Team Name: FoodBuddy (Food Recommendation System)

Team Number: 34

Team Members:

Vikhyat Goyal

Pavan Dhareshwar

Rishi Soni

Vision:

Create a restaurant and food recommendation system which learns and betters itself by using feedbacks and user experience.

Project Description:

There are three main actors / participants in the system:

1) Admin : Has responsibility to manage, maintain and secure the whole system.
2) End users : A person looking for a food/restaurant recommendation.
3) Host (Restaurant/food product owner) : Restaurant owners looking to expand business or food product manufacturers looking to launch a new product or promote an existing product.

Our aim was to create a food and restaurant recommendation system which would help end users find restaurants that matches with their preferences, their past experiences, and that has good feedback from other users. Furthermore, the system allows hosts (restaurant owners) to add their own profile, promote their businesses, modify the services & cuisines offered by them, and finally get feedback from the users.

The project has been implemented using the concepts of object - oriented design, design patterns and various Java frameworks (Spring MVC & Hibernate) learnt in the course.

Project Setup:

We used Spring Boot framework to set-up the entire project and implement its functionalities as described before. Since the system is interactive, in the sense that for example from a user's point of view, he will be allowed to create a new profile, add or update preference and feedbacks to get a better recommendation for food and restaurants, a main controller class was implemented to map all the client requests to system methods so that they can be run to produce expected results. Also, since data persistence is a significant entity in the functioning of the system, we used hibernate and created a database manager to abstract the insert, update, delete and find methods of the database. The use cases defined in the description were mapped to requests in the main controller and forwarded to service layer to be handled. We also used postman as an interface to specify client requests to our system, so that it can be handled and responses can be shown back to the client.

2. FEATURES IMPLEMENTED:

ID	REQUIREMENT / FEATURE	TOPIC AREA	USER	PRIORITY
UR-001	New End user should be able to create a profile	Profile	End User	High
UR-002	End user should be able to get recommendations for restaurants	Recommendation	End User	Critical
UR-003	End user should be able to get recommendations for food products	Recommendation	End User	Critical
UR-004	End user should be able to give feedback	Feedback	End User	High
UR-005	End user should be able to set filters	Database	End User	High
UR-006	New host should be able to create a profile	Profile	Host	High
UR-007	Host should be able to update dishes list	Database	Host	Critical
UR-008	Host should be able to update services list	Database	Host	High
UR-010	Host should be able to see feedbacks	Feedback	Host	Medium
UR-015	Admin should be able to add advertisements	Promotions	Admin	Medium

