TQS: Polarent - Product specification report

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1 Introduction

1.1 Overview of the project

This project was created within the context of the Software Quality and Testing curricular unit. The general structure of the project is a renting platform.
Our solution is a photography equipment renting platform named Polarent. This platform serves as a way to facilitate access to otherwise expensive photography equipment for a fraction of the price.
The platform also allows for the monetization of equipment that isn't being used.

1.2 Project limitations and know issues

We planned to use an external payment processor but at this moment it is not yet implemented.

To be reviewed and completed by the end of the project:

- Payment service
- Images in the listings

1.3 References and resources

For AI assisted code within the project context we used Kiro, an AI agent running in-terminal, capable of understanding the project scope and context.

2 Product concept and requirements

2.1 Vision statement

The system solves the high demand for good photography equipment at reasonable prices by supplying it in limited timeframes.
As key features a user must be able to browse equipment, search for specific equipment or request one or multiple pieces of equipment at once. A user must also be able to add a listing for any equipment they wish to rent at their own daily rate.
Our system is like Ebay or Vinted in the sense that users have the ability to market their own products. Users are also able to search for other users products.

2.2 Personas and scenarios

***Persona1*:** Maria Rodrigues is a 35-year-old professional wedding and event photographer, who works in Lisbon, Portugal. She holds a Bachelor's degree in Visual Arts. Married to an architect, with no children, she earns approximately 40,000$ per year. She lives in an apartment with her husband, where she has converted one room into a dedicated photography studio for storing her equipment. Maria owns a car that she uses to travel throughout Portugal, often loading it with multiple camera bags. She remains socially active within the photographer community, regularly attending workshops and networking events.

Maria feels that her equipment sits underutilized during off-season months, but she is anxious about potential damage or theft or her equipment. Also, Maria experiences income fluctuations typical of seasonal work and finds manual rental management time-consuming.

Motivation: generate additional income and maintain complete control over who uses her equipment.

Scenario:

"It's Tuesday morning and Maria is planning her week. Checking her calendar, she notices only one wedding scheduled for Saturday, leaving three cameras available. She accesses Polarent, updating the availability of her 70-200mm f/2.8 and 24-70mm f/2.8 lenses. Throughout the day, she receives notifications for two booking requests - one from a photography student for an academic project and another from an amateur photographer for a family event. She reviews both profiles, checks their previous ratings, and accepts the student's request, scheduling the pickup for Friday afternoon at her studio."

Persona2: João Silva is a 20-year-old art student at the University of Aveiro. Living in student accommodation, he survives on a tight budget, approximately with 400$ per month from part-time work and family support. João is naturally curious, constantly experimenting with new techniques and styles. He's socially engaged in the photography community, attending free workshops and networking events. He shares a small university dorm room with 3 other students. Despite the limited space, João has carved out a corner as his mini creative studio. As a final-year student, she is currently working on his graduation project - a photographic series exploring Aveiro's nightlife. However, he faces constant competition for the university's limited equipment pool, which is always in high demand among photography students. Creative ideas require specific equipment he can't access.

Motivation: access professional equipment for academic projects and experiment with different brands and models before making investment decisions.

Scenario:

"João needs a full-frame camera and fast lens for his night photography project documenting Porto's nightlife. At 9 PM, sitting at his dorm desk, he opens the Polarent on his smartphone. He filters for a maximum €30 daily rate, and Aveiro locations. He finds a Sony A7III available for €25 per day just 15 minutes away by bus station. After checking the owner's reviews, a fashion photographer with excellent ratings, he books the equipment for Friday and Saturday nights using the integrated payment system. On Friday, he meets the owner at the bus station and receives the gear with a quick tutorial on night photography settings."

Persona3: Carlos Mendes is a 40-year-old platform manager working remotely from Coimbra. Married, with two school-aged children, he holds a Master's degree in Information Systems Management and earns €55,000 annually managing the Polarent platform. Carlos lives in a suburban house outside Coimbra with his wife (a teacher) and their two children. His attic has been converted into a professional monitoring station with multiple displays and alert systems for round-the-clock platform supervision. Carlos is highly analytical, making data-driven decisions based on platform metrics. He operates proactively, anticipating issues before they affect users. He maintains constant communication with the community and follows rigorous protocols for issue resolution.

Scenario:

"At 10 AM, Carlos begins his day by checking the administration dashboard. He notices an unusual spike in new user registrations from Porto. Investigating further, he discovers an unauthorized local marketing campaign. Simultaneously, the alert system notifies him about an equipment damage dispute between an owner and renter. Carlos analyzes before/after photos, reviews both users' histories, and mediates a solution - splitting repair costs 50/50 due to inconclusive evidence. Throughout the afternoon, he implements improvements to the identity verification system to prevent future fraudulent registrations."

