

Massive Recycling System Portal for the Government of Hong Kong

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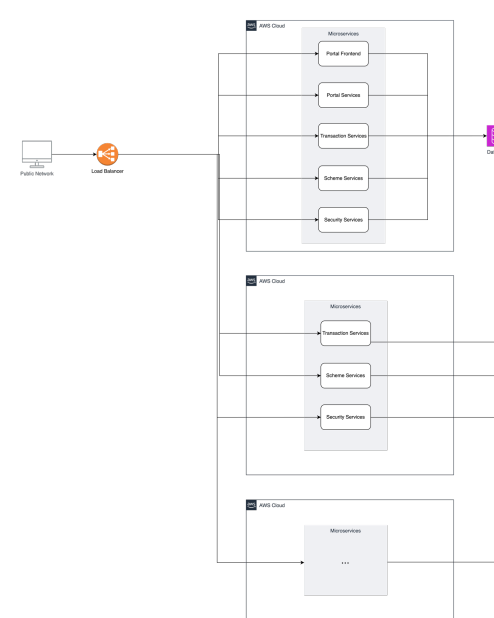


Introduction

To address the growing waste issue, the EPD introduced the GREEN@COMMUNITY initiative, aiming to promote a greener living culture by expanding recycling networks and implementing the GREEN\$ Electronic Participation Incentive Scheme (GREEN\$ EPIS). The scheme has gained widespread support, with over 200 mobile recycling points in operation, attracting around 3.8 million visitors and collecting over 14,400 tonnes of recyclables in 2021.

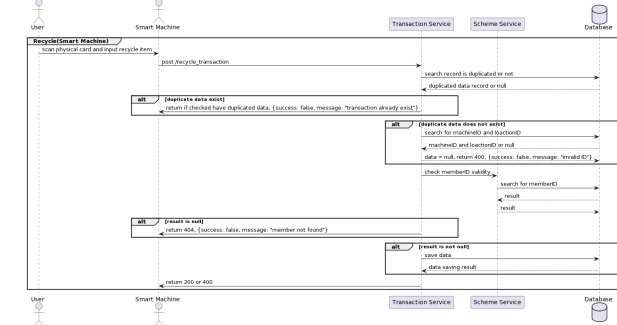
To effectively manage the increasing workload and data volumes generated by the program, the EPD recognized the need to enhance the existing data management portal developed by Sengital. This project was initiated to upgrade the portal, providing better support for stakeholders in terms of data management, insights extraction, and administrative tasks. The upgraded portal will also improve reliability, performance, and maintainability to accommodate the growing data size, ensuring the continued delivery of excellent service.

System Diagram



Microservices architecture is applied to decompose different functionalities of the EPD system into 5 service modules, namely:

- "Portal Frontend",
- "Portal Service",
- "Transaction Service",
- "Scheme Service" and
- "Security Service"



Transaction Service recycle flow

Technology stack for the portal:



Frontend



Backend



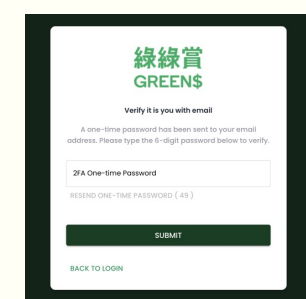
Infrastructure

Objectives

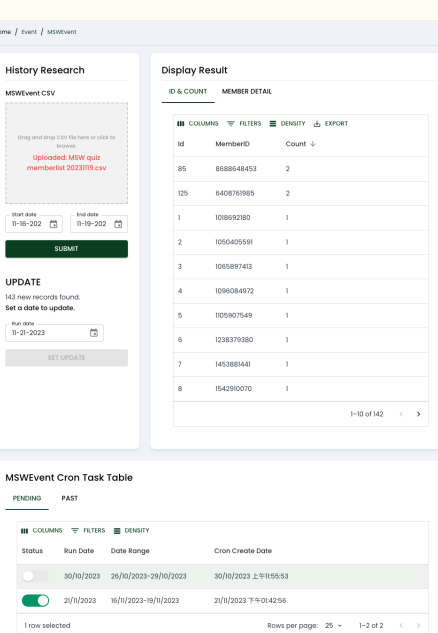
1. Upgrade portal for staff workflow efficiency enhancement.
2. Provide data insight efficiently.
3. Ensure portal security.

Design

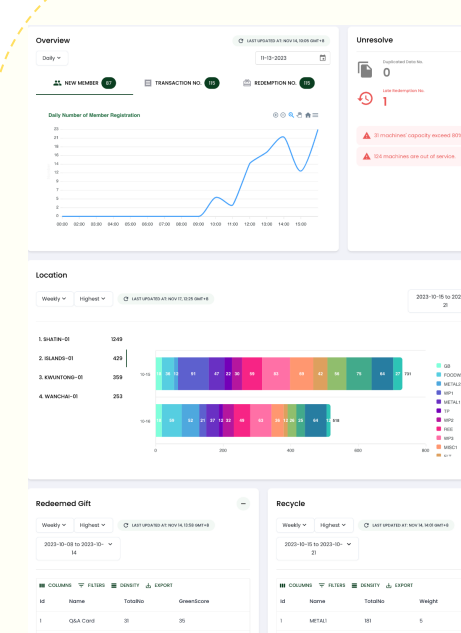
Portal use case diagram with new features highlighted.