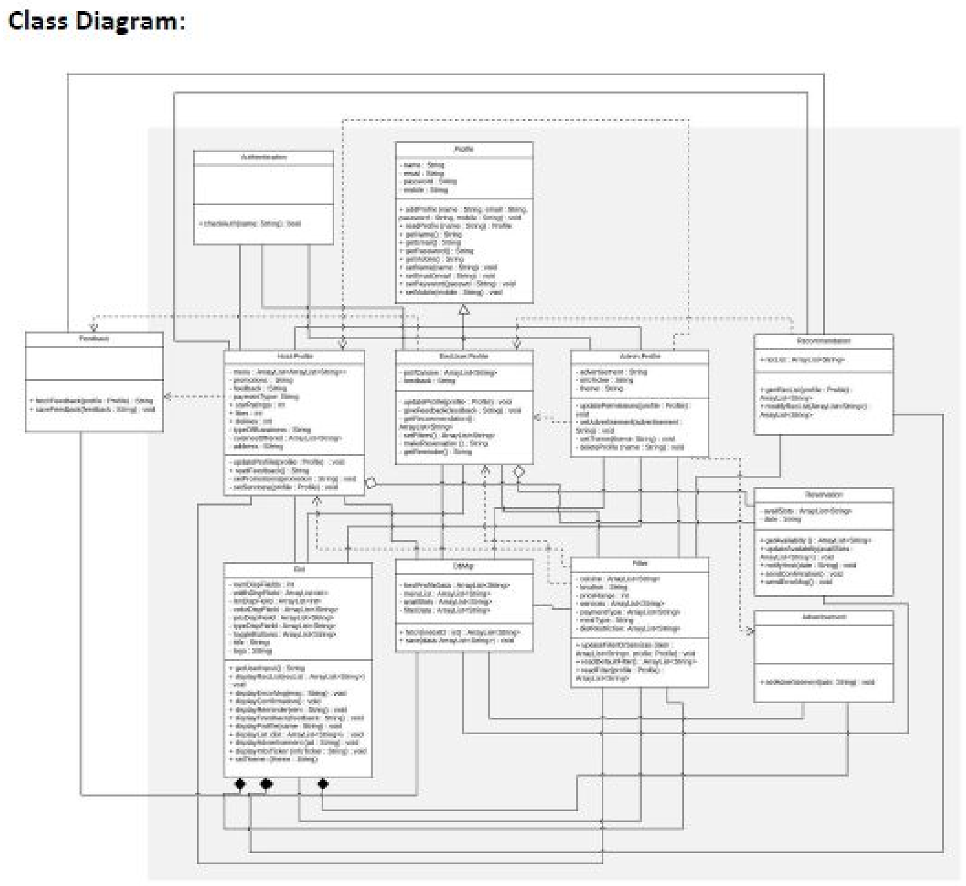
3. FEATURES NOT IMPLEMENTED:

ID	REQUIREMENT / FEATURE	TOPIC AREA	USER	PRIORITY
UR-009	Host should be able to update availability	Database	Host	Medium
UR-011	Host should be able to update promotions	Promotions	Host	Medium
UR-012	Admin should be able to authorize new host profile	Profile	Admin	Critical

