

SOFTWARE ENGINEERING 2



travlendar+

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OVERVIEW

1. Requirements Analysis
2. System Design
3. Implementation
4. Testing
5. Demo Video



PURPOSE

- **Travlendar+** is a calendar based application to help users organise their appointments taking into account their preferences and providing appropriate mobility solutions.
- **Main goals and functionalities**
 - Manage events (standard, flexible, recurrent)
 - Guarantee schedule feasibility
 - Provide mobility solutions according to preferences
 - Offer booking functionalities



REQUIREMENTS ANALYSIS



GOALS (8)

- **[G.1]** Access from different platforms
- **[G.2]** Manage meetings
- **[G.3]** Reach every meeting on time
- **[G.4]** Select or edit a travel mean to reach an event
- **[G.5]** Set preferences
- **[G.6]** Create flexible events and recurrent events
- **[G.7]** Book transportation for a trip
- **[G.8]** Be notified before the occurrence of an event



CONSTRAINTS AND DEPENDENCIES

- **Location:** Milan
- **Platform:** compatible OS or browser
- **Connection:** Internet connection
- **External services:** third-party APIs
 - Travel options
 - Booking
- **Persistent data:** a DBMS to store/retrieve data



DOMAIN ASSUMPTIONS (12)

- **Data correctness**

- [D.3] Events informations provided by the user are correct

- **Network resiliency**

- [D.1] The sent email is assumed to be correctly received

- **Travel availability**

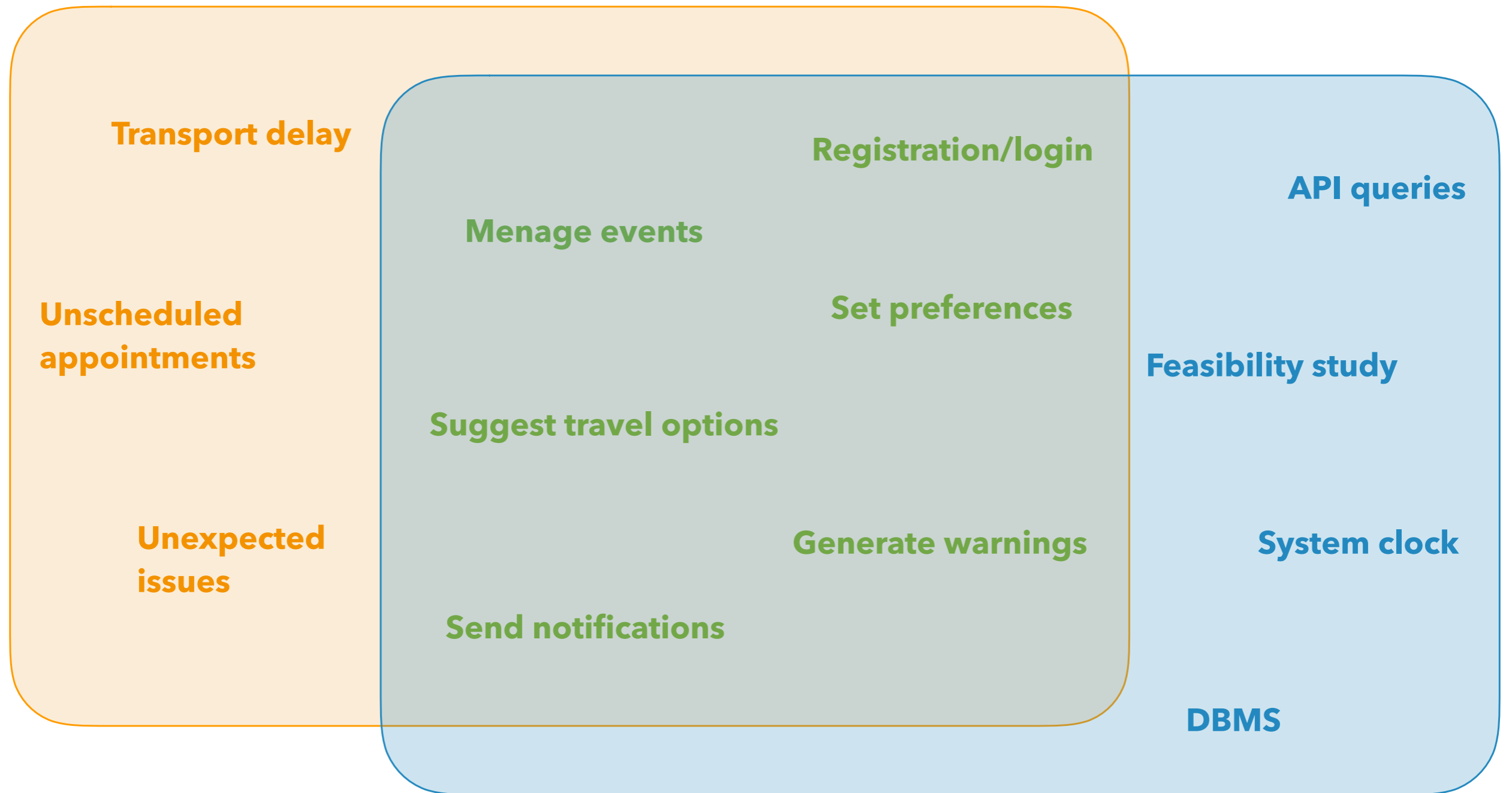
- [D.9] All selected travel means specified in the preferences are available

- **Booking service**

- [D.11] User is registered to the service which offers the booking option.



