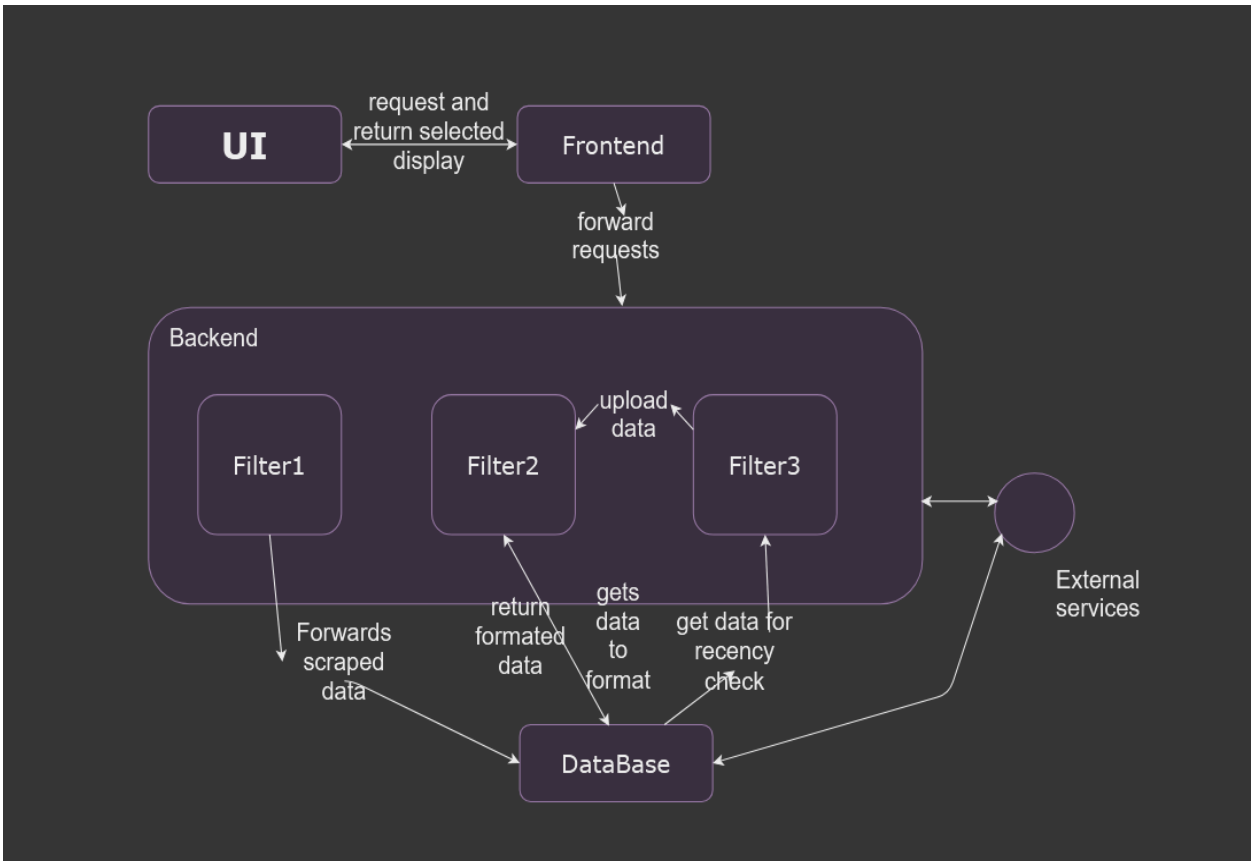
Macedonian Stocks Analyzer – Architectural Design

Conceptual Architecture Model



User Interface / Frontend:

- Displays data,
- Search functionality,
- Issuers data,
- Data visualizations,
- Personalization,
- Report Generation,

Backend:

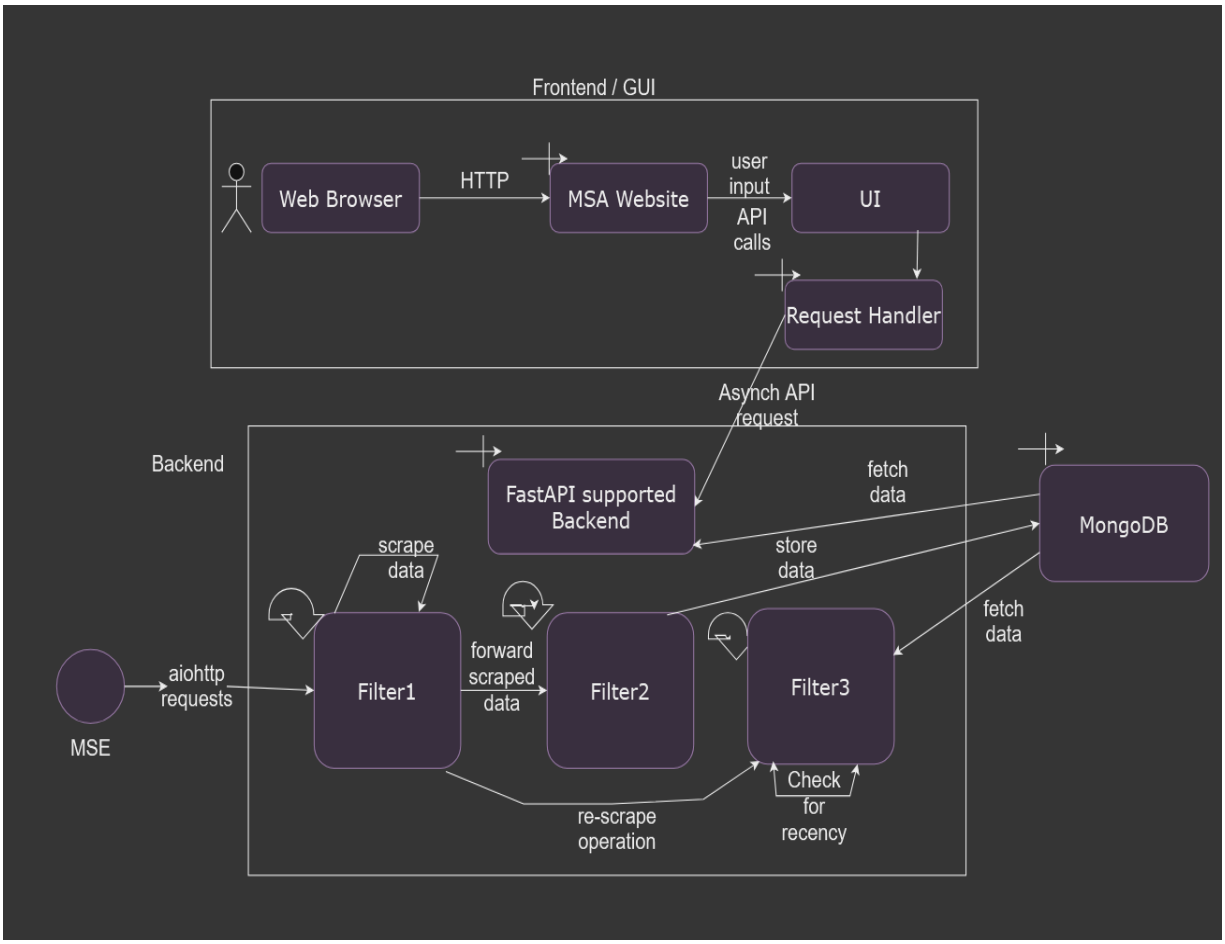
- Process requests sent from the **Frontend** and return results through the API
  - Filter 1: Scrape issuers from the MSE website, validate them and insert them in the database,

- Filter 2: Scrape data for valid issuers, format the price values, and store them in the database,
- Filter 3: Get last scraping date for valid issuers, compare to the user's system date, and scrape new data if found within the date range.

