

Software Architecture Design Document

Donuts on Demand (DoD) Project

Software Architecture Design Class 2021

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Table of contents

Introduction	3
Background	4
Stakeholders	5
Functional Requirements	6
Quality Attributes	7
Usability (H)	7
Performance (H)	7
Security (M)	8
Availability (M)	8
Scalability (L)	8
Data	9
Architecture Overview	10
Big Picture	10
Diagrams	11
Use Case Diagram	11
Class Diagram	12
Sequence Diagram	13
Risk and Mitigation Plan	14
What will not be implemented	15
Tools	16
Github Issues and Labels	16
Acceptance criteria	17
Milestones	18
Kanban project	19
References	20

1. Introduction

The purpose of this document is to give an overview of the software architecture design of our Donuts on Demand (DoD) project. Our system will focus on four main quality attributes which are: usability, availability, maintainability and testability. We chose those aspects in order of what we think will be important for our application.

Hence, this document will talk about the background of our project, and the functional requirements of our architecture design. We will illustrate the attributes mentioned above through a set of scenarios or use cases our users will go through, then introduce the big picture of our system architecture, followed by UML diagrams and a couple views into the system. Finally, we will address acknowledgements, references and appendices.

The goal of this software architecture design document is to provide the development team with a high-level overview of our system architecture. Additionally, it is for the project sponsors to conclude on the proposed architecture before going into a more detailed design.

2. Background

Doughnuts or donuts are made from fried dough confectionery, either in homes or purchase from outlets, and it is popular among kids and youngsters. In 2016, the market of doughnuts reached 8 billion USD in SouthEast Asia which makes the second largest region after North America [1]. There are different varieties of doughnuts around the world such as glazed, chocolate, fashioned, croissant, jelly, etc. But what could be more infuriating than to go to a store to buy something, and then have to leave empty-handed due to a lack of stock?

The purpose of this project is to set up an innovative service for our customers, at the crossroads of the e- Shop and the drive-in. This service, called "Donuts on Demand » (DoD), will allow customers to make their selection from our range of donuts, place their order and specify the date and time they will pick them up. The same services already exists for custom-made cupcakes, and in this project, we aim to produce something similar for doughnuts.

Ordering on Donuts on Demand ensures that you always get your favorite cookie recipe, right out of the oven, on time. No more queues in the store, no more unpleasant surprises such as chocolate being out of stock. Donuts are always fresh, available in less than two hours and recovered while still hot for even more gourmet family moments.

3. Stakeholders

The main stakeholders of Donut On Demand are employees of the company and customers. The application will henceforth support 4 main types of users :

Customer

The customer is our consumer and who will be mainly browsing a variety of doughnuts on our website, placing doughnuts orders and picking them up.

Manager

The manager is the one who will create, manage and sell donuts. This person can be the donut shop owner, or a doughnuts enthusiast who will be creating recipes and making handmade donuts. He / she will be tracking sales statistics, set store opening hours, etc. Eventually, it will be the person or the person representing the company who we will sell the application to.

Order Supervisor

The order supervisor refers to anyone who will be managing orders and the pick up of orders. This person can be the manager of a single store outlet for larger companies.

Cashier

The cashier is the person facing customers and who validates orders withdrawals, updating sales and such. The requirements for this stakeholder are the lowest.

4. Functional Requirements

It is possible for anyone to create an order, choose their recovery store and appointment date and then pay the amount due by credit card. An order consists of a set of "donuts" and the desired quantity, among the pre-existing recipes for which the establishment is famous (for example, the "Sooo Chocolate", the "Dark Temptation", the "Krispy Kreme", ...).

Each donut recipe is defined by its type of dough, an optional flavor, up to three toppings, a type of mix, and finally a type of cooking.