WORLD AND MACHINE PARADIGM



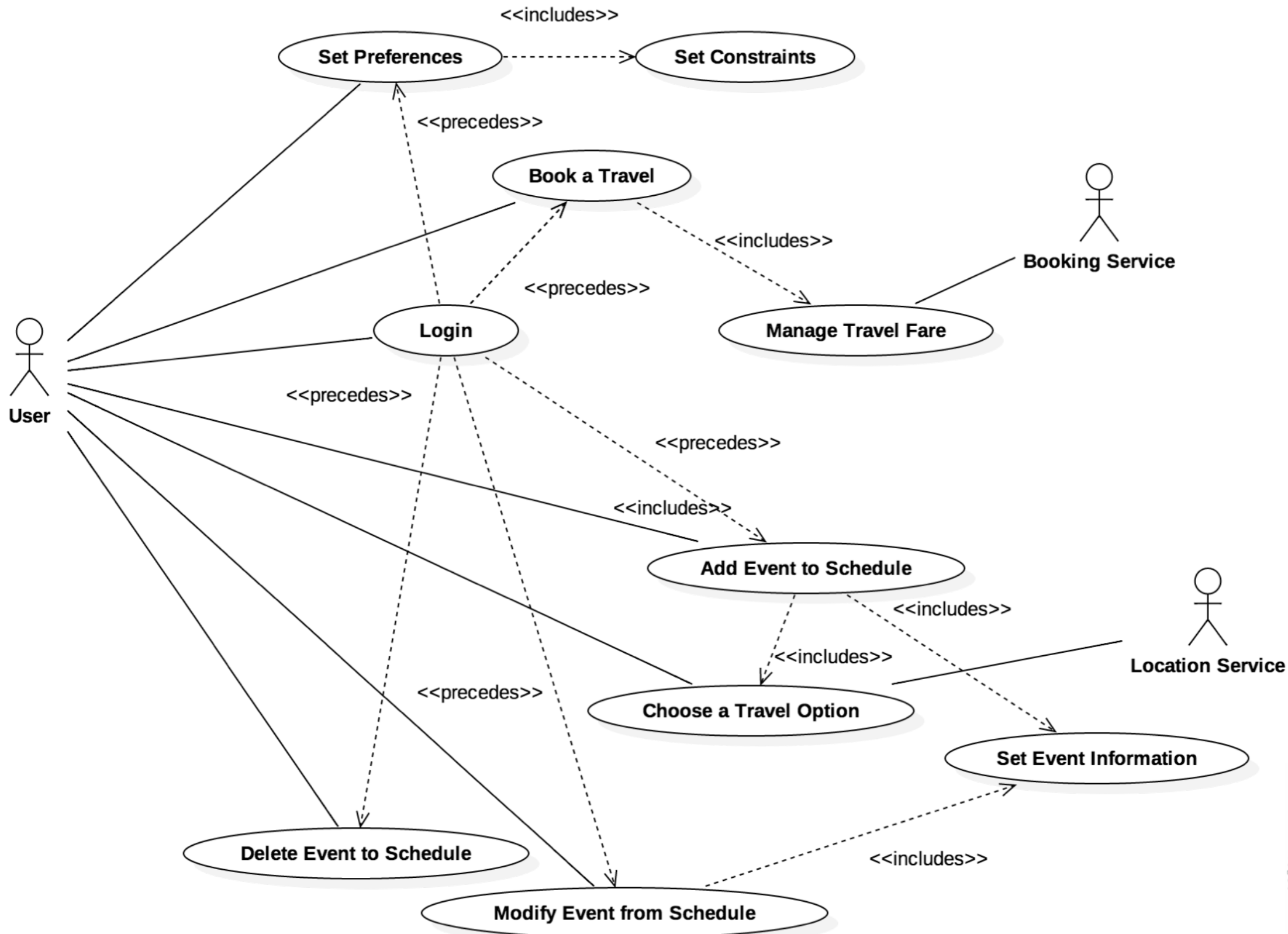
World phenomena

Machine phenomena

Shared phenomena



USE CASE DIAGRAM

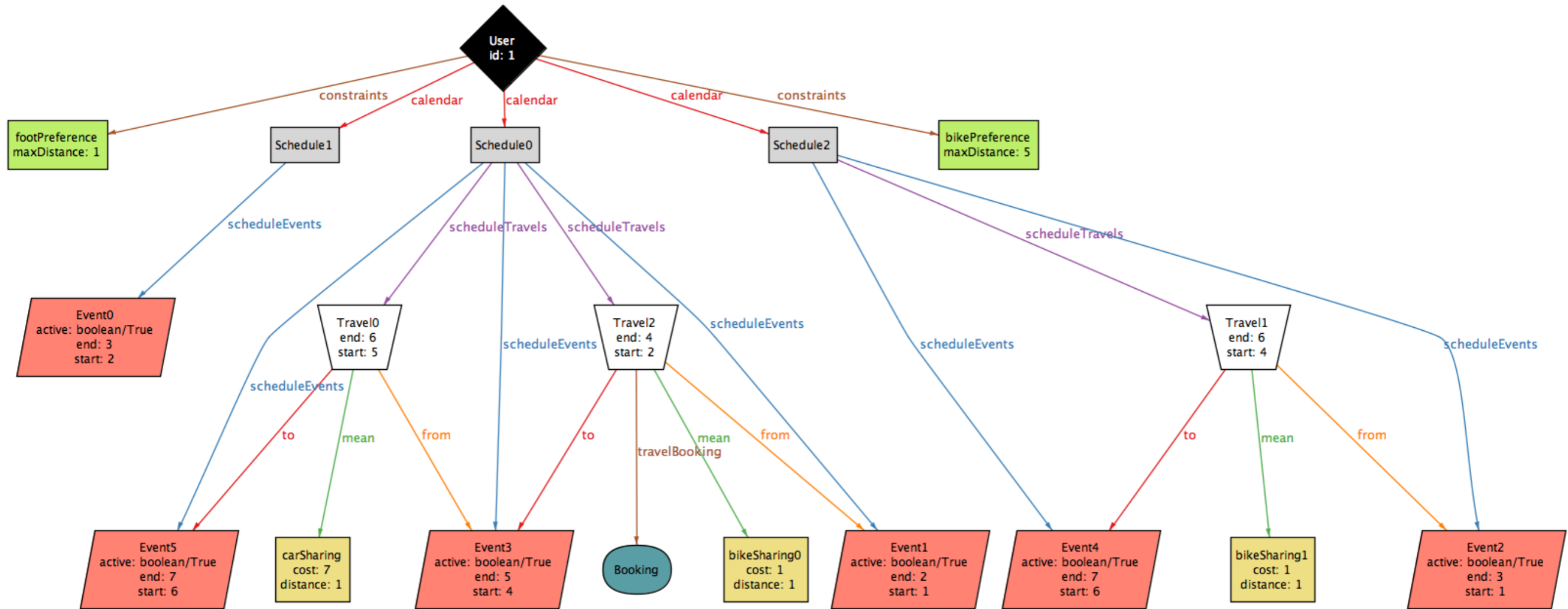


FUNCTIONAL REQUIREMENTS (29)

- **User registration/login**
 - [R.4] Allow the User to log in using his/her personal credentials
- **Event management**
 - [R.7] The User must be allowed to create events, specifying...
 - [R.11] Check if the event created or edited by the User is feasible.
- **User preferences/constraints**
 - [R.18] User can define specific constraint for each travel means, that are...
- **Third party APIs**
 - [R.27] Provide interface for third party services allowing the User to authenticate
- **Notifications**
 - [R.28] Allow to activate notifications and setting their time



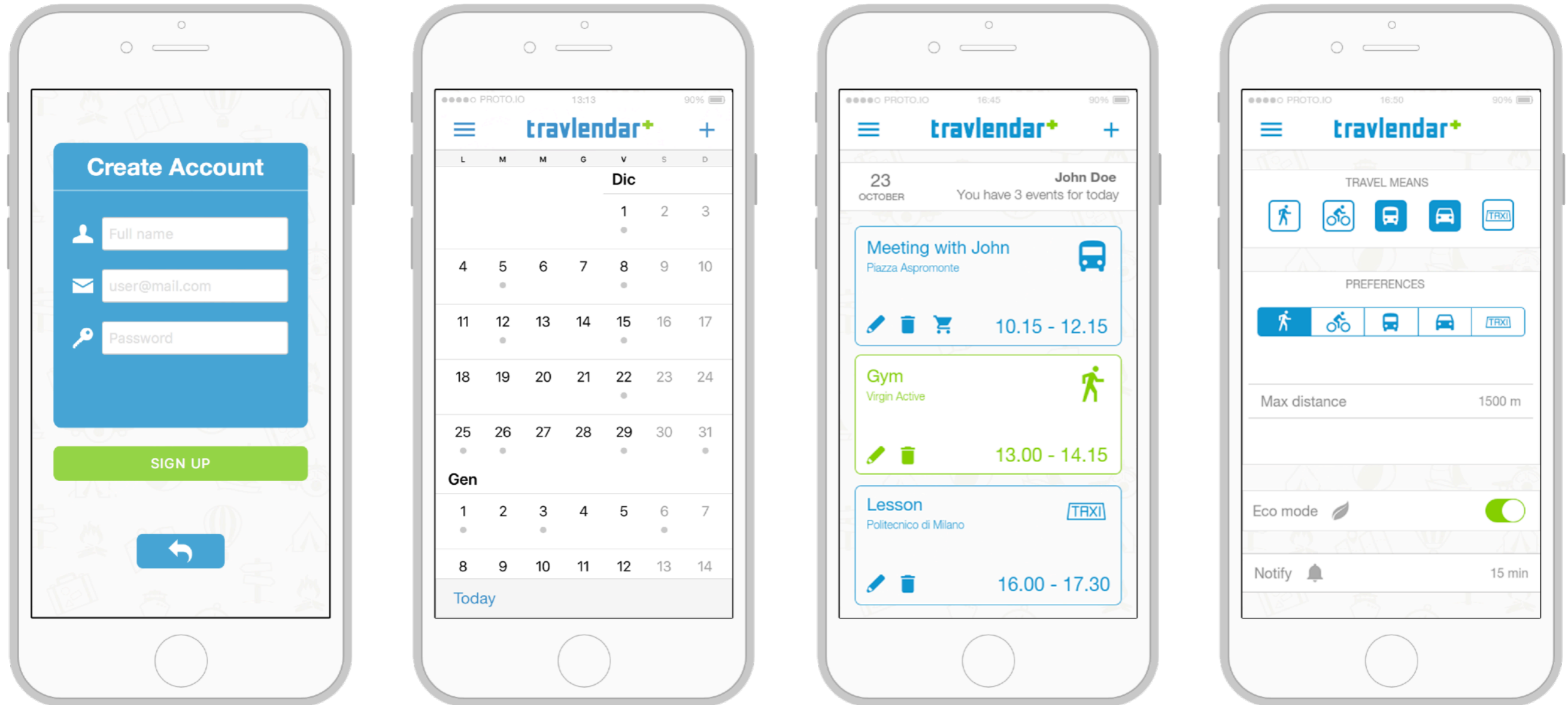
ALLOY MODEL



- Users: **1**
- Schedules: **3**
- Events: **6**
- Travels: **3**
- Booking: **1**