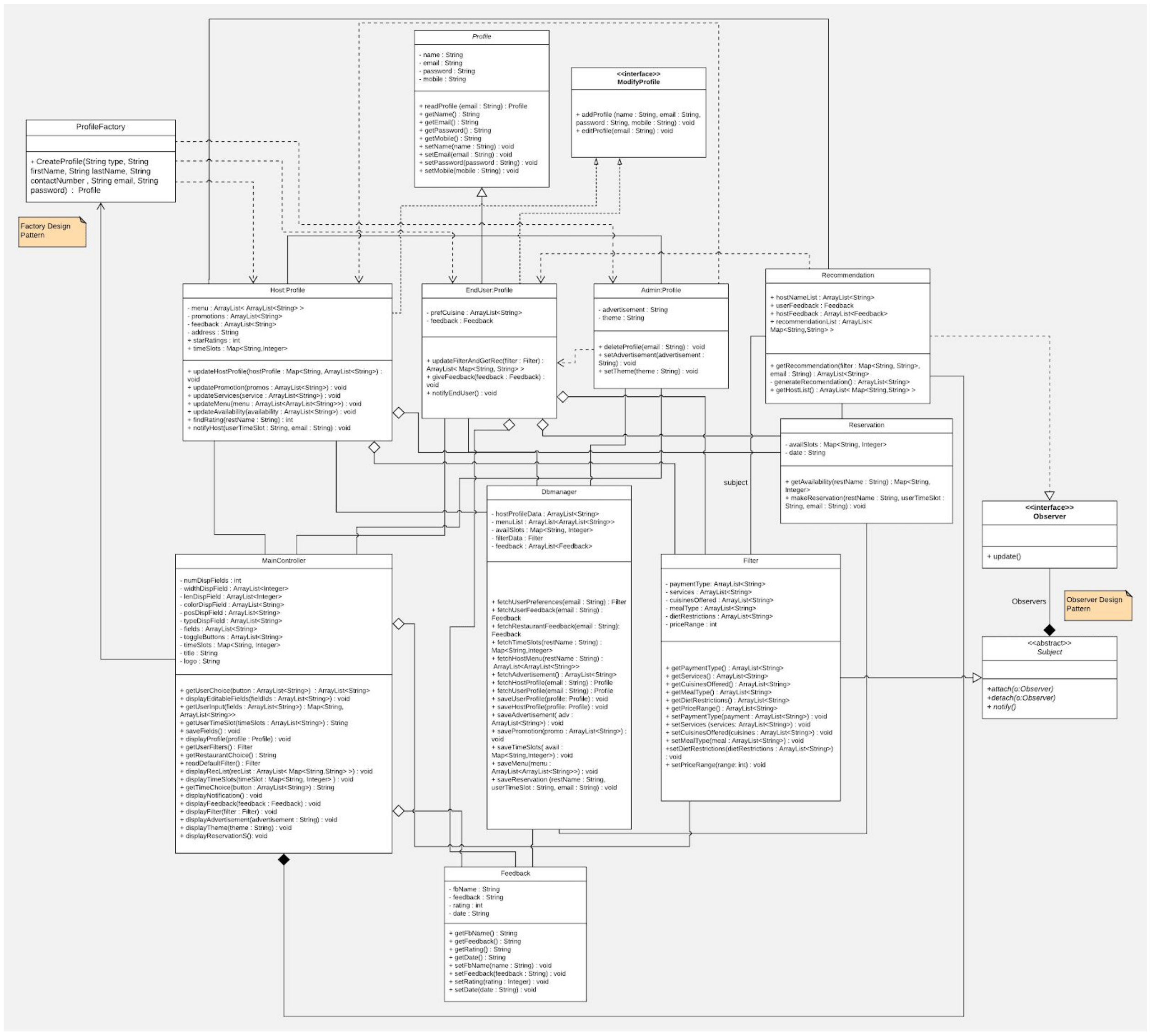
4. COMPARISON OF CLASS DIAGRAMS

“Show your Part 2 class diagram and your final class diagram. What changed? Why? If it did not change much, then discuss how doing the design up front helped in the development.”

Part 2 class diagram:



Final class diagram:


Profile
- name : String
- email : String
- password : String
- mobile : String
+ readProfile (email : String) : Profile
+ getName() : String
+ getEmail() : String
+ getPassword() : String
+ getMobile() : String
+ setName(name : String) : void
+ setEmail(email : String) : void
+ setPassword(password : String) : void
+ setMobile(mobile : String) : void
<<interface>> ModifyProfile
+ addProfile (name : String, email : String, password : String, mobile : String) : void
+ editProfile(email : String) : void
ProfileFactory
+ CreateProfile(String type, String firstName, String lastName, String contactNumber , String email, String password) : Profile
Factory Design Pattern
Host:Profile
- menu : ArrayList< ArrayList<String> >
- promotions : ArrayList<String>
- feedback : ArrayList<String>
- address : String
+ starRatings : int
+ timeSlots : Map<String,Integer>
+ updateHostProfile(hostProfile : Map<String, ArrayList<String>) : void
+ updatePromotion(promos : ArrayList<String>) : void
+ updateServices(service : ArrayList<String>) : void
+ updateMenu(menu : ArrayList<ArrayList<String>>) : void
+ updateAvailability(availability : ArrayList<String>) : void
+ findRating(restName : String) : int
+ notifyHost(userTimeSlot : String, email : String) : void
EndUser:Profile
- prefCuisine : ArrayList<String>
- feedback : Feedback
+ updateFilterAndGetRec(filter : Filter) : ArrayList< Map<String, String> >
+ giveFeedback(feedback : Feedback) : void
+ notifyEndUser() : void
Admin:Profile
- advertisement : String
- theme : String
+ deleteProfile(email : String) : void
+ setAdvertisement(advertisement : String) : void
+ setTheme(theme : String) : void
Recommendation
+ hostNameList : ArrayList<String>
+ userFeedback : Feedback
+ hostFeedback : ArrayList<Feedback>
+ recommendationList : ArrayList< Map<String,String> >
+ getRecommendation(filter : Map<String, String>, email : String) : ArrayList<String>
- generateRecomendation() : ArrayList<String>
+ getHostList() : ArrayList< Map<String,String> >
Reservation
- availSlots : Map<String, Integer>
- date : String
+ getAvailability(restName : String) : Map<String, Integer>
+ makeReservation(restName : String, userTimeSlot : String, email : String) : void
subject
<<interface>> Observer
+ update()
Observers
Observer Design Pattern
<<abstract>> Subject
+attach(o:Observer)
+detach(o:Observer)
+ notify()
Dbmanager
- hostProfileData : ArrayList<String>
- menuList : ArrayList<ArrayList<String>>
- availSlots : Map<String, Integer>
- filterData : Filter
- feedback : ArrayList<Feedback>
+ fetchUserPreferences(email : String) : Filter
+ fetchUserFeedback(email : String) : Feedback
+ fetchRestaurantFeedback(email : String): Feedback
+ fetchTimeSlots(restName : String) : Map<String,Integer>
+ fetchHostMenu(restName : String) : ArrayList<ArrayList<String>>
+ fetchAdvertisement() : ArrayList<String>
+ fetchHostProfile(email : String) : Profile
+ fetchUserProfile(email : String) : Profile
+ saveUserProfile(profile: Profile) : void
+ saveHostProfile(profile: Profile) : void
+ saveAdvertisement(adv : ArrayList<String>) : void
+ savePromotion(promo : ArrayList<String>) : void
+ saveTimeSlots(avail : Map<String,Integer>) : void
+ saveMenu(menu : ArrayList<ArrayList<String>>) : void
+ saveReservation (restName : String, userTimeSlot : String, email : String) : void
MainController
- numDispFields : int
- widthDispField : ArrayList<Integer>
- lenDispField : ArrayList<Integer>
- colorDispField : ArrayList<String>
- posDispField : ArrayList<String>
- typeDispField : ArrayList<String>
- fields : ArrayList<String>
- toggleButtons : ArrayList<String>
- timeSlots : Map<String, Integer>
- title : String
- logo : String
+ getUserChoice(button : ArrayList<String>) : ArrayList<String>
+ displayEditableFields(fieldIds : ArrayList<String>) : void
+ getUserInput(fields : ArrayList<String>) : Map<String, ArrayList<String>>
+ getUserTimeSlot(timeSlots : ArrayList<String>) : String
+ saveFields() : void
+ displayProfile(profile : Profile) : void
+ getUserFilters() : Filter
+ getRestaurantChoice() : String
+ readDefaultFilter() : Filter
+ displayRecList(recList : ArrayList< Map<String,String> >) : void
+ displayTimeSlots(timeSlot : Map<String, Integer>) : void
+ getTimeChoice(button : ArrayList<String>) : String
+ displayNotification() : void
+ displayFeedback(feedback : Feedback) : void
+ displayFilter(filter : Filter) : void
+ displayAdvertisement(advertisement : String) : void
+ displayTheme(theme : String) : void
+ displayReservationS(): void
Filter
- paymentType: ArrayList<String>
- services : ArrayList<String>
- cuisinesOffered : ArrayList<String>
- mealType : ArrayList<String>
- dietRestrictions : ArrayList<String>
- priceRange : int
+ getPaymentType() : ArrayList<String>
+ getServices() : ArrayList<String>
+ getCuisinesOffered() : ArrayList<String>
+ getMealType() : ArrayList<String>
+ getDietRestrictions() : ArrayList<String>
+ getPriceRange() : ArrayList<String>
+ setPaymentType(payment : ArrayList<String>) : void
+ setServices (services: ArrayList<String>) : void
+ setCuisinesOffered(cuisines : ArrayList<String>) : void
+ setMealType(meal : ArrayList<String>) : void
+setDietRestrictions(dietRestrictions : ArrayList<String>) : void
+ setPriceRange(range: int) : void
Feedback
- fbName : String
- feedback : String
- rating : int
- date : String
+ getFbName() : String
+ getFeedback() : String
+ getRating() : String
+ getDate() : String
+ setFbName(name : String) : void
+ setFeedback(feedback : String) : void
+ setRating(rating : Integer) : void
+ setDate(date : String) : void