- Dough: Plain, Chocolate, Peanut butter, Oatmeal
- Flavour: Vanilla, Cinnamon, Chili
- Topping: White chocolate, Milk chocolate, M&M'sTM, Reese's buttercup
- Mix: Mixed or Topped
- Cooking: Crunchy or Chewy

Customers must present the order form (each recipe has a given price) obtained from the system to retrieve their order in the store. A new recipe can be added at any time, and some recipes may disappear because of lack of buyers.

By creating a user account on DoD, it is possible to join the "Loyalty program", which offers after 30 donuts ordered a 10% discount on the next order.

Store managers can define their opening hours. They can also add new employees in their shop. The system should allow the display of statistics on CoD usage (recovery time). The store must verify that it is able to ensure an order, even a personalized one.

5. Quality Attributes

5.1. Usability (H)

One of our highest quality attributes is usability. In the case of our Donuts on Demand project, this refers to how intuitive the interface is, how easy it is to learn and to use. This is especially important for our customer's first use of the application, as they need to figure out how it works and eventually convert first time visitors into loyal customers.

- The app should be compatible with the most popular browsers (Chrome, Firefox, Safari and Internet Explorer)
- The app should be responsive to any device
- The app has to be easy to use and has to only require a few seconds to understand what it does, especially for customers

5.2. Performance (H)

To support our usability requirements, our app has to satisfy performance requirements as well. Doughnuts are quick snacks that customers can have on the go and so our application performance has to follow the same logic with blazing fast performance.

- The process from registration to completing an order should take less than 5 steps (or screens)
- The application should be able to handle a high traffic load
- Response time for any action should be less than 2s

5.3. Security (M)

Our architecture will incorporate a login function which requires personal information to be stored securely, as well as a way to differentiate between user types, their permissions and what they have access to. At the moment, our system will not incorporate payment since payments will be done in-store and because of lack of time available.

- Customers personal information should be stored securely

5.4. Availability (M)

As mentioned before, doughnuts should be available to order anytime on the go, especially during peak times such as late afternoons when kids finish school, after classes or after work. It should be ready to handle spikes of traffic during peak hours and not fail.

5.5. Scalability (L)

Our architecture needs to be able to expand to further doughnuts customisations beyond what we currently have (Topping, Dough, Flavour, Mix, Cooking) if needed. The architecture needs to be able to incorporate a payment system at a further stage, for customers who wish to pay with a credit card and to ensure orders can't be cancelled after the products have been made.