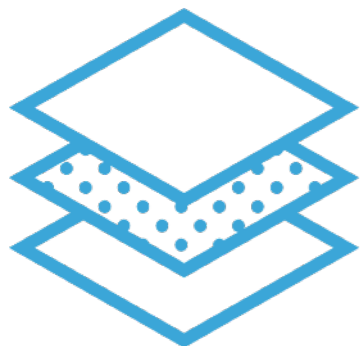
MOCKUPS



- Application prototyping platform: **Proto.io**



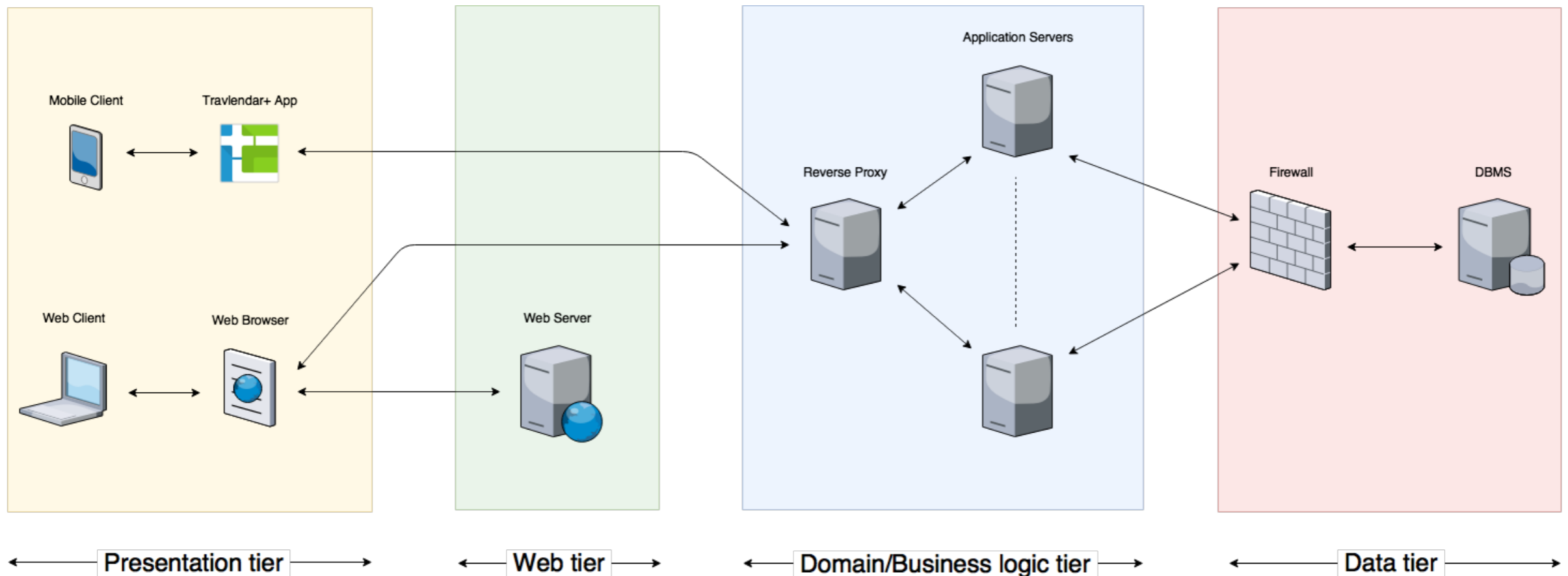
SYSTEM DESIGN



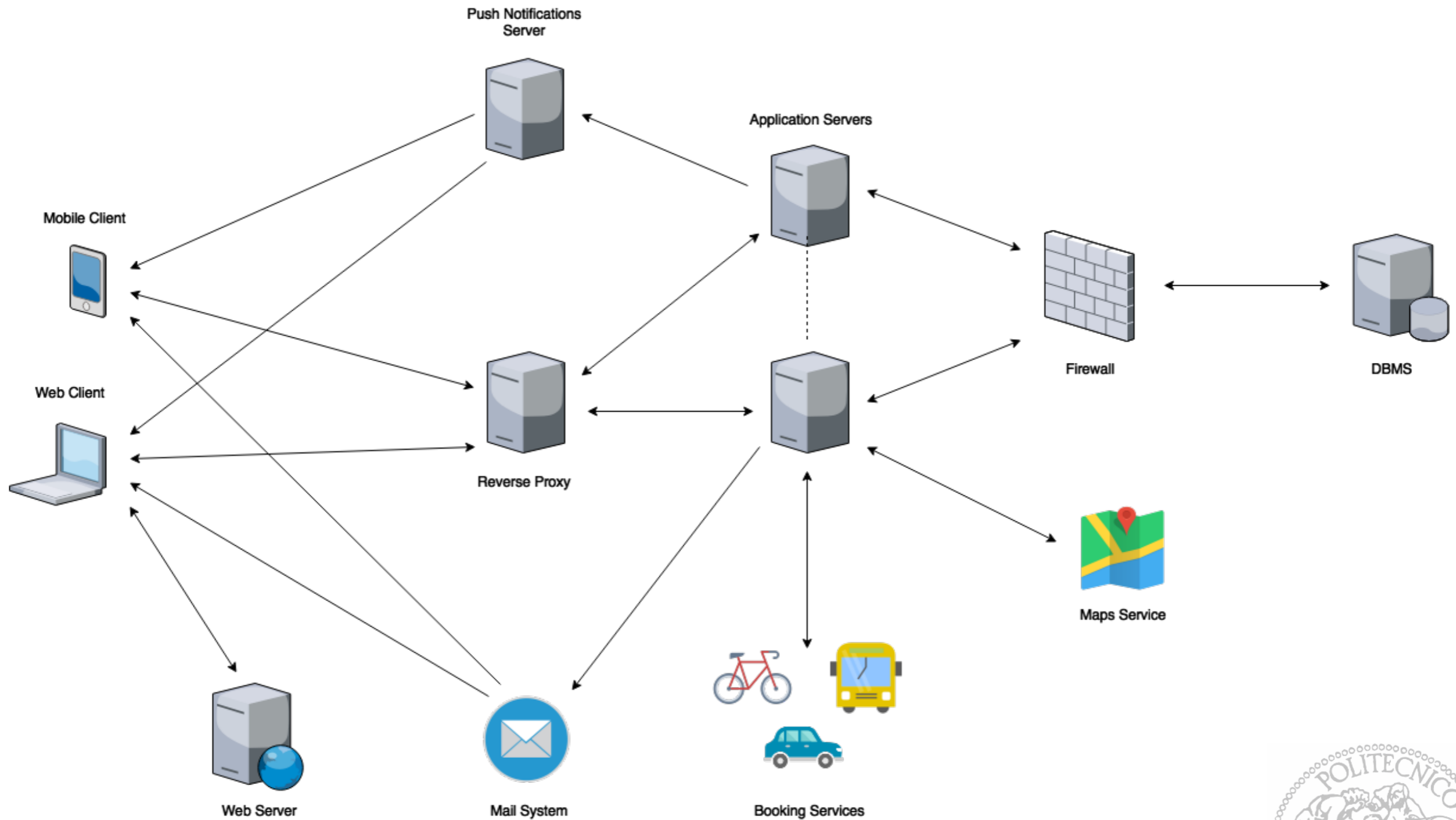
SYSTEM ARCHITECTURE

- **Multitier Architecture**

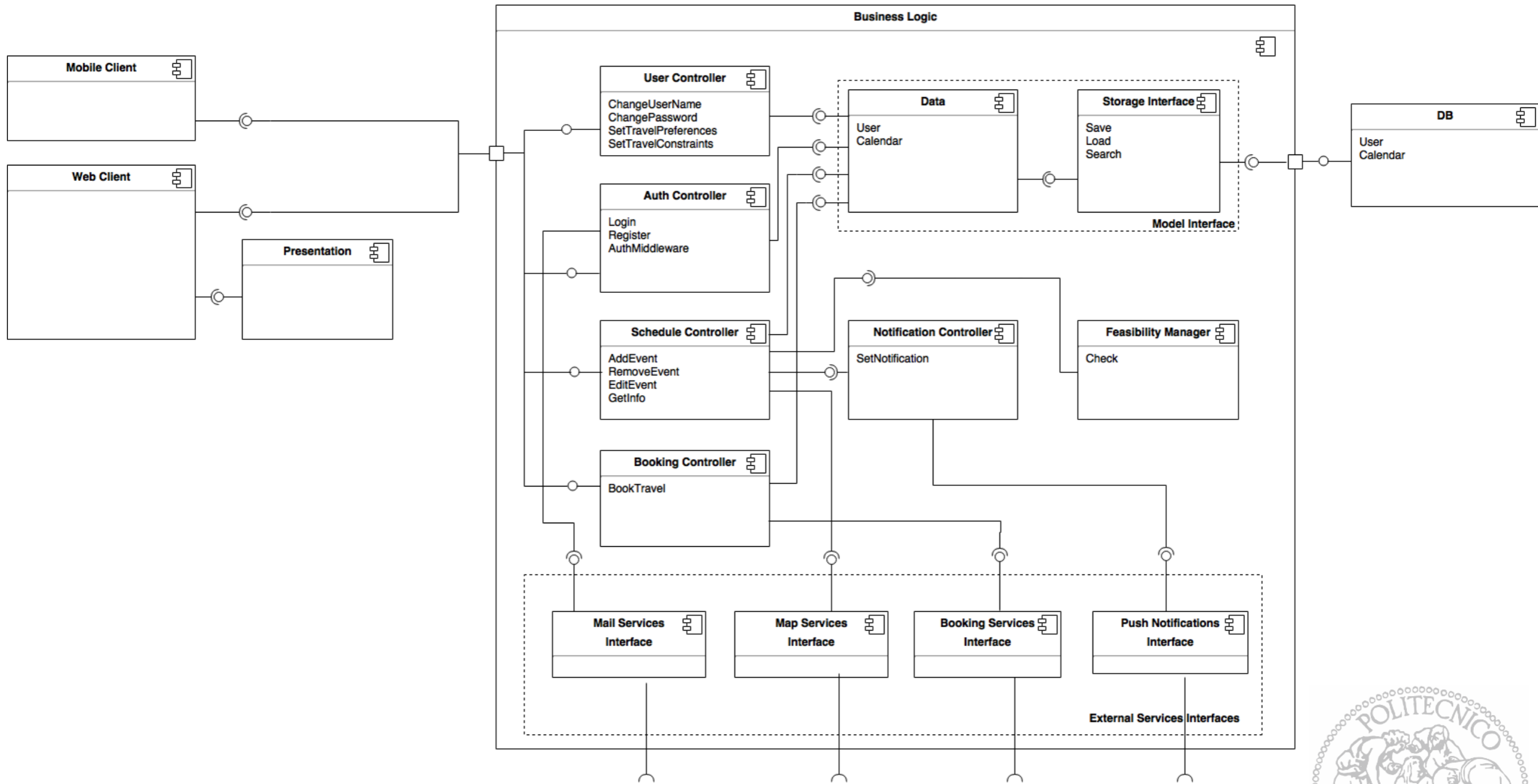
- *Presentation Tier*: interface the User interacts with
- *Web Tier*: provides client side application
- *Business Logic Tier*: controls application's functionality
- *Data Storage Tier*: used to store data



SYSTEM OVERVIEW



COMPONENT DIAGRAM



REQUIREMENTS TRACEABILITY

Component

Requirements

Auth Controller

- [R.1] A Guest must be able to register. During the registration the System will ask to provide credentials.
- [R.2] Check if the Guest credentials are valid.