Making the class diagram helped us to visualize the entire system and its classes. Without making it, it would have been almost impossible for us to think logical and in a structured manner about implementing our project. It's simply not possible to visualize the communication between classes everytime we wrote some code. Furthermore, we realized that reuse of code (through abstract classes and interfaces) is easier to understand and implemented it with a class diagram as it helps to appreciate the fact multiple different classes can have similar functionality, so abstraction helps to reuse some code which is similar. This reduces the size of the code base and programming effort significantly.

We made a lot of improvements and corrected the mistakes committed in Part 2 in our subsequent class diagram and a few of them are listed below:

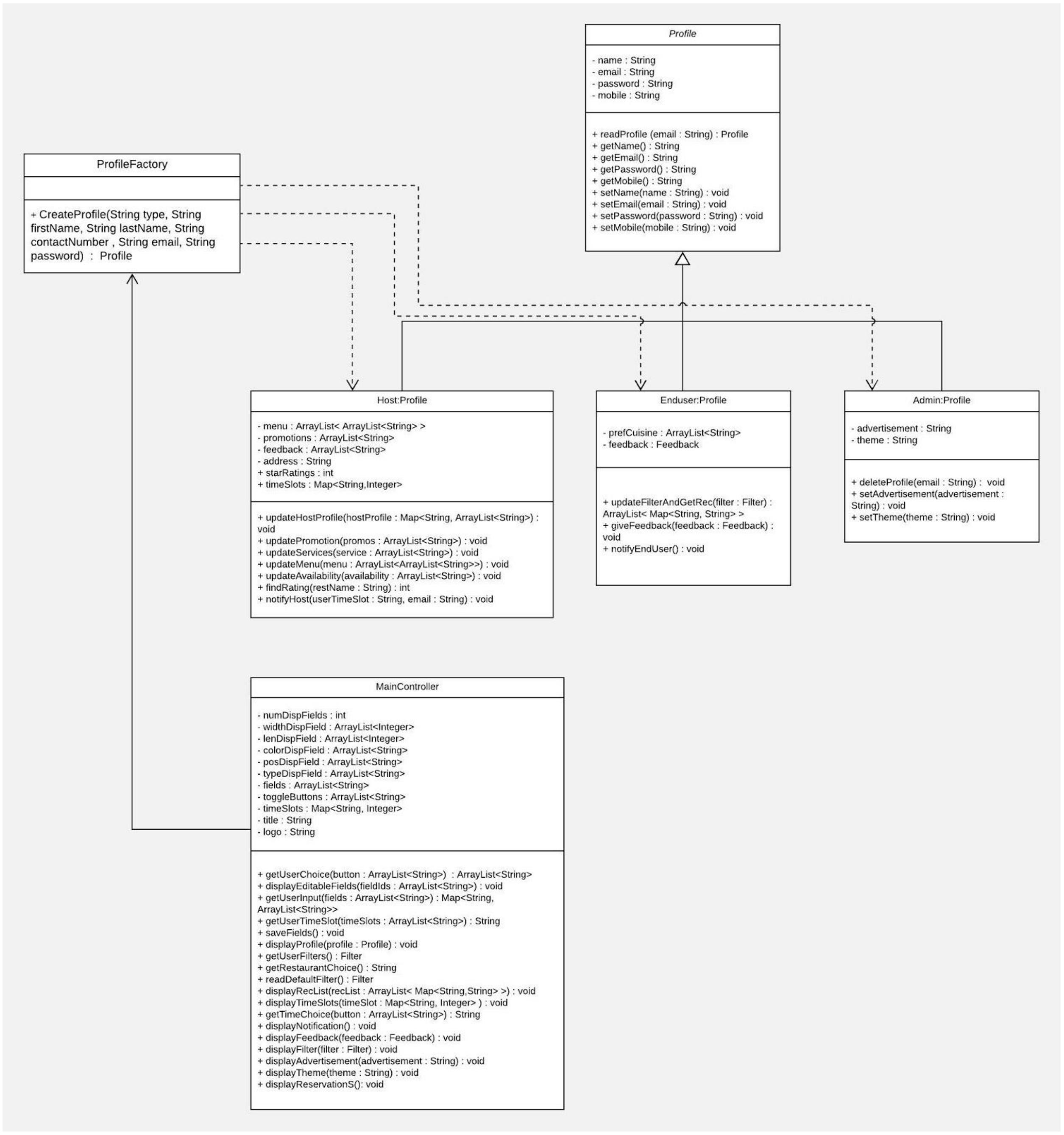
- Classes that were missing or misnamed were corrected in the class diagram