2.3 Project epics and priorities

EPIC 1: Owner catalog management

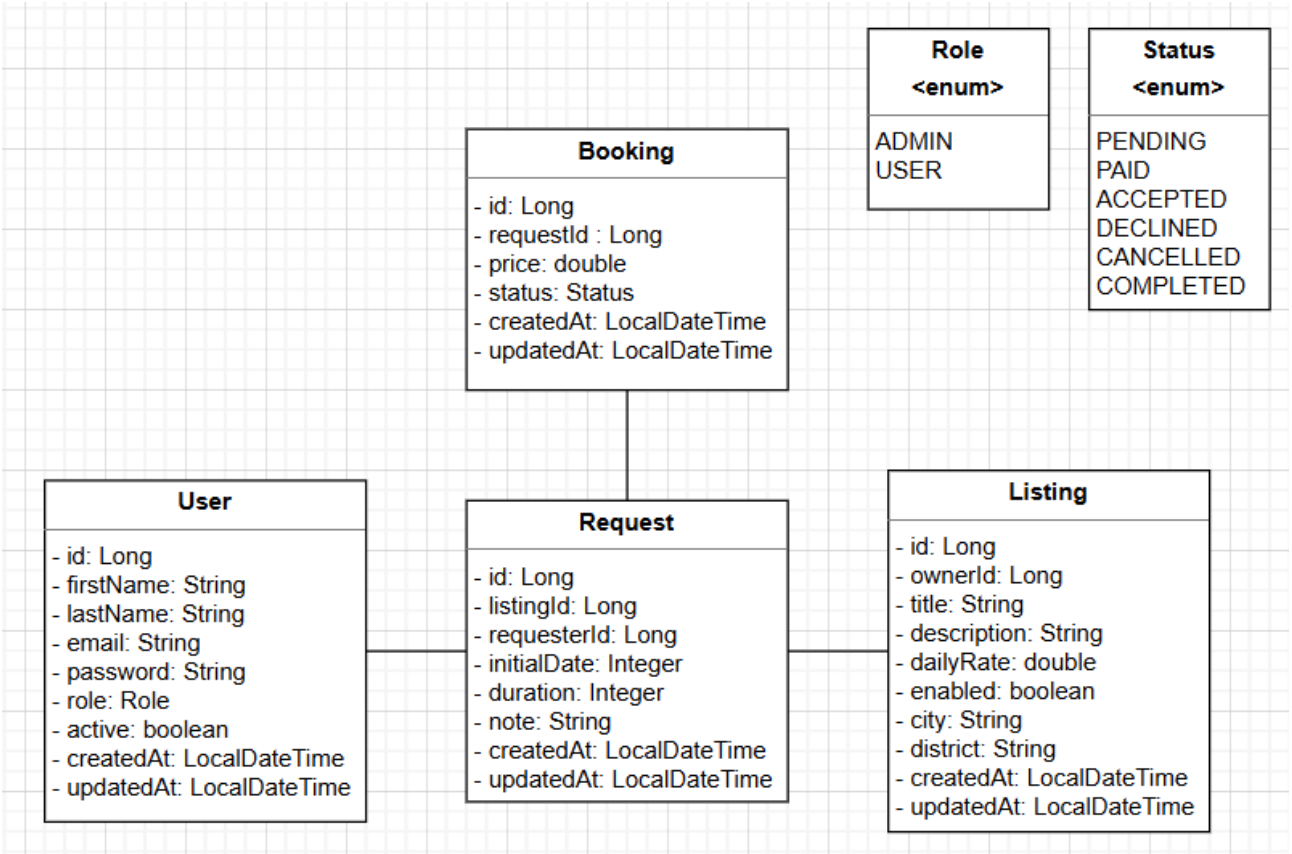
First we must ensure the users can navigate the pages to browse and search items

EPIC 2: Rental process and requests
The users must be able to issue booking requests to selected listings and accept requests made to their own listings

EPIC 3: Dashboards and visibility
The users must have visual representations of the request/booking activity in their account

EPIC 4: Monitoring and security management
The administration must have ways to verify the activity in the platform and manage its users

