

DREAM

Data-dRiven PrEdictive FArMing in Telangana

Authors:
Kinga Marek
Józef Piechaczek
Mariusz Wiśniewski

Goals



Improve farmers performance by providing them with personalized suggestions.



Acquire, combine, and visualize data from external systems.



Facilitate performance assessment of the farmers.



Promote regular farms' visits by agronomists, depending on the type of problems they face.



Enable agronomists to exchange information with farmers.



Enable farmers to exchange their knowledge.

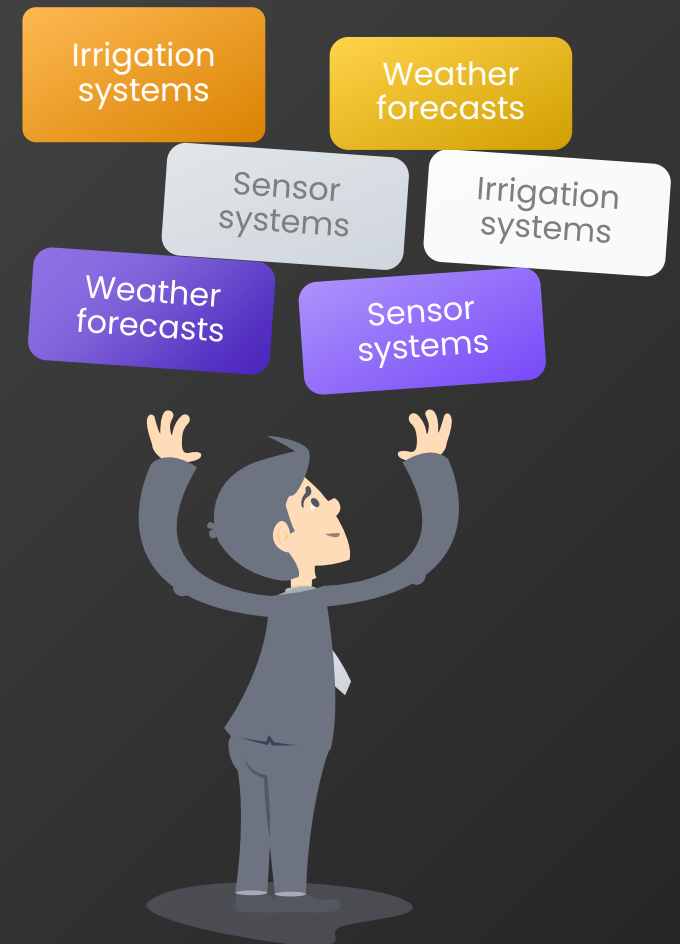
External systems

Shared phenomena:

SP4. The system reads and stores information about short-term and long-term meteorological forecasts provided by the API of Telangana's government.

SP5. The system reads and stores information about the amount of water used by each farm, provided by the water irrigation system's API.

SP6. The system reads and stores the data collected by the sensors at a given farm, provided by the sensor system's API.



Use cases

- Farmer: Request help
- Farmer: Create forum thread
- Policy maker: Assess farmer's performance
- Agronomist: Manage daily plan
- Agronomist/Farmer: Create help response