- [R.4] Allow the User to log in using credentials.

Feasibility Manager

- [R.11] The System must check if the event created or edited by the User is feasible.
- [R.14] The System must guarantee a feasible schedule, that is, the User is able to move from an appointment to another in time.



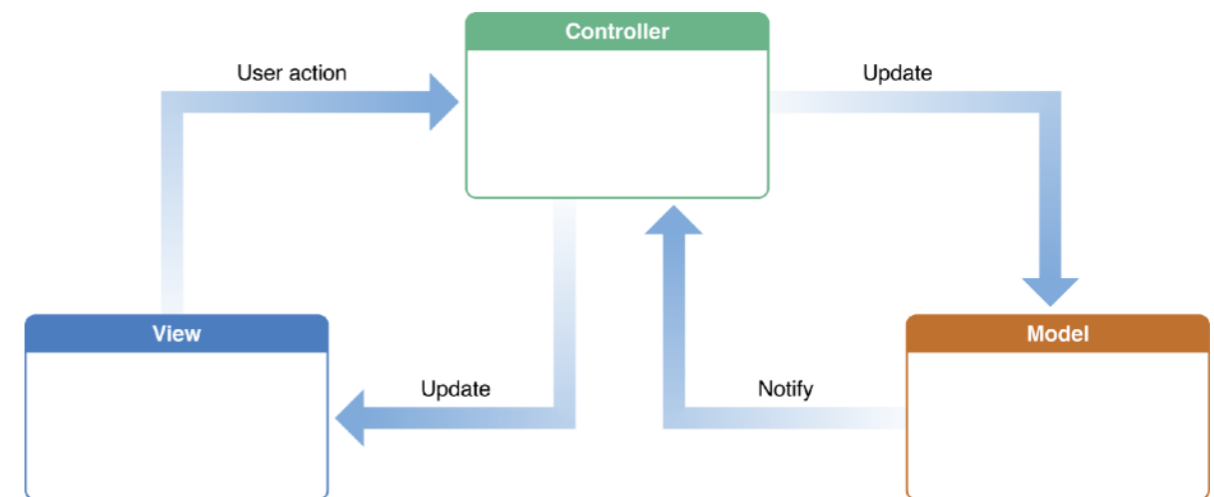
DESIGN CHOICES AND PATTERNS

- **Thin Client**

- Close to no computation
- Handles communications
- Easy data synchronization
- Less effort for implementation in different Clients

- **Model View Controller**

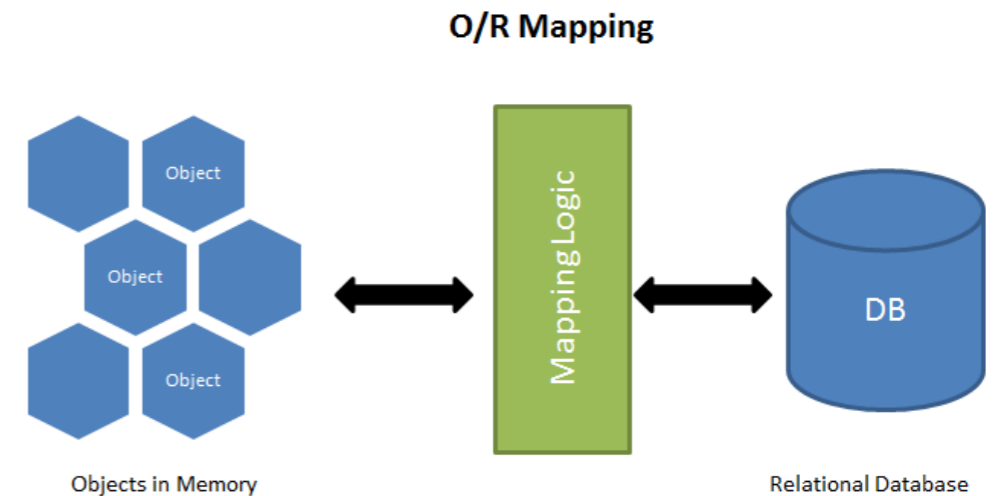
- Change of components without hassle
- I&T without fully implemented components



DESIGN CHOICES AND PATTERNS

- **Object-Relational Mapping**

- Query and manipulate data using object-oriented paradigm
- More reusable and cleaner code