Email Verification / My Profile Page



Event Page enables EPD staff to upload a CSV file containing user data, then specify a start date and end date to filter the data, and lastly, generate a list of qualified \$GREEN members. Staff can also set a date for database updates.



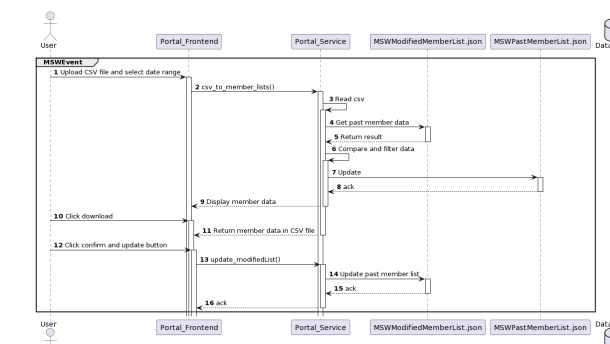
Both the Dashboard Page and the Analytics Page are for displaying KPIs and trends from the data collected in the scheme.



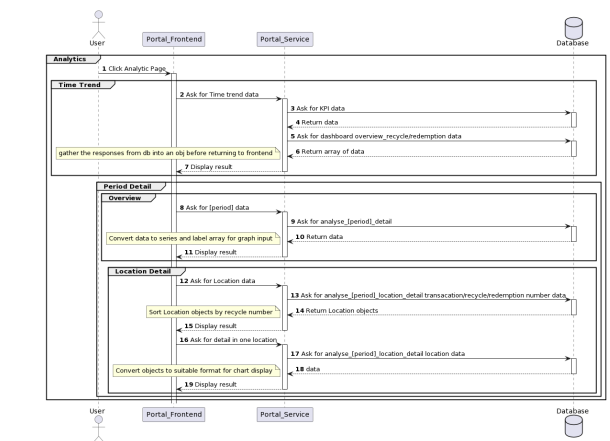
New database structures were designed for the newly aggregated data display on these pages.

Implementation

Event Page Sequence Diagram



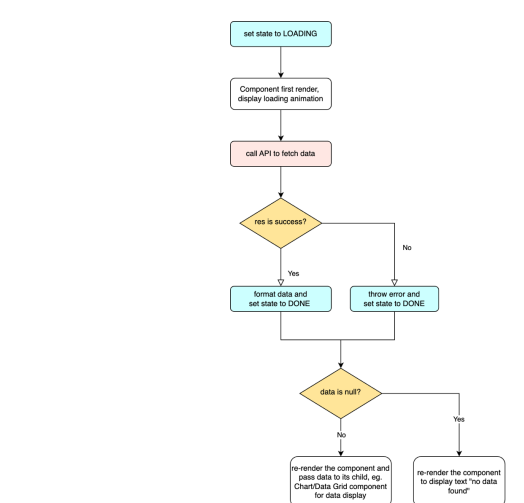
Analytics Page Sequence Diagram



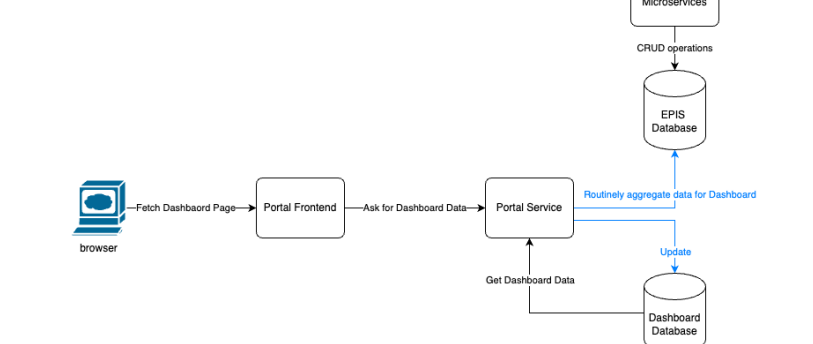
New APIs were created, they can be summarised into 5 modules:

- Dashboarded Module
- Event Module
- 2FA Module
- Cron Module
- Analytics Module

Component & API Interaction Flow Chart



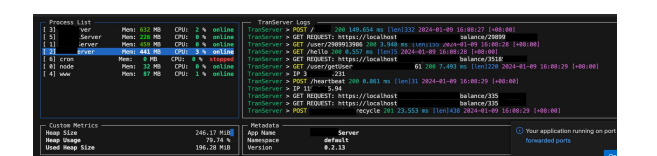
Dashboard System Diagram



- 2 new databases are created for analytics and dashboard page.
- Cron tasks for aggregating dashboard data were implemented.

Testing

- Conducted unit test and integration test with simulated data generated by Faker library on testing network.
- Monitored the health and performance of running processes



Conclusion

This project has successfully enhanced the portal by adding new features for streamlining administrative work and visualizing data, as well as implementing email verification method and user access control.