6. Data

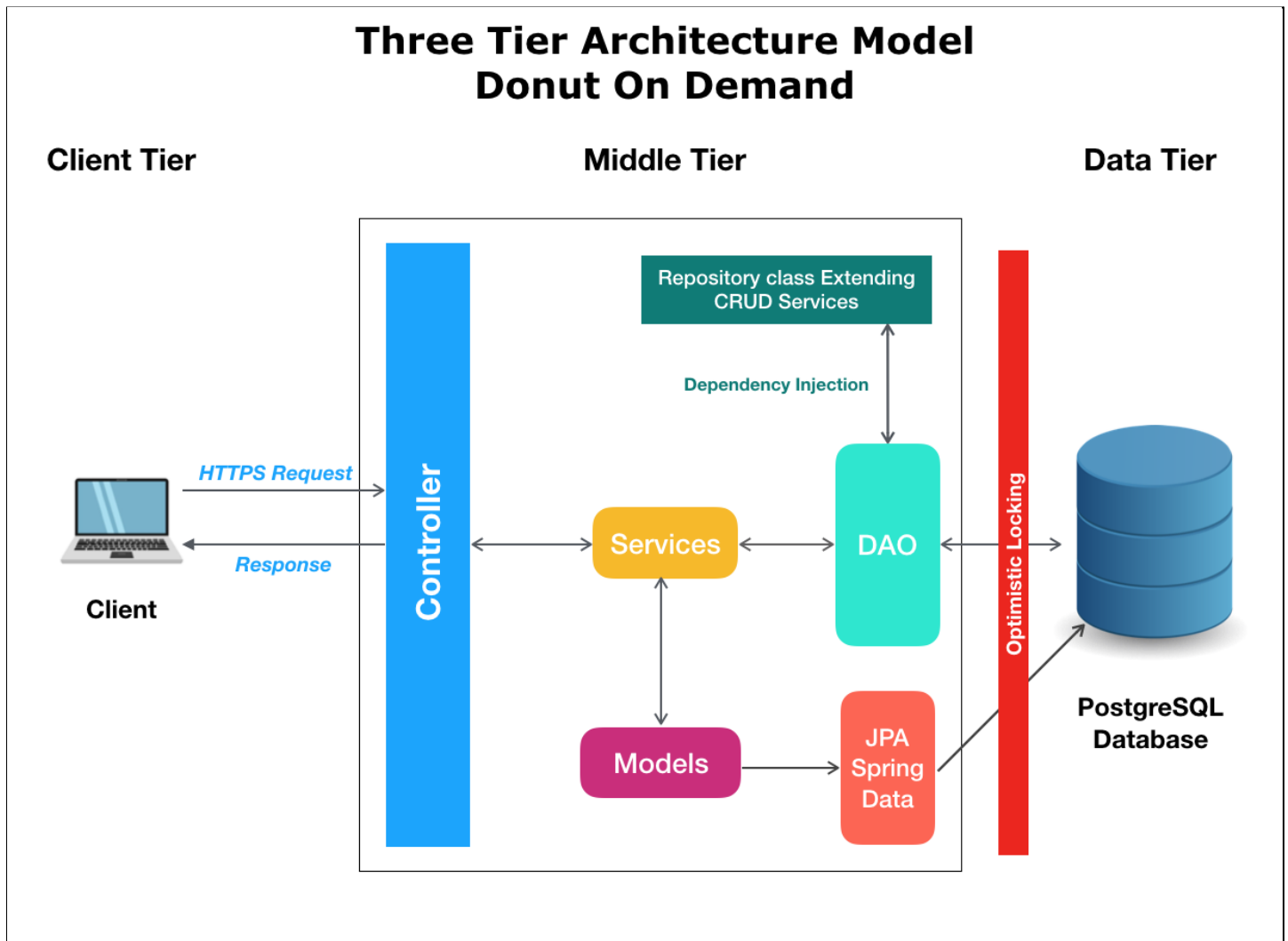
For our application, we need to store the data in a persistent and structured way in order to have access to it even if the server stops. This is why we chose to use PostgreSQL which is a relational and object database management system. We chose it because we had already used this tool before and it met our needs perfectly.

We will keep all the data indefinitely because the different orders made by the customers will allow us to make statistics and analysis to know for example which donut is the most successful.

In order to anticipate and manage cases where two people modify data at the same time, we use Optimistic locking. This allows us to manage concurrent access to a database properly.