- Corrected a few instances of incorrect notation in the class diagram
- Identified and added design patterns that can be used in our project
- Removed the “Authentication” class since it was not necessary for the project
- Created an interface called “ModifyProfile”, which is used to create multiple end users (multiple instances) of the end user, by the “EndUser” class, which inherits from a abstract class called “Profile”.
- Modified and added methods & attributes to the Recommendation class for being the class using which recommendations can fetched from the database and request the algorithm to generate recommendations based on the filter parameters for the end user.
- Used to the java.utils.Observer package to implement the Observer interface for the Observer design pattern.
- Merged the functionality of the “Advertisement” class into the “Admin” class, where the advertisements are stored as an ArrayList of strings. The “Advertisement” class was therefore deleted.
- Added a number of new methods to the “Filter” class to get and set multiple attributes of the host. For example, getters and setters were used and created for the following class attributes: “paymentType”, “services”, “cusinesOffered”, “mealType”, “dietRestrications” and “priceRange”.
- Added and modified the database manager class (“DbManager”) with a lot more specific fetch and save methods, corresponding to the implemented MySQL database
- Added attributes to the “Feedback” class: “fbname”, “feedback”, “rating” & “date”. Added their corresponding getters & setters.
- Modified the “Host” class with methods & attributes to update the menu, read feedback & read ratings.
- Restricted the “Admin” class to set advertisements & delete profile (end user or host)
- Created the “ProfileFactory” class to facilitate the implementation of the Factory design patterns.
- Replaced the “GUI” class with the “MainController” since we changed the method of accessing the classes through the Hibernate and Spring MVC framework.

5. DESIGN PATTERNS IMPLEMENTED

“Show the classes from your class diagram that implement each design pattern”

Factory Design Pattern:


Profile
- name : String
- email : String
- password : String
- mobile : String
+ readProfile (email : String) : Profile
+ getName() : String
+ getEmail() : String
+ getPassword() : String
+ getMobile() : String
+ setName(name : String) : void
+ setEmail(email : String) : void
+ setPassword(password : String) : void
+ setMobile(mobile : String) : void
ProfileFactory
+ CreateProfile(String type, String firstName, String lastName, String contactNumber , String email, String password) : Profile
Host:Profile
- menu : ArrayList< ArrayList<String> >
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- feedback : ArrayList<String>
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+ updateServices(service : ArrayList<String>) : void
+ updateMenu(menu : ArrayList<ArrayList<String>>) : void
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+ setAdvertisement(advertisement : String) : void
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MainController
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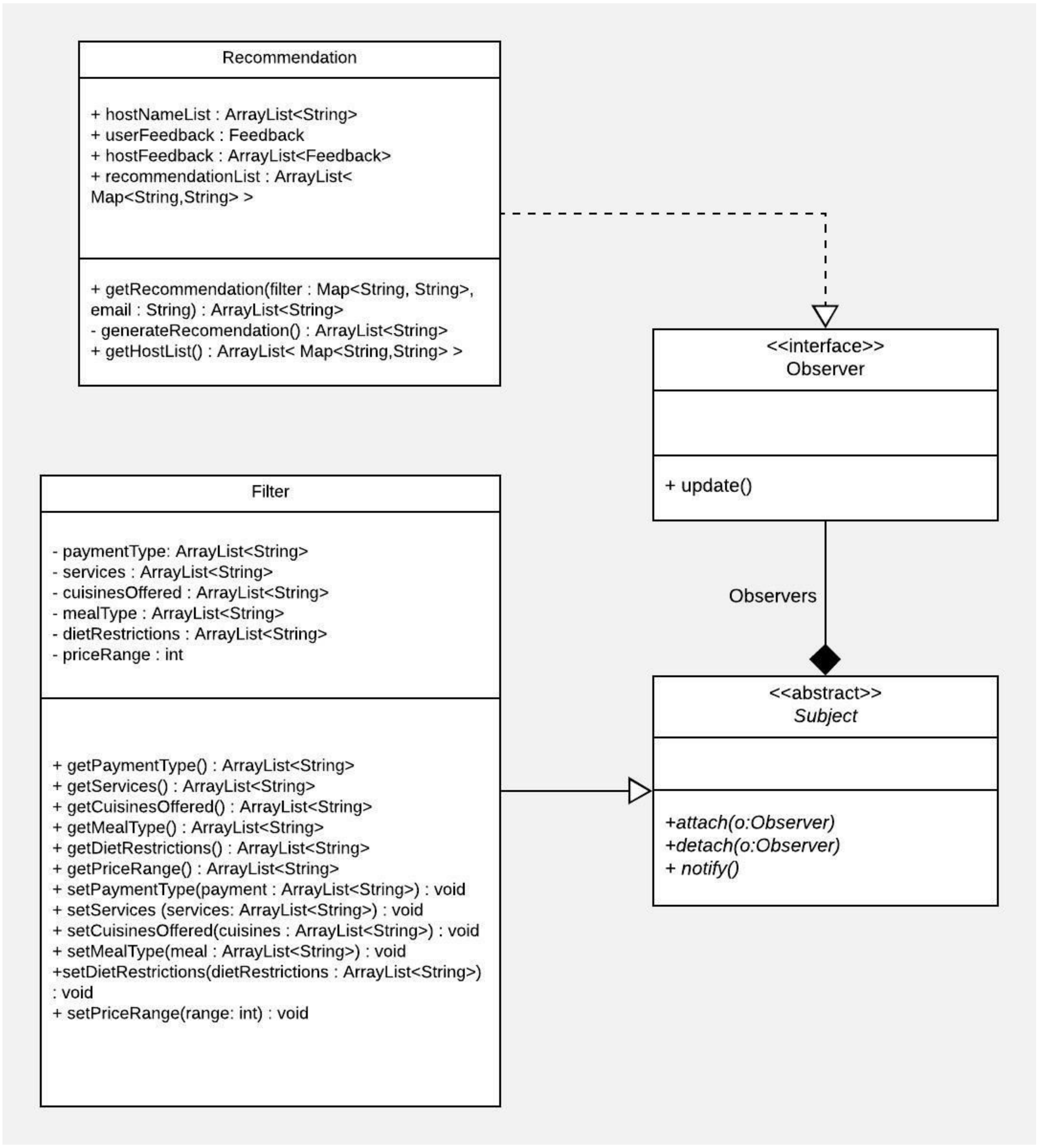
- lenDispField : ArrayList<Integer>
- colorDispField : ArrayList<String>
- posDispField : ArrayList<String>
- typeDispField : ArrayList<String>
- fields : ArrayList<String>
- toggleButtons : ArrayList<String>
- timeSlots : Map<String, Integer>
- title : String
- logo : String
+ getUserChoice(button : ArrayList<String>) : ArrayList<String>
+ displayEditableFields(fieldIds : ArrayList<String>) : void
+ getUserInput(fields : ArrayList<String>) : Map<String, ArrayList<String>>
+ getUserTimeSlot(timeSlots : ArrayList<String>) : String
+ saveFields() : void
+ displayProfile(profile : Profile) : void
+ getUserFilters() : Filter
+ getRestaurantChoice() : String
+ readDefaultFilter() : Filter
+ displayRecList(recList : ArrayList< Map<String,String> >) : void
+ displayTimeSlots(timeSlot : Map<String, Integer>) : void
+ getTimeChoice(button : ArrayList<String>) : String
+ displayNotification() : void
+ displayFeedback(feedback : Feedback) : void
+ displayFilter(filter : Filter) : void
+ displayAdvertisement(advertisement : String) : void
+ displayTheme(theme : String) : void
+ displayReservationS(): void