Important requirements

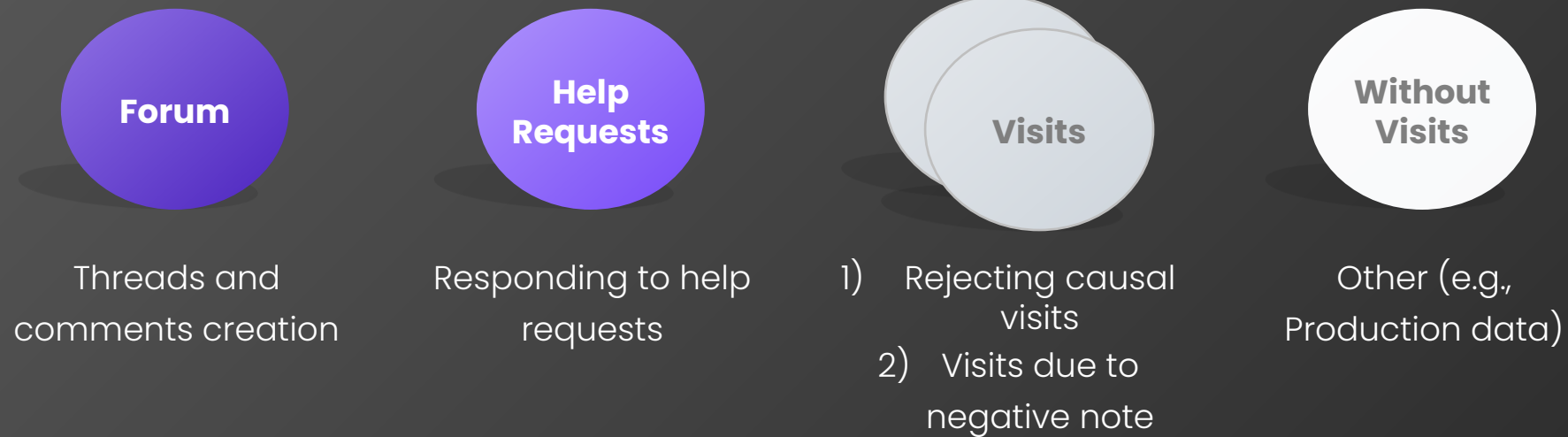
- (R5) The system must ensure that two casual farm visits are scheduled for each year of the farm's existence.
- (R10) The system must allow a policy maker to assign a note to a farmer.
- (R14) The system must ensure that a farm is visited more often in the event of any problems.
- (R26) The system must allow a farmer to manage his monthly production data.
- (R32) The system must allow a farmer with a positive note to see a list of all help requests in his mandal.