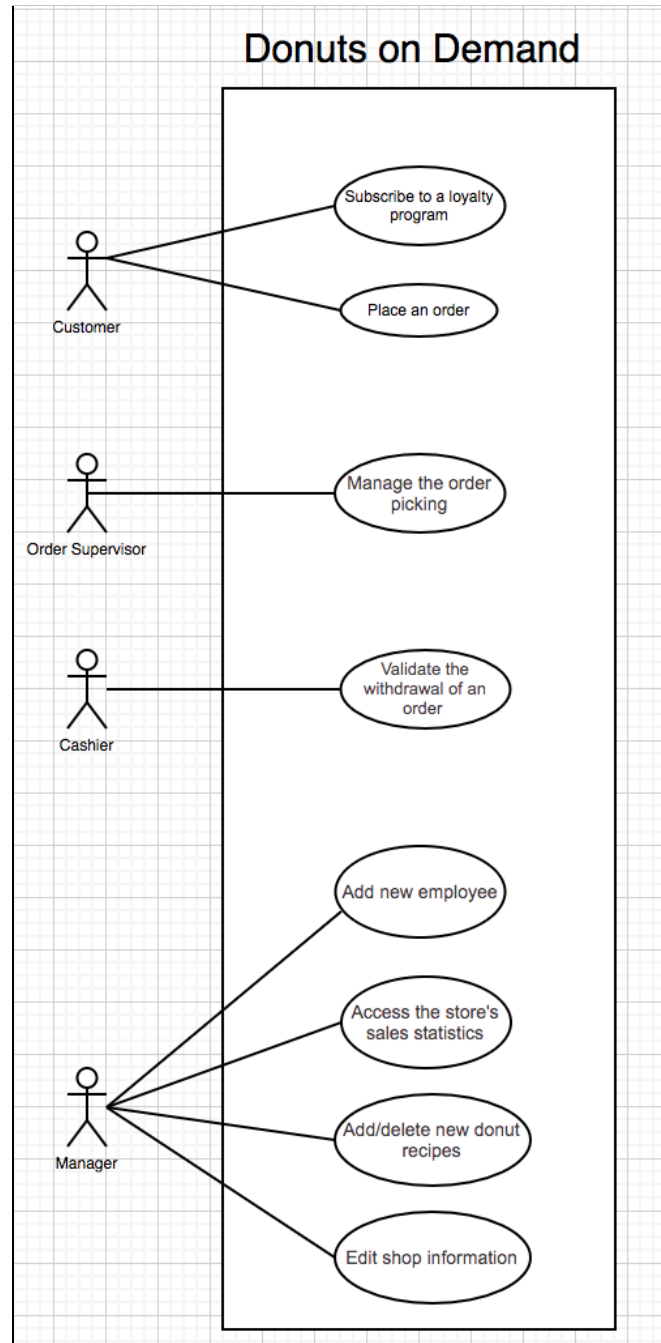
7. Architecture Overview

7.1. Big Picture

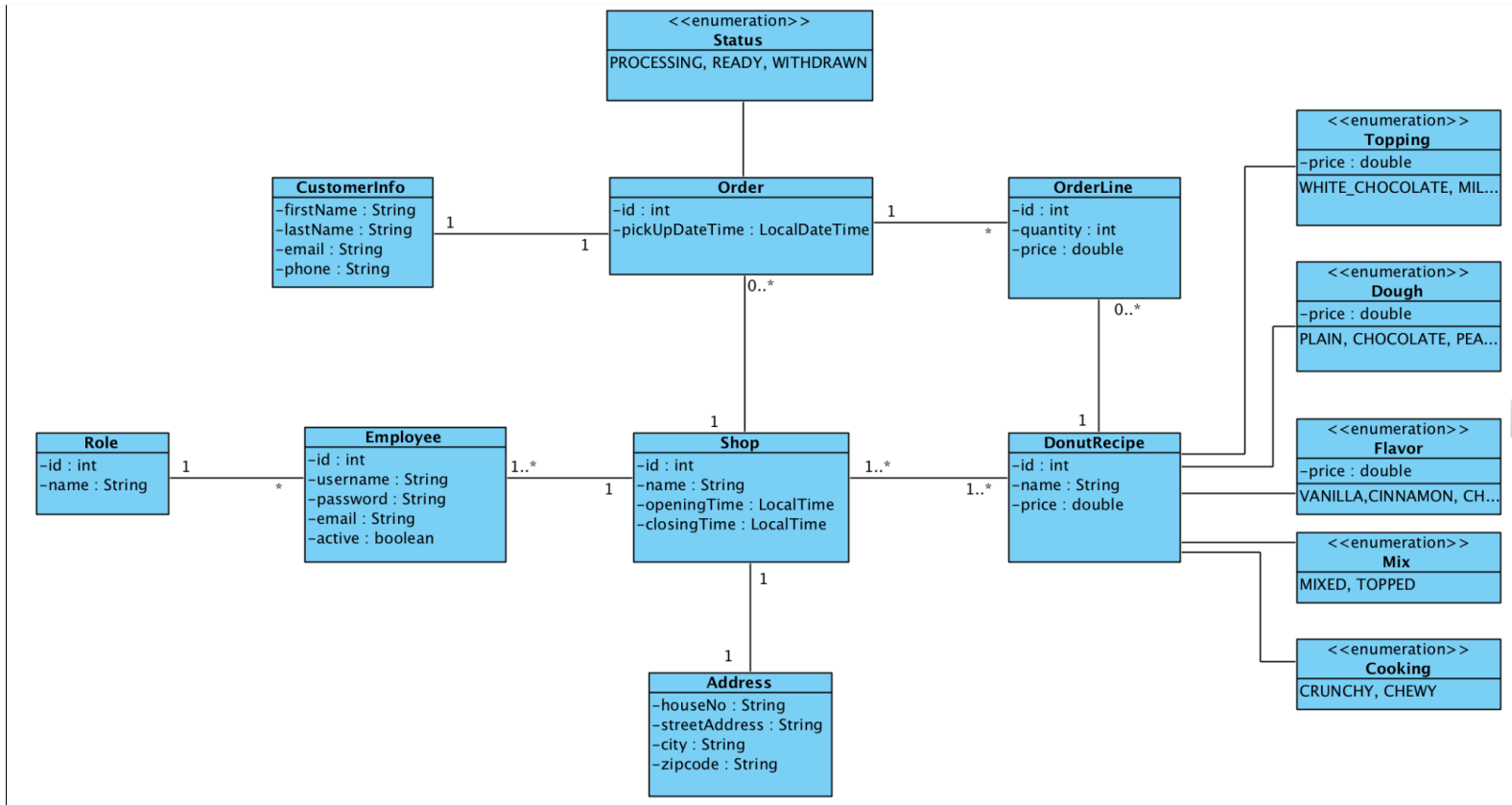


7.2. Diagrams

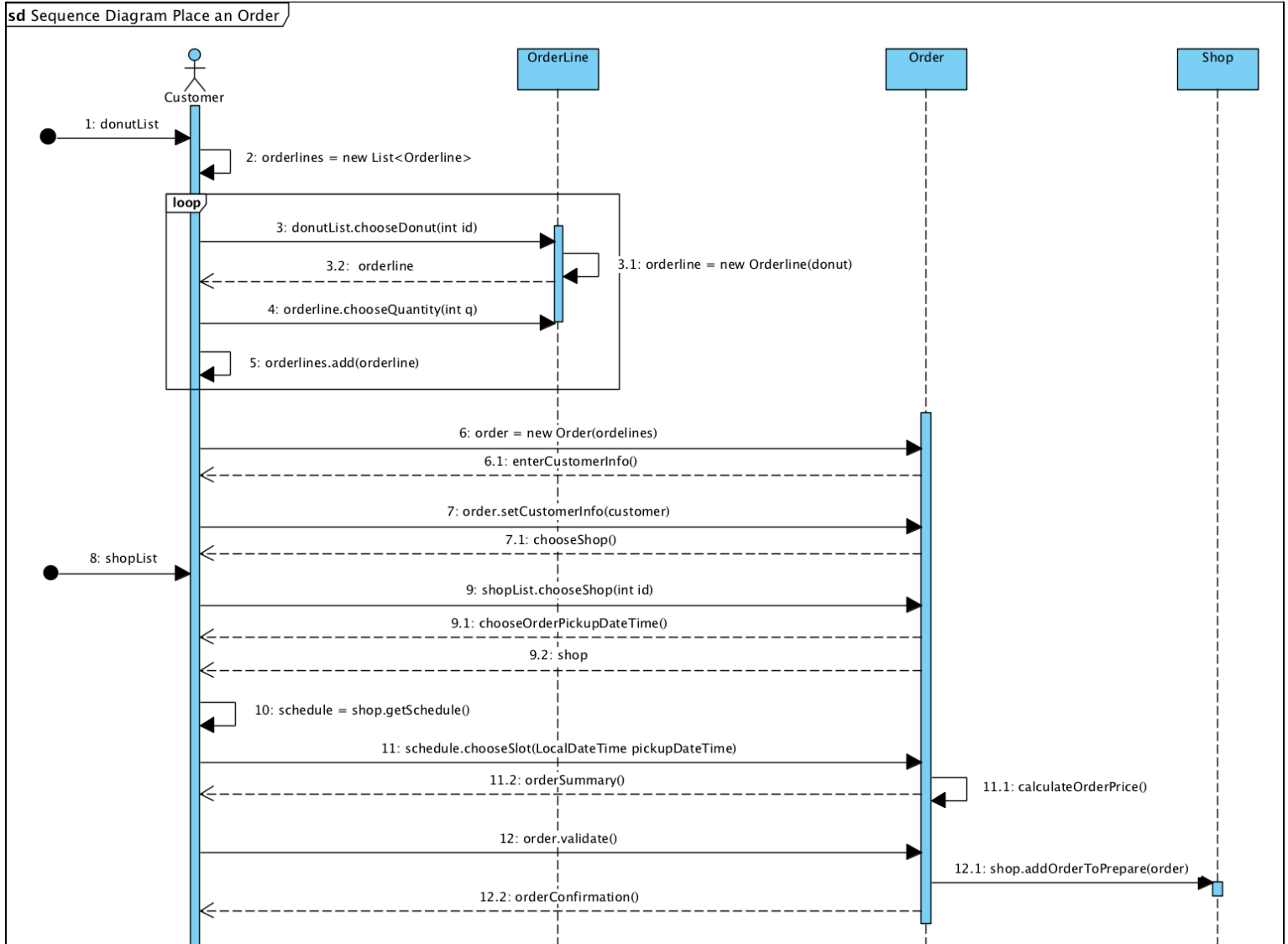
Use Case Diagram



Class Diagram



Sequence Diagram



8. Risk and Mitigation Plan

Risk #	Cause	Effect	Likelihood	Consequences	Risk Ranking	Mitigations strategies	Owner
1	Delays in work due to competing work for the dev team	Delays in overall progress in development	Likely	Major	Very High	1/ Devise appropriate schedule for work 2/ Make proper breakdown of the tasks and assign equally among dev team	Developpement team
2	Underestimating the time and difficulty of a task	Delays in overall progress in development	Possible	Major	High	1/ Break down tasks as finely as possible in order to focus on one feature 2/ Use tools to estimate the difficulty and usefulness of the feature	Developpement team