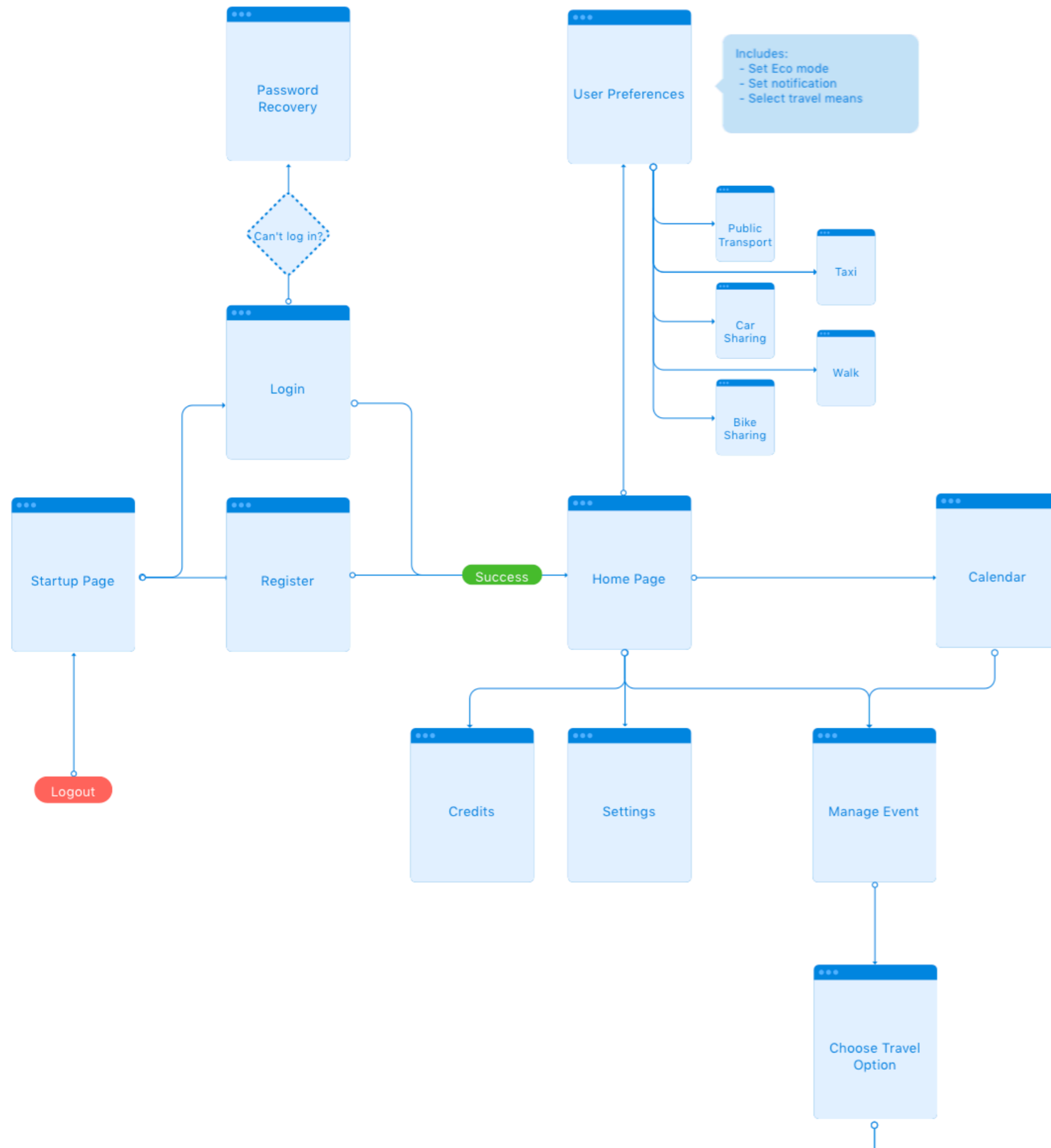


- **RESTful**

- Data exchange through HTTP protocol
- Stateless: requests contain all the necessary information
- Uniform Interface: enhance scalability



UX DIAGRAM



- **User flow:** path the user follows through the application

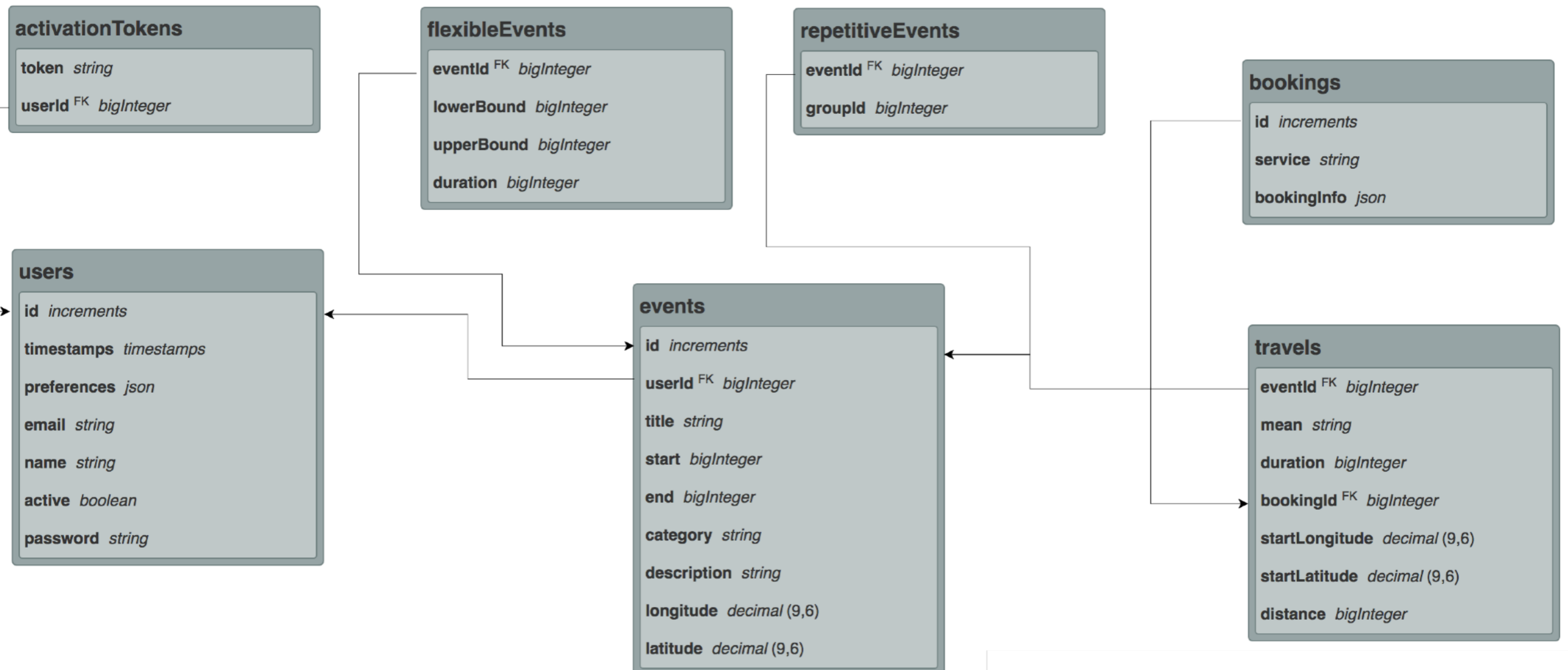


IMPLEMENTATION DETAILS



DATABASE SCHEMA

- **DBMS:** Relational DBMS (PostgreSQL 9.6)



BACKEND DETAILS

- **Framework:** Laravel 5.4
- **Language:** PHP 7.1
- **DBMS Interface:** Eloquent (ORM)
- **Authentication:** Passport (Token)
- **APIs:** RESTful



BACKEND FUNCTIONALITIES

- **User**

- User credentials
- Preferences

- **Schedule**

- Constraint Satisfaction Problem to solve feasibility
- Flexible events adjustment
- Recurrent events as single events after creation

- **Travel**

- Accounting for travel time
- Adapting schedule for each option



EXTERNAL SERVICES

- **Travel APIs**

- Google Directions: public transport, personal transport and foot
- Mapbox: bicycle
- Uber: available services