- (R43) The system must allow a farmer to create a forum thread.
- (R52) The system must allow an agronomist to see a list of all help requests in his area of responsibility.

Domain assumptions

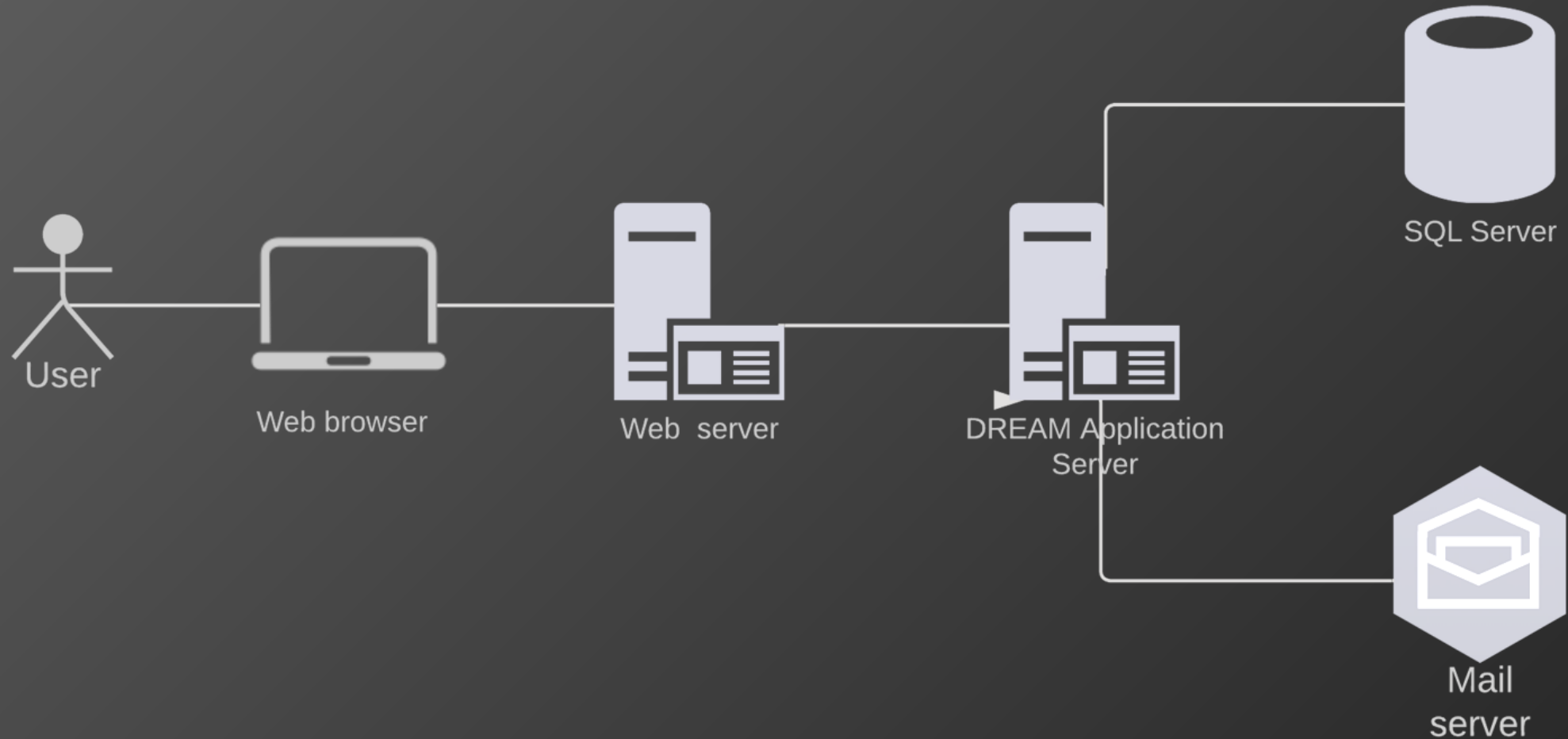
- Each farmer possesses exactly one farm.
- Each farm belongs to exactly one farmer.
- Each farm is inside exactly one mandal.
- Each mandal has at least one agronomist who is responsible for the farms inside that area.
- Each farmer reliably updates his production data each month.