3	Little experience in programming with Spring boot	Delays in overall progress in development	Certain	Major	High	1/ Training with the different labs 2/ Search for solutions on the internet (Stackoverflow)	Developpement team
4	Announcing the achievement of too many features in a too short time	The project will not be finished at the end	Possible	Crucial	Very High	1/ Define the time required for each feature 2/ Good distribution of tasks in the development team 3/ Spread the realization of the features over several 2-week sprints	Developpement team

9. What will not be implemented

Due to the short time we have to develop such an application, we decided to focus mainly on developing a clean and efficient architecture for our application.

Therefore, we will not develop an ergonomic and beautiful user interface.

Furthermore, regarding the management of credit card payments, we unfortunately have no experience in developing such a feature and we believe that learning this will take too long to be finished in time. Thus, we concluded that this part of the application would not be implemented.

10. Tools

Github Issues and Labels

In order to better organize and visualize the different functionalities we have to realize, we used the tool Issues in github. This one allowed us to define more precisely each requirement. Moreover, the labels available on github allowed us to define several information about each feature. This allows us to have a quick overview of the feature because we defined for each issue, their priority (thanks to the MoSCoW method) as well as their difficulty of realization (using a tee shirt sizing technic) S is equivalent to SMALL, M is MEDIUM and L is LARGE, which means that the feature is consistent and quite difficult to realize.