- **Booking APIs**

- Uber: book available service

- **Mail Service**

- Google Mail as mail server

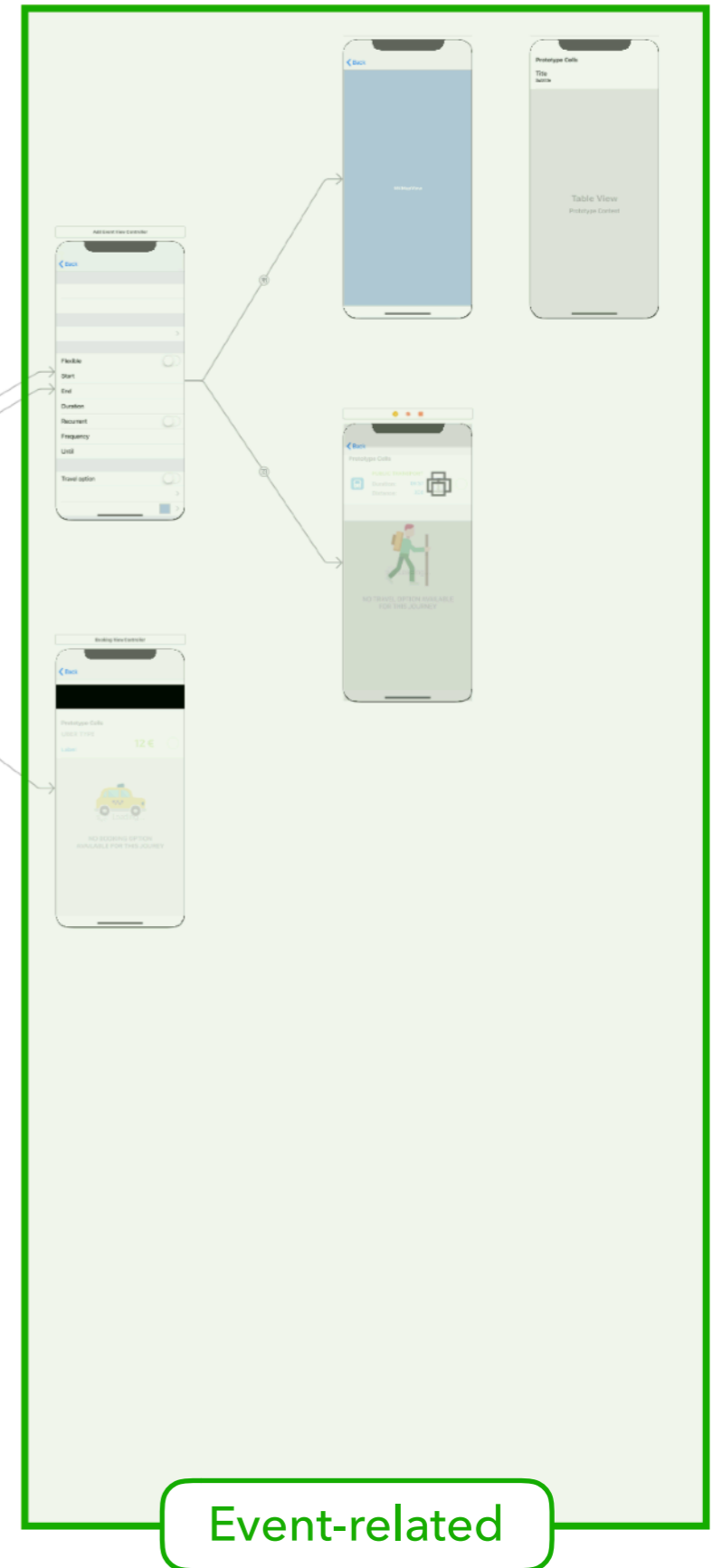
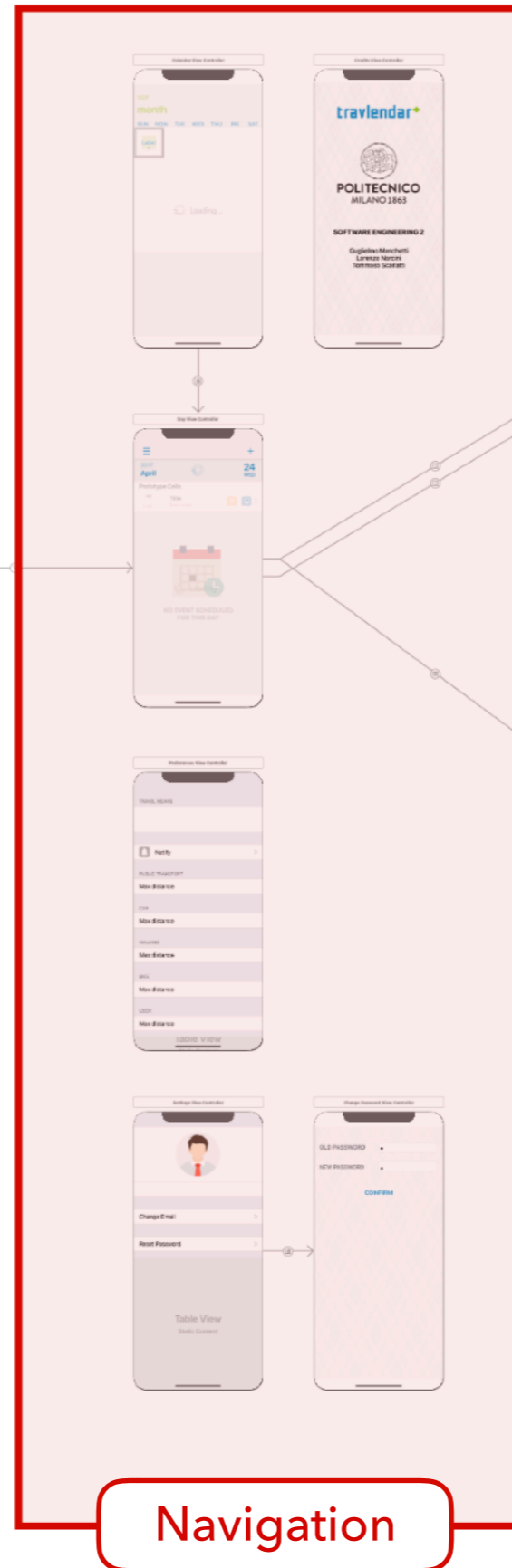
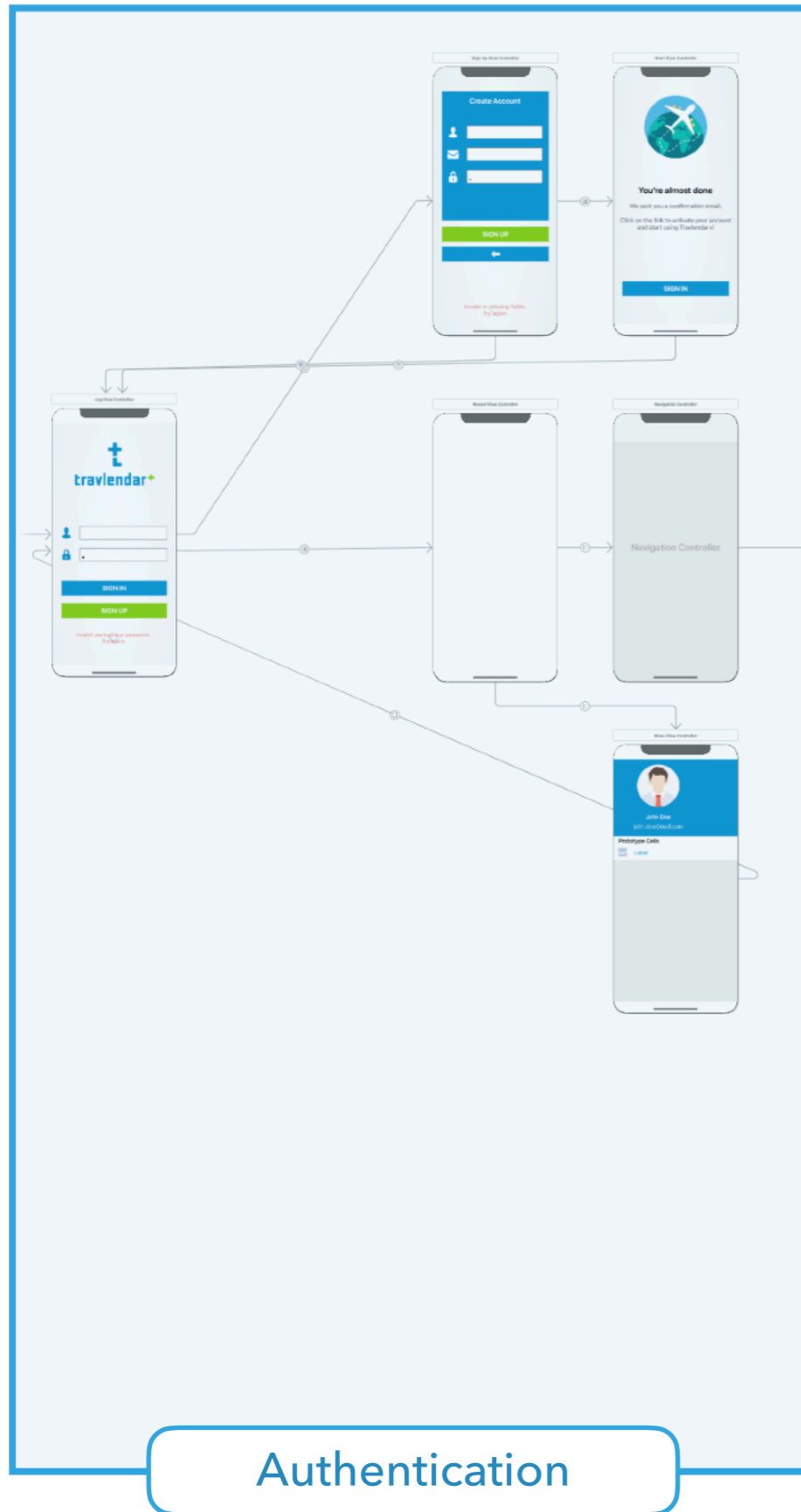


