entity. One of its children contains the set of all kiosks because, physically the plaza contains many kiosks. In order for customers to view a kiosk they have to interact with their parent node the Plaza. A customer can either interact physically with the plaza or remotely via some platform to view all kiosks. Similarly, the child node containing all kiosks has two children: a node that contains a set of all Merchants where a Merchant is responsible for managing a single or more Kiosk, and the collection of Articles present in a single Kiosk. A kiosk can only be managed by a single merchant. In order for a Customer to view articles it has to interact with its parent, the plaza, to view all kiosks then interact with a single kiosk to view its articles. If the Customer is planning to buy an article he would then add the article to its shopping cart and when ready it would need to interact with the kiosk to then interact with the merchant. The merchant would then react to the request or event and update its stock and profit accordingly.

2.4 - Concept Analysis of Rough Domain Sketches

The Plaza del mercado can be perceived as an abstract concept because it groups together kiosks. A kiosk can be considered as a generic instance of the abstract concept kiosks. The concrete concepts that are abstracted by kiosks is the fact that a kiosk can have its own specialty. Similarly, Customer can also be seen as a generic instance of the concrete concept Customers. Additionally, a Merchant can group together a gradient of different types of concrete concepts, i.e a Cheese Merchant, a Poultry Merchant, etc... , into a single generic

abstract concept Merchants. A Shopping Cart is a concrete concept abstracting away the specifics of a single physical cart.

2.5 - Descriptive Domain Terminology

The Descriptive Domain Terminology consists of explaining the terminology used in the project. Terms of the domain include “Plaza del Mercado”, kiosks, merchant, and articles.

- ***Plaza del Mercado*** can be perceived as the actual building located in downtown Mayaguez. In the case of the service, Plaza del Mercado can be perceived as the application where the client can access different articles.
- ***Kiosks*** can be perceived as the each merchant’s space of selling articles at the Plaza del Mercado. In the case of the service, the Kiosks refer to a specific vendor of a product where you need to go in order to collect your paid articles.
- ***Merchants*** can be perceived as the human vendor that uses the service to sell its products. They are responsible for uploading products and updating them when necessary.
- ***Articles*** can be perceived as the actual products that are sold in the Plaza del Mercado. In this case, they will be viewed on the service for the customers to buy.

2.6 Descriptive Domain Narrative

The domain narrative consists of providing an overview of how the system works. The system breaks down in various steps in order to be completed. In order to access the Plaza del Mercado, the client needs to arrive at the physical location. Next, the client enters the building and finds himself with kiosks and a hallway towards the main kiosks sections. After arriving at the kiosks hallway, the client searches kiosk by kiosk which articles might be attractive to him. When the client finds an article in which he is interested, he goes to the kiosk and talks with the merchant. The merchant will determine the price of the article depending it’s weight or quantity. After getting the price of the article, the client can pay the merchant with cash or ATH Movil. The client finally has his article. Now, he can determine if he wants to search for more articles or leave the Plaza del Mercado. In the case that he wants to search for more articles, he will need to repeat the steps. When leaving the Plaza del Mercado, the client just follows the hallway in which he entered and exits with his bought articles.

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