The screenshot displays a GitHub Issues page with 12 open issues. The interface includes a header with filters (Author, Label, Projects, Milestones, Assignee, Sort) and a summary of 12 Open and 4 Closed issues. Each issue entry consists of a checkbox, a status icon, a title, a priority label (MEDIUM, MUST, SMALL, COULD), a MoSCoW label (SHOULD), a difficulty label (USER STORY), and a link to the issue details. The issues are sorted by most recent first.

Issue ID	Title	Priority	MoSCoW	Difficulty	Opened	By	Sprint
#16	As a customer, I want to have a shopping cart confirmation before validate my order	MEDIUM	SHOULD	USER STORY	6 hours ago	titouanlm	SPRINT 2
#15	As a customer, I want to receive an email confirmation of my order	MEDIUM	SHOULD	USER STORY	2 days ago	titouanlm	SPRINT 3
#13	As a Cashier, I want to validate the withdrawal of an order ready when a customer picks it up at the store	MUST	SMALL	USER STORY	8 days ago	titouanlm	SPRINT 3
#12	As an Order supervisor, I want to manage the order picking and indicate which ones are ready	MEDIUM	MUST	USER STORY	8 days ago	titouanlm	SPRINT 3
#11	As a customer, I want to create and order my own personal donuts recipe	COULD	MEDIUM	USER STORY	8 days ago	titouanlm	SPRINT 4
#10	As a manager, I want to access the store's sales statistics to see which recipes are famous	COULD	MEDIUM	USER STORY	8 days ago	titouanlm	SPRINT 4
#9	As a manager, I want to be able to add/delete new donut recipes in my store	MEDIUM	MUST	USER STORY	8 days ago	titouanlm	SPRINT 3
#8	As a manager I want to be able to edit informations of my store (Name, opening hours)	SHOULD	SMALL	USER STORY	8 days ago	titouanlm	SPRINT 4
#7	As a customer, I want to be able to pay and validate my order	MEDIUM	MUST	USER STORY			

Acceptance criteria

Each issue may also contain a description and other information. Thus, we used it to define the criteria that allow us to affirm that the functionality is correctly realized.

As a manager, I want to be able to create account for Order supervisor and Cashier #7

Closed

titouanlm opened this issue 9 days ago · 0 comments

titouanlm commented 9 days ago • edited

Collaborator

Scenario :

Acceptance criteria

- Given a manager of a shop of our application
- When he logs in and accesses the employee creation page
- And fills in the different fields of an employee and submit
- Then The employee is created in the database and the manager is redirected to the home page of his account