3 Domain model



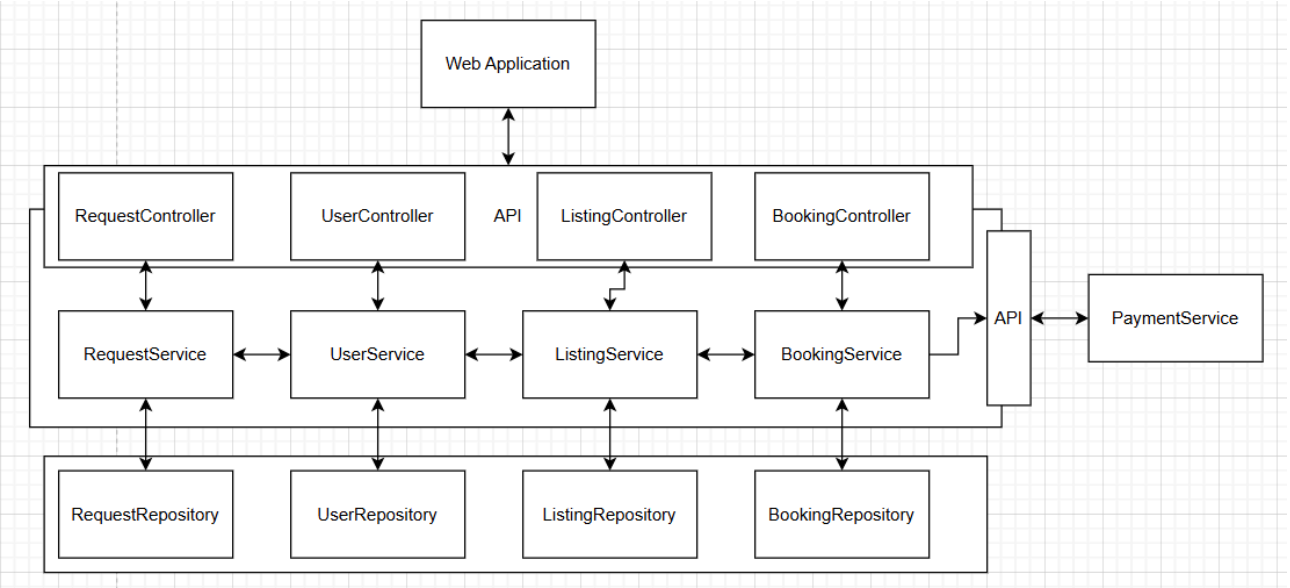
To send these entities back and forth between services and in and out of the backend we map these entities to DTOs.

4 Architecture notebook

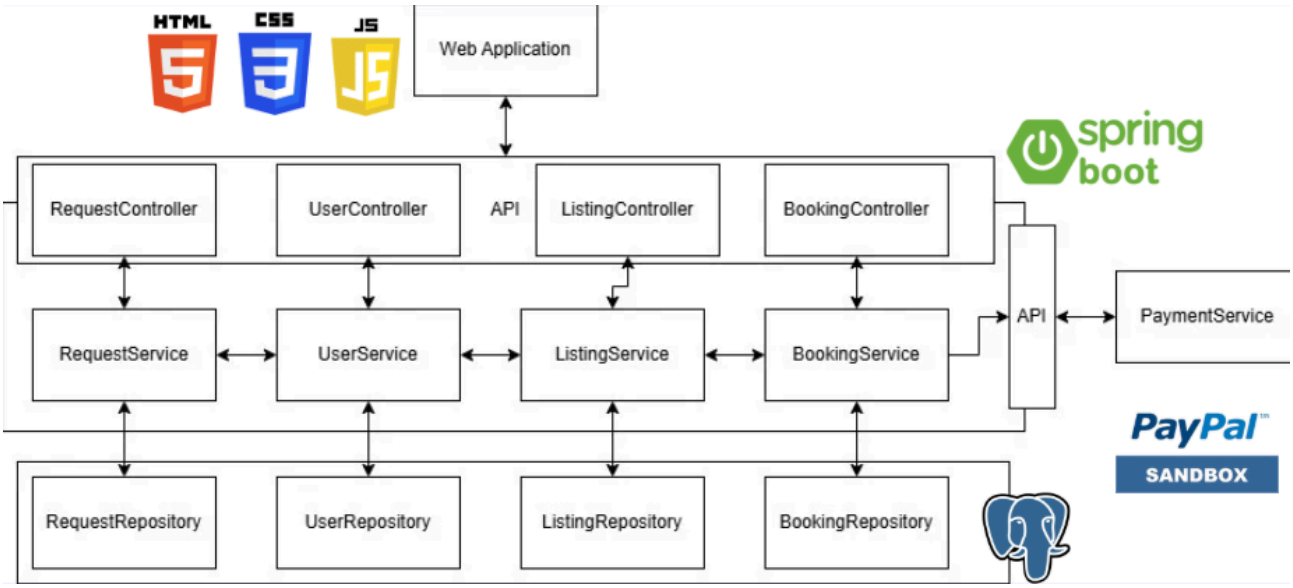
4.1 Key requirements and constrains

For simplicity's sake we chose a service-oriented layered architecture.

4.2 Architecture view



4.3 Deployment view (production configuration)



Dev:
-frontend: 192.168.160.25:8081
-backend(API): 192.168.160.25:8080
Prod:
-frontend: 192.168.160.25:80
-backend(API): 192.168.160.25:8082

5 API for developers

The API is organized as such:
/api

- /users: for user related operations
- /listings: for listing related operations such as disabling a specific listing
- /bookings: for booking related operations such as changing a booking status
- /requests: for request related operations such as creating a request
- /admin/config: for administrative operations
- /auth: for authentication related operations

The resources passed are in the form of DTOs and there are (in general) 3 different DTOs for each entity, EntityRequestDTO, EntityResponseDTO, EntityUpdateDTO