Alloy analysis

Alloy analysis focused on representing most fundamental assumptions and requirements.



High-level architecture diagram



Architectural styles and paradigms

- Client Server
- REST
- JWT

- N-tier application

API

Business Logic

Data Access

2 Visits per Year

The system must ensure that two casual farm visits are scheduled for each year of the farm's existence.

Additional Visits

The system must ensure that a farm is visited more often in the event of any problems.

Daily Plan

The system must allow an agronomist to submit a daily plan's execution state, by rejecting or confirming each visit, on the same date or after the daily plan's date has passed.



Visits Planning

Visit Deletion

The system must allow an agronomist to delete a visit before its date.

Reject Casual Visit

The system must ensure that in case of rejecting a casual visit, a new one is created in maximally 5 days.

Visit Rescheduling

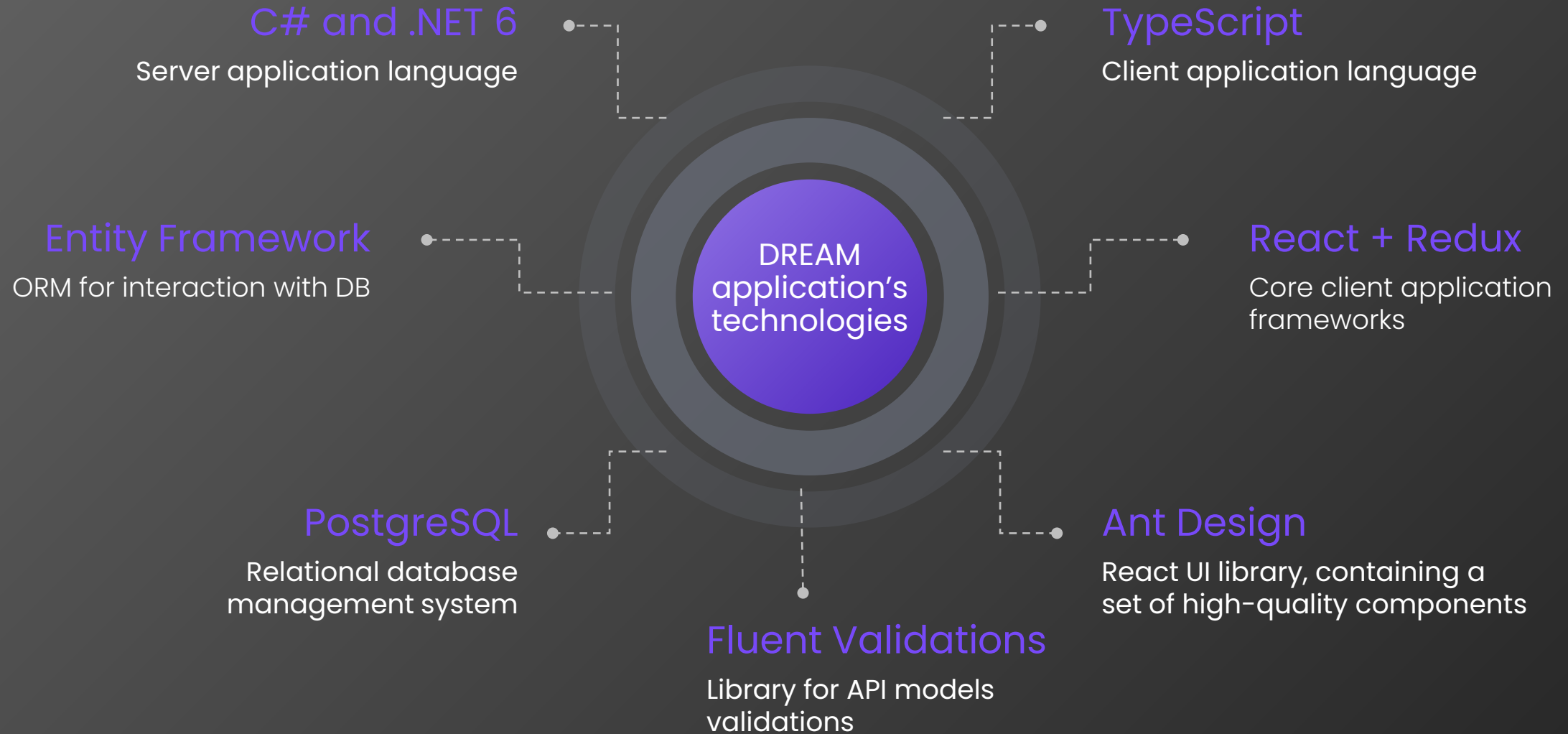
The system must allow replanning any different visit than a casual one without any constraints.

