



Green Vault

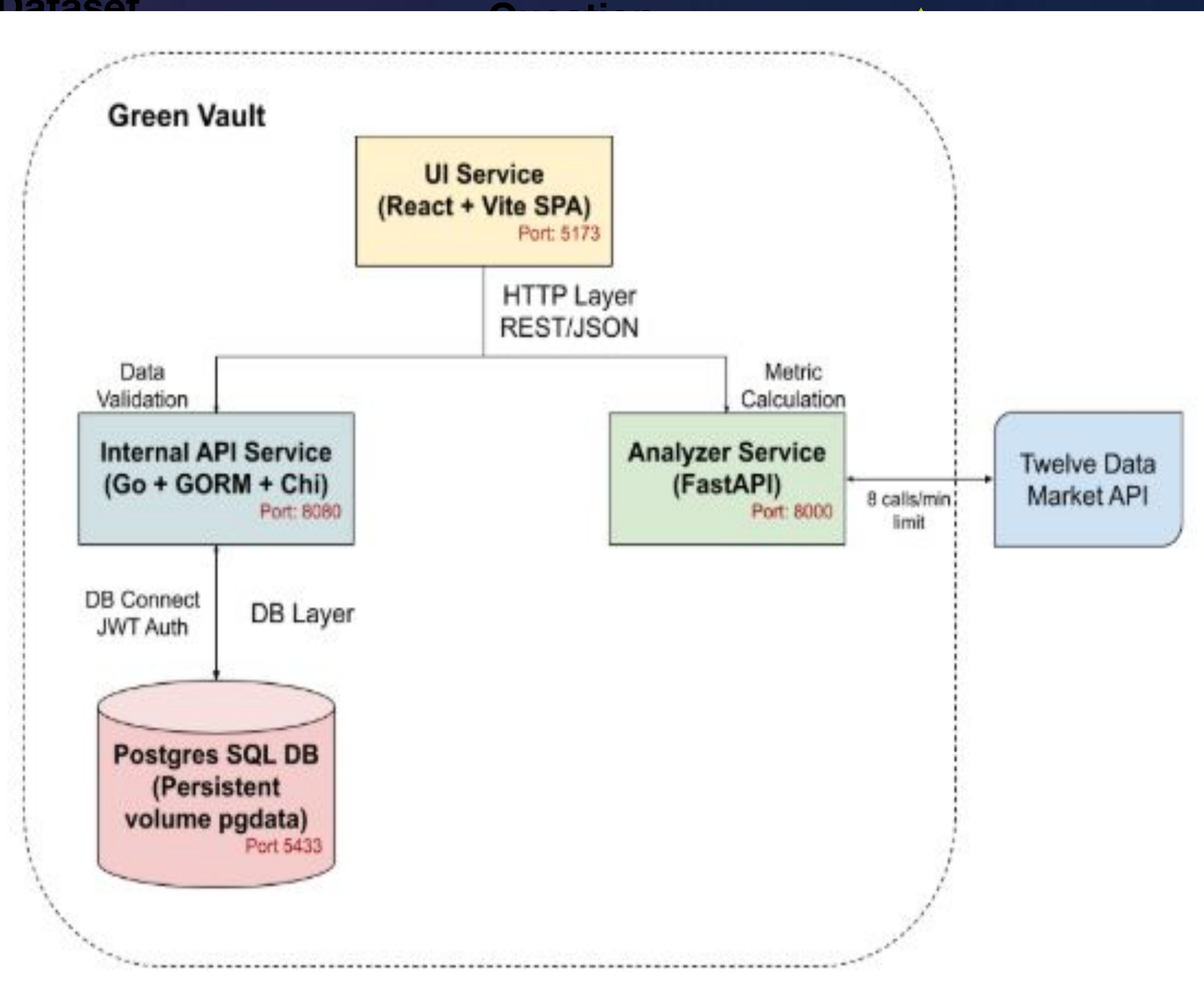
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PROBLEM

The main problem Green Vault solves is that most traders, especially beginners and intermediate-level users, receive a trade fill but have no clear way to understand whether their execution was good or bad. It leaves everyday traders without guidance on slippage, timing, or how market movement impacted their trade.

Our solution takes the provided user trader and outputs a clear analysis. Our application fetches 1-minute Open, High, Low, Close, and Volume (OHLCV) market data from a Twelve Data API and computes hidden metrics, such as Volume-Weighted Average Price (VWAP) slippage, shortfall, effective and realized spreads, impact, and drift. These are then used to evaluate the user’s performance and output a clear review with explanations.

SYSTEM DESIGN



CURRENT SYSTEM

Most traders today do not measure their execution quality in any structured way. The majority of traders make a trade and check their fill price and what it was around the time they traded. Experienced traders may check the VWAP for some of their trades, but it is time-consuming and often insufficient. On the other hand, large institutions use expensive Transaction Cost Analysis tools to compute detailed metrics. These are often inaccessible and too detailed for most traders. As a result, there is not a consistent way for traders to analyze and understand their performances.

OBJECT DESIGN

- UI: Displays all application features. (Malik)
- Internal: API Auth validation and database insertions. (Rodrigo & Daniella)
- Analyzer: Calculates metrics and determines performance. (Giorgio & Audrey)
- Database: Stores user data. (Rodrigo & Daniella)



REQUIREMENTS

- Functional:**
- GO handles auth, account creation, updates, deletion, and data storing in the database.
 - Analyzer accepts and verifies user inputs, and returns errors if necessary.
 - UI handles errors and outputs them in a handled verbose response.
- Nonfunctional:**
- Service always available as long as the trades are performed within valid hours.
 - User data remains local and private.
 - Users authenticated with JWT tokens, no exposure of keys, and credentials are safe.
 - 0 Common Vulnerability Exposures (CVEs) from Chainguard Images usage.

IMPLEMENTATION

Front UI:

- React
- Vite

Programming Language:

- python

Analytics Service:

- Python
- Twelve Data API
- FastAPI

Auth & Internal Backend:

- Go
- Chi
- PostgreSQL
- REST/JSON
- testcontainers

Persistence:

- Docker Volume for Postgres

Images:

- Chainguard Images (Golang, Python, Node, Postgres)

System Integration:

- Docker Compose

• TailwindCSS

• Docker

• React Router



VERIFICATION

- The internal API service validates routing, authentication, and database persistence via Go Tests, serving as the system’s sole gateway to PostgreSQL to ensure data integrity and durability.
- The analyzer service uses a rate-limited client and pytest to validate its analytics workflows, operating as a stateless component intentionally isolated from all database access.



SUMMARY

Green Vault addresses the lack of accessible execution-quality tools by providing clear trade analysis for beginners and deeper metrics for intermediate users. The platform ingests a user’s trade, retrieves relevant market data, computes execution metrics like slippage and spreads, and stores results through a structured backend designed for secure authentication, validation, and data management.

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