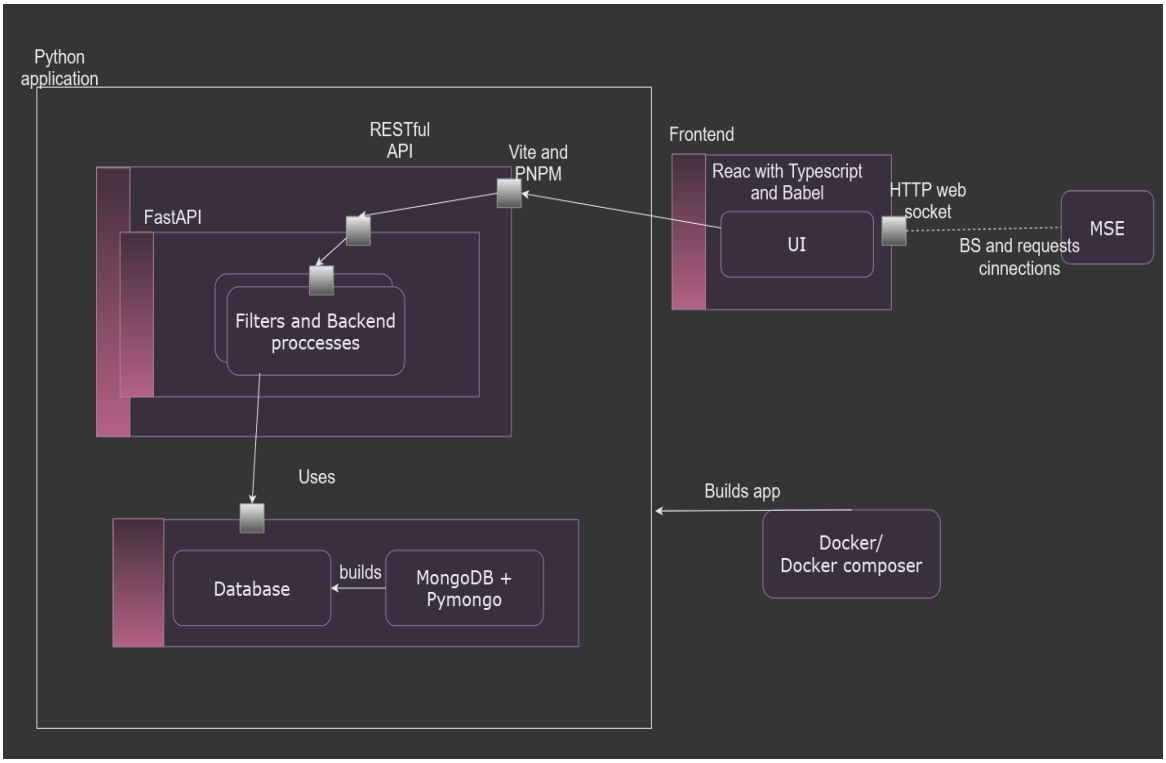
Database:

- Store data,
- Forward requested data.

Execution Architecture Model



Implementation Architecture Model



Frontend (React + TypeScript + Babel):

- Interacts with the backend API (FastAPI) to fetch and display stock data.
- Sends requests to FastAPI for filtering and refreshing the stock data.

Backend (FastAPI + Uvicorn):

- Exposes REST APIs to interact with the frontend.
- Manages the execution of **Filter 1, Filter 2, and Filter 3.**
- Handles interactions with **MongoDB** to store/retrieve data.
- Manages asynchronous execution.

MongoDB:

- A NoSQL database that stores processed stock data.

Docker and Docker Composer:

- Used to build the application before running it.

Technologies and Tools

1. Frontend:

- ReactJS with TypeScript and Babel,
- Interactive UI,
- API integration.

2. Backend:

- FastAPI (Python-based framework for RESTful APIs),
- Uvicorn (ASGI server for concurrency),
- RESTful API endpoints for frontend interaction.

3. Containerization:

- Docker (to containerize each component),
- Docker Compose (to orchestrate multiple containers).

4. Deployment:

- Build Docker images for all components,
- Deploy and manage containers using Docker Compose.

Architecture styles and patterns

Layered Architecture

- **Pipes and Filters**
  Processing data decouples and made into a independent system to Scrape data, format, validate and update.
- **Distributed architecture**
- Filters 1-3 all are microservice threads
  All components are contained separately in order to improve maintainability, scalability and to ensure we can easily improve upon the application in the future.

Execution data flow:

- UI send an API call based on user request and input on the UI,
- Backend fetches requested data.
- The data is checked if it is outdated, if so, backend will initiate an update.
- Processed data is then sent to the frontend for displaying.

Implementation aspect:

Model View Controller

- Model: MongoDB – storage
- View: React with TypeScript and Babel – UI and frontend technologies,
- Controller: FastAPI – backend request handler.

Database acts as a repository, abstracting data access and operation.

FastAPI and Uvicorn use asynchronous request messages.

Hybrid architecture overview:

The application uses:

- Layered architecture
- Pipes and filters
- Threads and microservices
- Distributed architecture
- MCV and repository systems
- Asynchronous invocations
- Containerization