Implementation and testing plan

System tests

Integration tests

- Minimum Viable Product
- Dependencies identification
- Iterative way



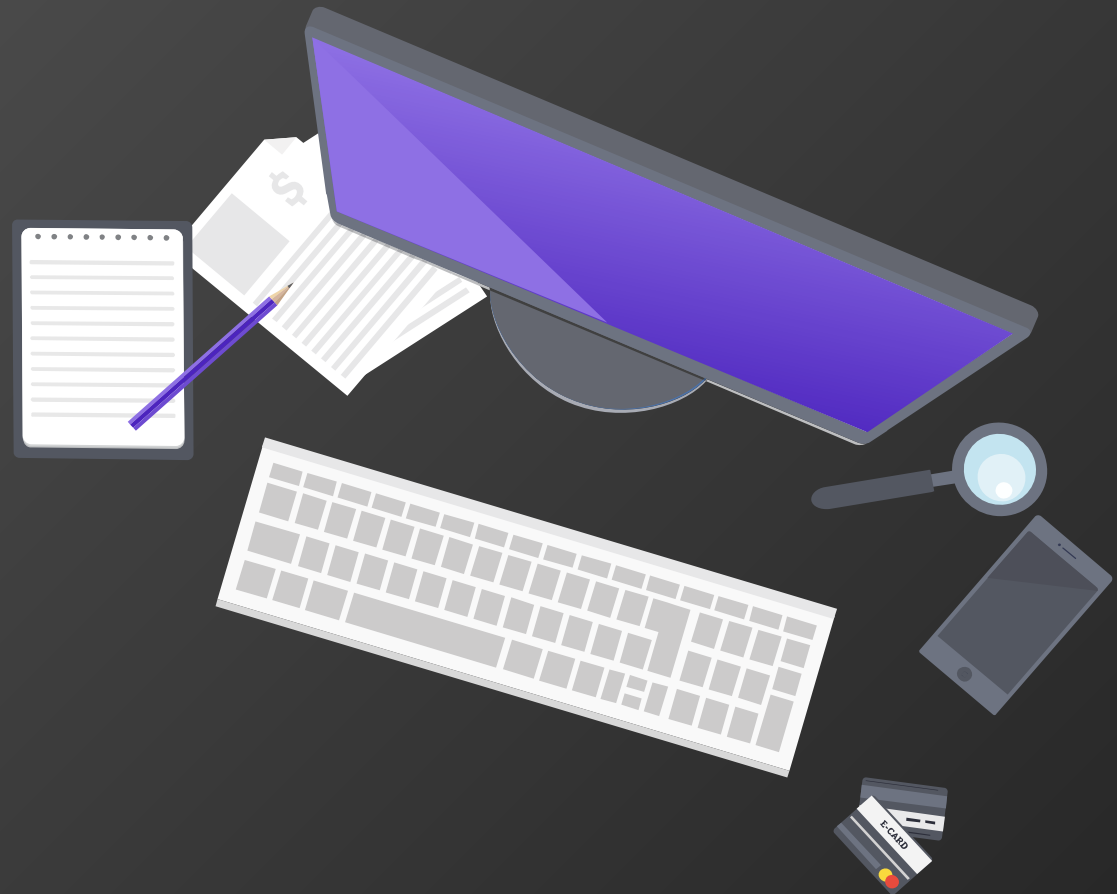
Design patterns

Client:

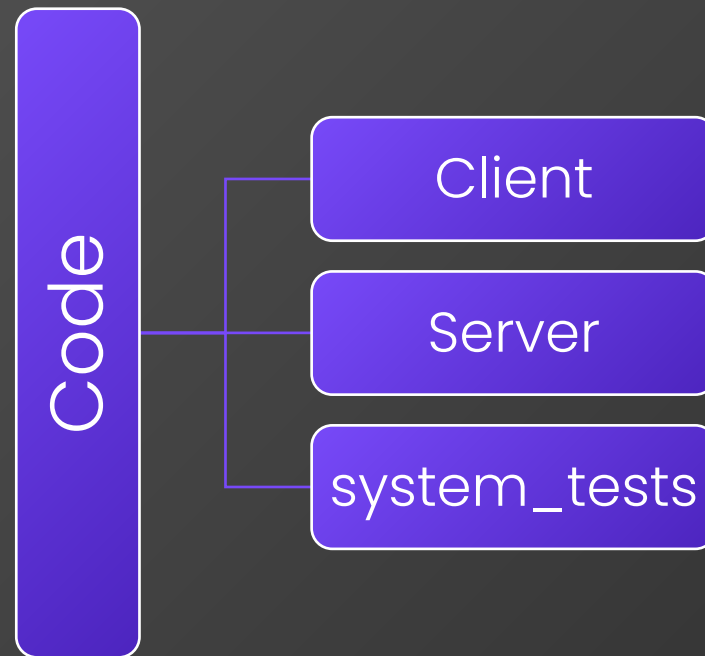
- Functional components
- React Hooks

Server:

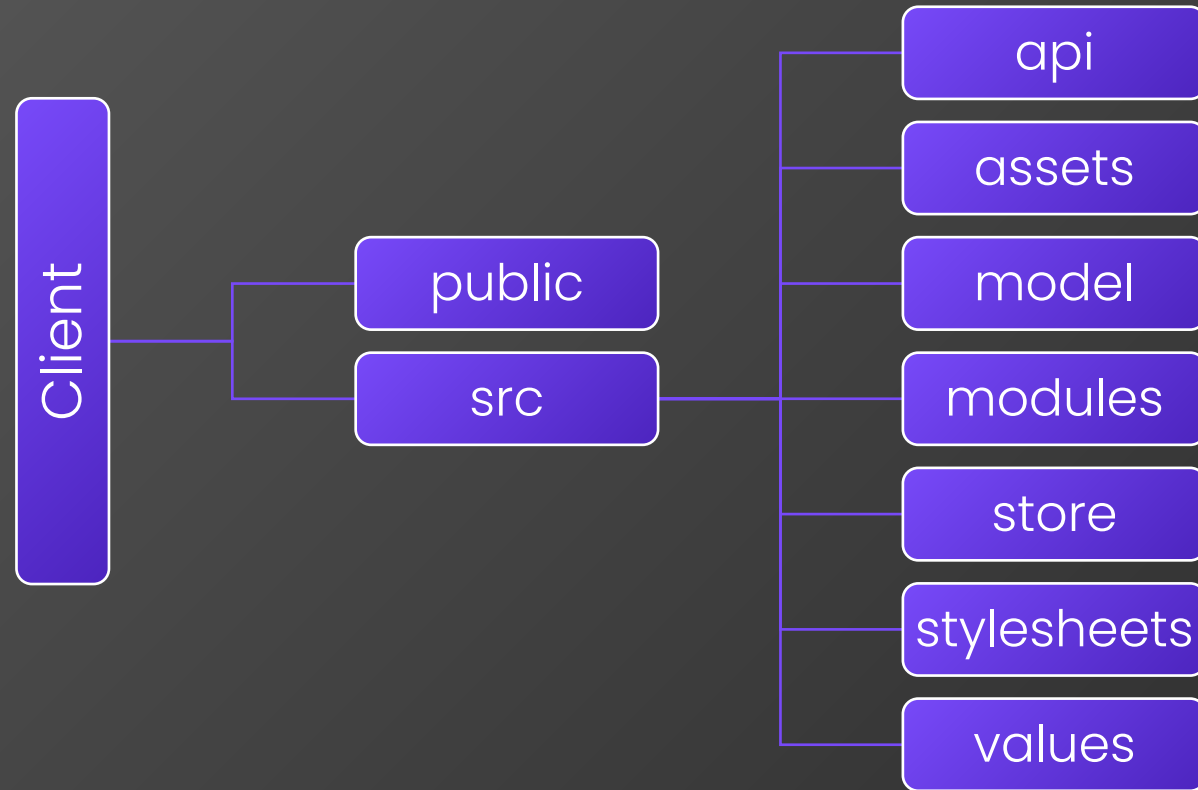
- Data transfer object (DTO)