Observer Design Pattern:


Recommendation
+ hostNameList : ArrayList<String>
+ userFeedback : Feedback
+ hostFeedback : ArrayList<Feedback>
+ recommendationList : ArrayList< Map<String,String> >
+ getRecommendation(filter : Map<String, String>, email : String) : ArrayList<String>
- generateRecomendation() : ArrayList<String>
+ getHostList() : ArrayList< Map<String,String> >
<<interface>> Observer
+ update()
Observers
<<abstract>> Subject
+attach(o:Observer)
+detach(o:Observer)
+ notify()
Filter
- paymentType: ArrayList<String>
- services : ArrayList<String>
- cuisinesOffered : ArrayList<String>
- mealType : ArrayList<String>
- dietRestrictions : ArrayList<String>
- priceRange : int
+ getPaymentType() : ArrayList<String>
+ getServices() : ArrayList<String>
+ getCuisinesOffered() : ArrayList<String>
+ getMealType() : ArrayList<String>
+ getDietRestrictions() : ArrayList<String>
+ getPriceRange() : ArrayList<String>
+ setPaymentType(payment : ArrayList<String>) : void
+ setServices (services: ArrayList<String>) : void
+ setCuisinesOffered(cuisines : ArrayList<String>) : void
+ setMealType(meal : ArrayList<String>) : void
+setDietRestrictions(dietRestrictions : ArrayList<String>) : void
+ setPriceRange(range: int) : void

6. EXPERIENCES & LESSONS LEARNT

“What have you learned about the process of analysis and design now that you have stepped through the process to create, design and implement a system?”

The course added a great value to the overall understanding of design flow for software applications. As a team composed of electrical engineering students, It was a new experience to think of the design of the software as a product. This project helped us in further appreciate the quality added to software when it its development is followed by a clear and well established design. Not only could we understand the importance of design but also of how the design is communicated between software individuals. All the UML tools which help us in further understanding and defining the product before it’s even started to be coded really help us have a better understanding of how we can organise and convert an idea into a well-designed product.

Few of the key learning we had from this exercise were:

1) **Getting familiar with the actual benefits of design patterns**:

The course overall gave a very comprehensive knowledge about design patterns, but to understand the exact problem they solve and to identify the problem in your design which could be solved by a particular design patterns is something which was still a challenge. WIth eth experience gained while working on the project, it became way clearer.

2) **Getting familiar with the implementation of design patterns**:

The course taught us many design patterns, while we could appreciate the use of these design patterns and understood there target problem issue, we could not fully understand there code level implementation. The project pushed us to understand the design patterns to a newer depth, with focus also on code implementation.

3) Understanding various ways to store the persistent data:

The project used spring framework with hibernate to access and manage database. None of the team members had ever tried this before, so this opportunity really helped us in understanding this field of study.