Assignees

titouanlm

Labels

MUST SMALL USER STORY

Projects

Donut TC
Done

Milestone

Milestones

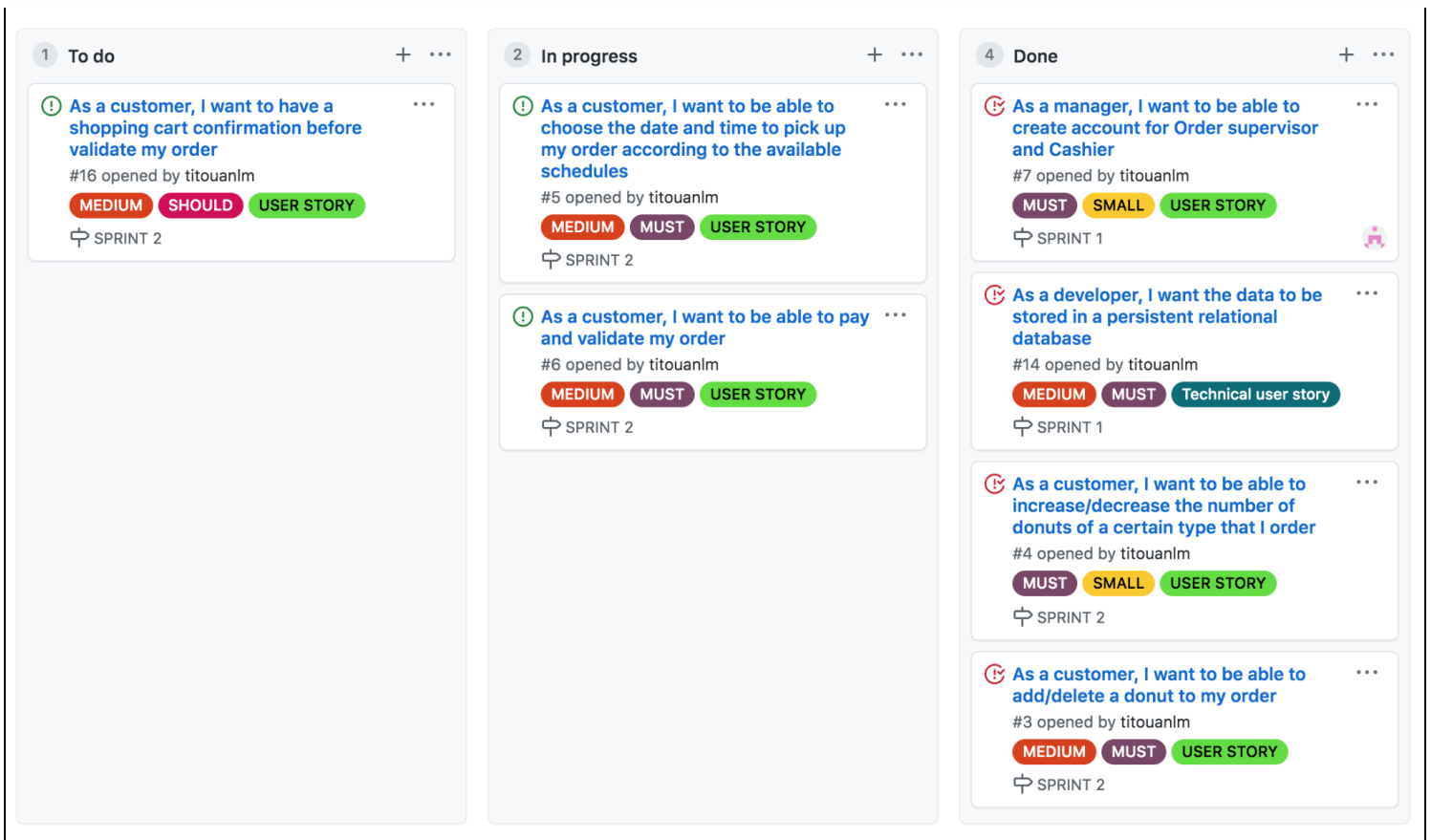
Github also allows you to group several issues into a single milestone and indicate the deadline. So we used this feature to define our different sprint and to constantly see the progress of them. Indeed, each time we validate the implementation of a feature, we close the issue in order to see only the one that remains to be done

The screenshot shows the GitHub interface for Milestones. At the top, there are navigation tabs: Code, Issues (12), Pull requests, Actions, Projects (1), Wiki, Security, and Insights. Below these, there are buttons for Labels and Milestones, and a 'New milestone' button. The main content area displays four milestones, each with a title, a progress bar, and a summary of issues.

Milestone	Progress	Open	Closed
SPRINT 4	0% complete	5	0
SPRINT 3	0% complete	4	0
SPRINT 2	40% complete	3	2
SPRINT 1	100% complete	0	2

Kanban project

Finally, in order to manage our project and to organize ourselves in an optimal way in the distribution of the tasks, we used the Project functionality of github which allows to define a Kanban project with the various informed issues. It allows us to see clearly who does what, what is done and what is left to do.



11. References

[1] Goldstein Market Intelligence, 2020, Global Doughnuts Market Report 2030, *On the basis of products, On the basis of types, By Region With COVID-19 impact | Forecast Period 2017-2030.*