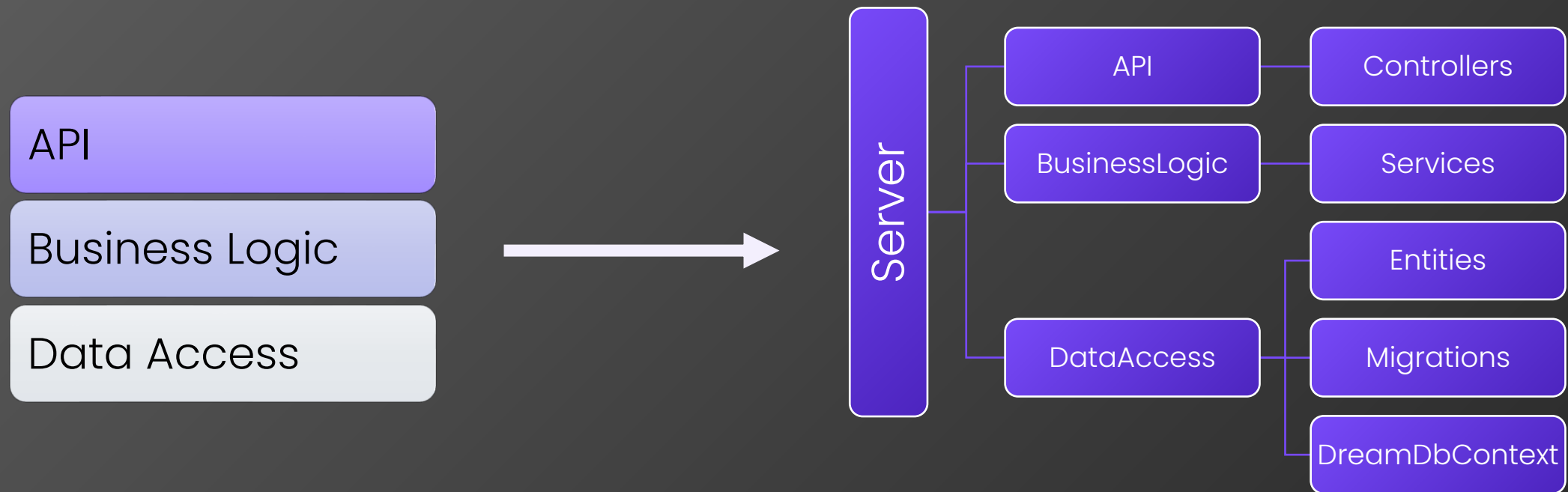
Code structure



Client code structure



Server code structure





DevOps

- *docker-compose up* to run the application
- CI for building the code and automatically running system tests



GitHub
Actions



Docker

Integration Testing



Manual server's API testing



Swagger interface



14 endpoints tested with a total of
53 test cases

System Testing

44 fully automated test cases



python

Programming Language



Selenium WebDriver

Automation



pytest

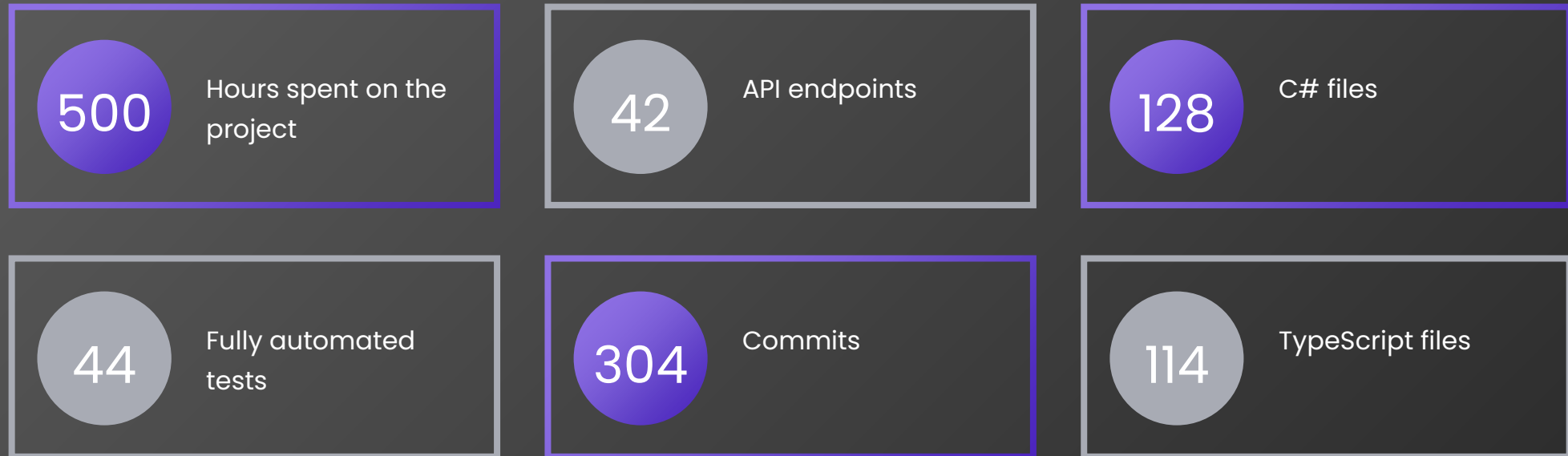
Testing Framework

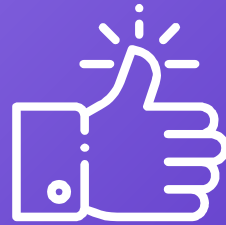


Demo...

A brief showcase of our application

DREAM in numbers





Thanks for
your time!