FRONT END DETAILS

- **Target:** iOS 11
- **Language:** Swift 4
- **Frameworks and SDKs**
 - *JTAppleCalendar*: build a calendar from scratch
 - *SwiftDate*: manage dates and timezones in Swift
 - *Alamofire*: make elegant HTTP requests
 - *UberRides*: integrate Uber Rides API



FRONT END STORYBOARD

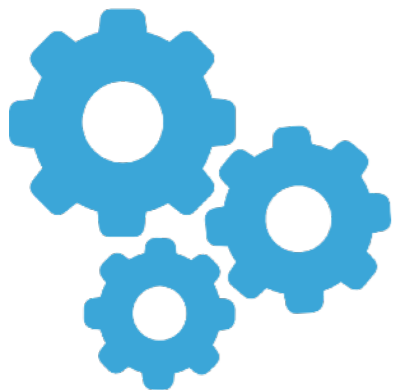


IMPLEMENTED FUNCTIONALITIES

- **[G.1]** Access from different platforms
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TESTING



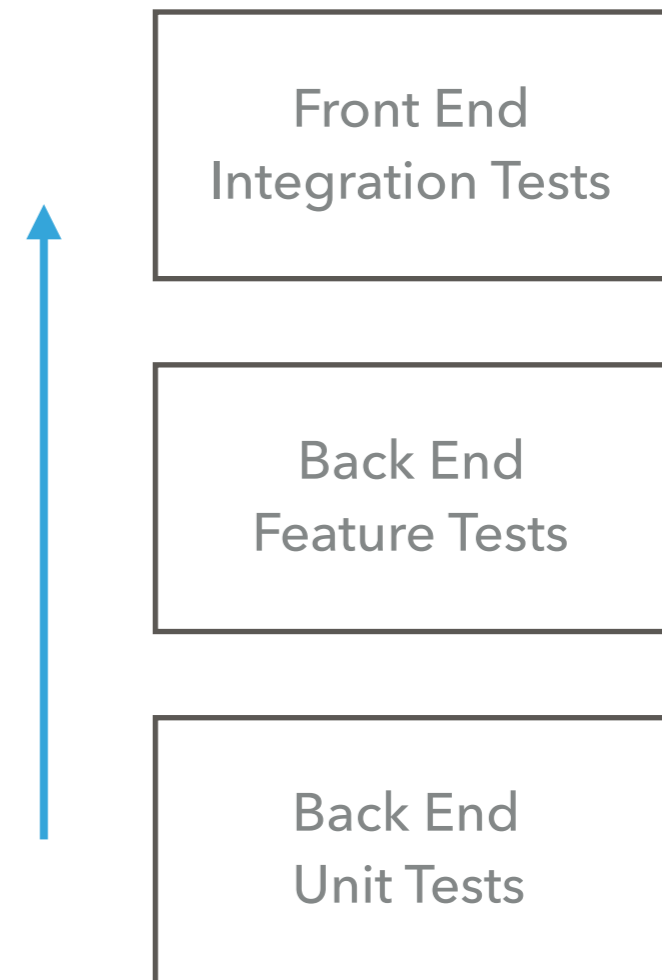
TESTING OVERVIEW

- **Bottom Up Approach**

- Unit test of backend components
- Feature test of APIs
- Integration test of frontend and backend

- **Testing Frameworks**

- PHPUnit
- XCTest



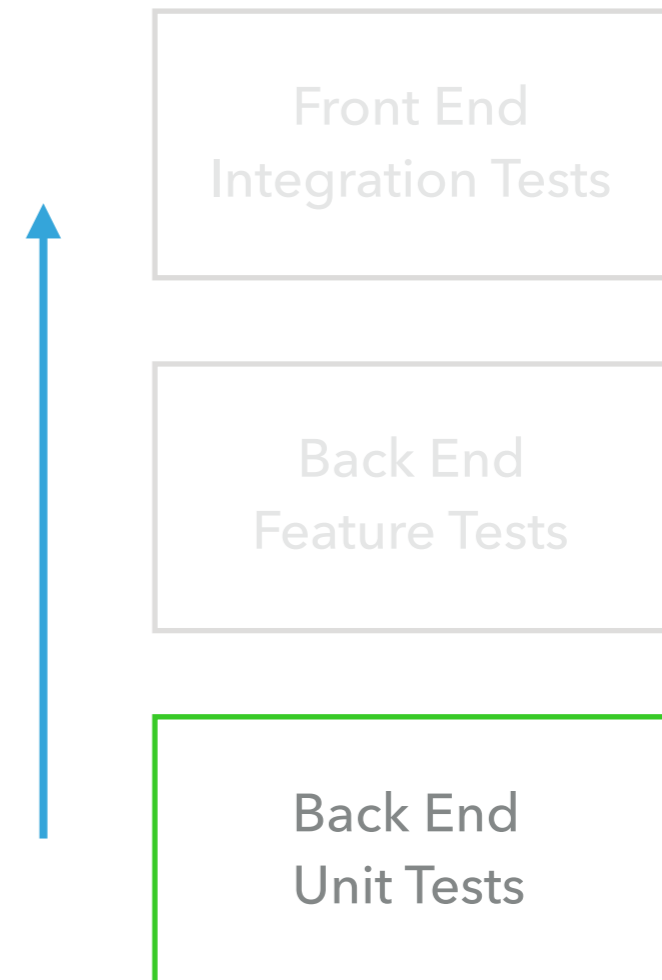
BACKEND UNIT TESTS

Tested Components

- Booking Interface
- Maps Interface
- Constraint Satisfaction Problem solver
- Feasibility Manager

Performed Checks

- Functions return values



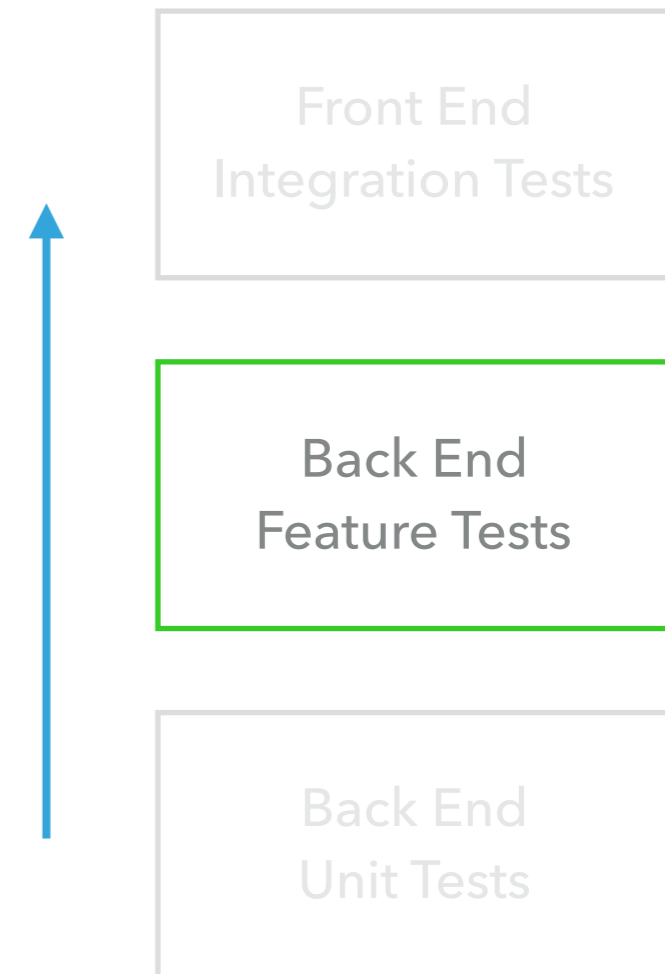
BACKEND FEATURE TESTS

Tested APIs

- Authentication
- User Management
- Event Management
- Booking
- Travel

Performed Checks

- HTTP response code
- HTTP response body
- Data storage and retrieval



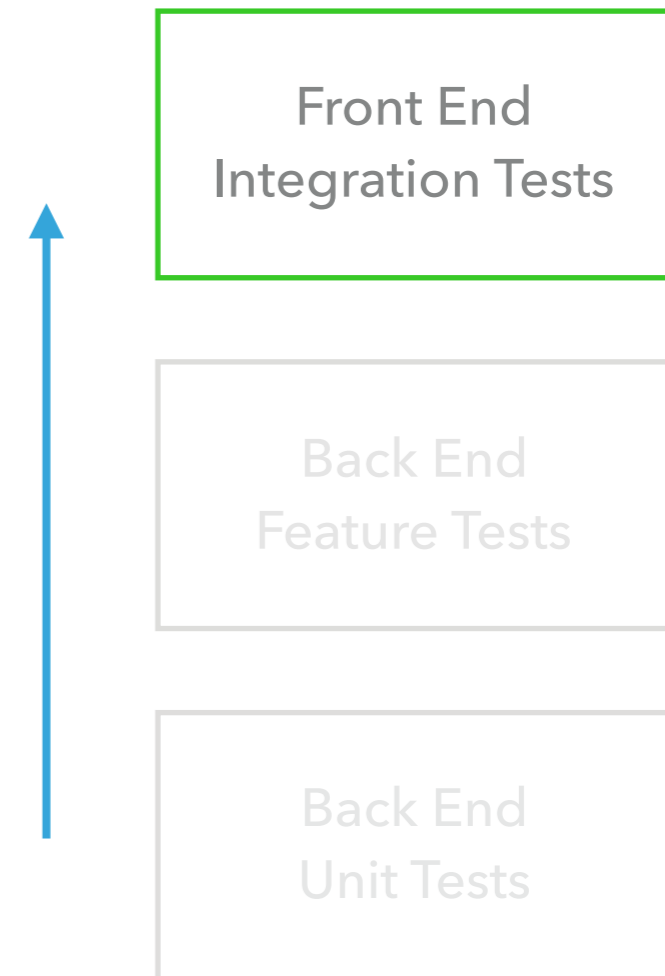
FRONTEND INTEGRATION TESTS

Tested Functionalities

- Authentication
- User Management
- Event Management
- Booking
- Travel

Performed Checks

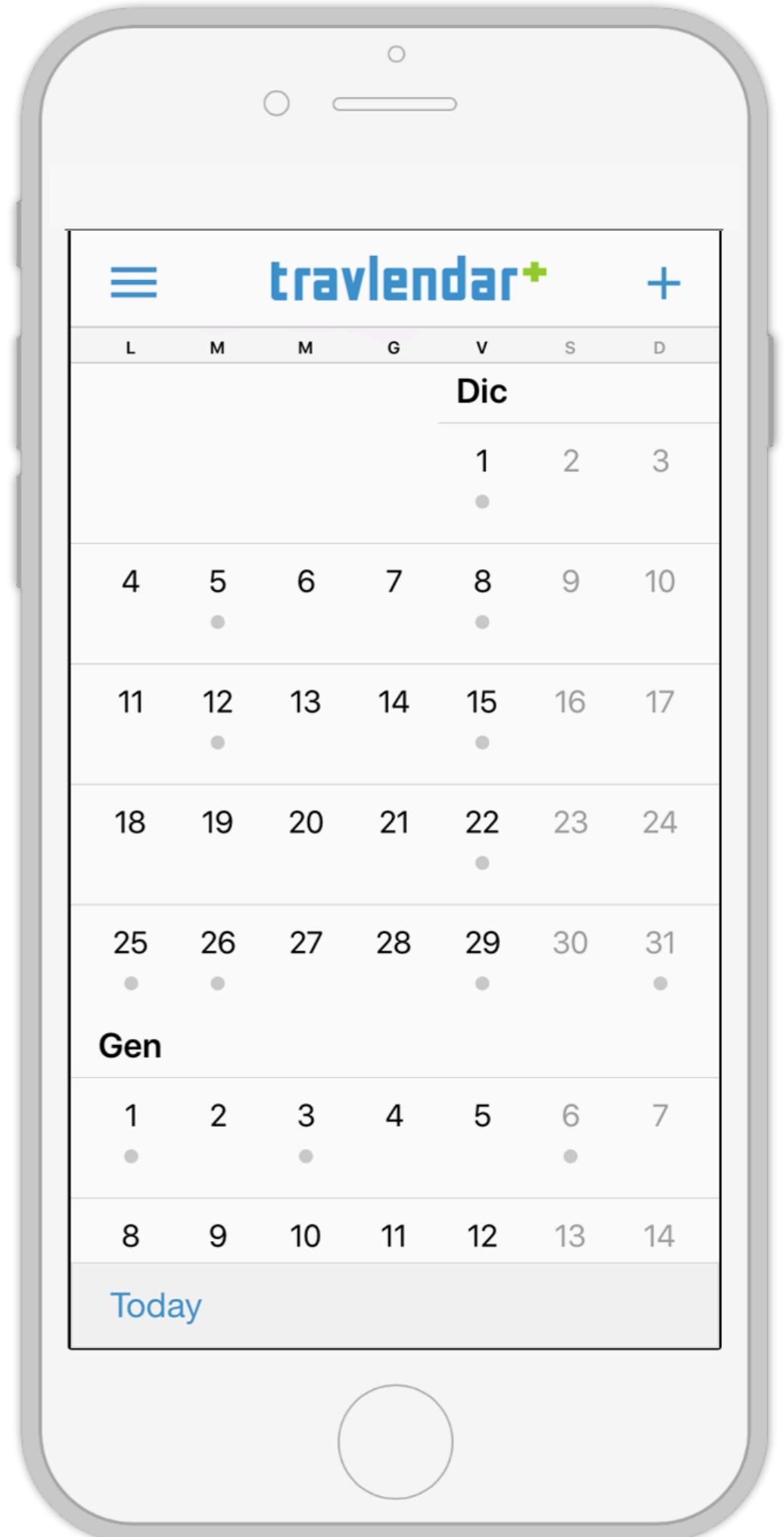
- HTTP response code
- Effects of requests on the system



DEMO VIDEO



- SIGN UP
- CONFIRMATION EMAIL
- LOG IN
- ADD STANDARD EVENT
- ADD RECURRENT EVENT
- ADD "LUNCH" EVENT
- AUTOMATIC ADJUSTMENT
- SET PREFERENCES
- ADD EVENT WITH TRAVEL
- BOOK RIDE WITH UBER
- DELETE EVENT
- SETTINGS
- CREDITS
- LOGOUT



SOFTWARE ENGINEERING 2



THANK YOU FOR YOUR ATTENTION

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