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Original Article

Personal Expense Tracker utilizing Amazon Web Services

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***Abstract** - Tracking spending is one of the most important components of a person's daily existence. The most effective method to utilize our wealth is to be aware of our spending patterns. We can determine whether our money is being spent wisely by keeping track of our expenses. Additionally, it enables us to develop appropriate handling methods for a range of issues, including debt. Hence, we developed a minuscule application that serves as a tool for someone to keep track of their regular expenditures and wallet balance. Users may monitor and amend their purchases, enabling them to maintain tabs on the remaining money in their wallets. As scalability is a major issue that could potentially hamper the progression of our project, we turned to build this application via Amazon Web Services. The powerful features and services offered by AWS, from security to data storage, have enabled us to focus entirely on our project requirements and milestones in place of the logistics. This project could be beneficial for the common people to maintain their wallets. Moreover, small businesses would find this application beneficial when maintaining a certain capital amount.*

***Keywords** - AWS, Cloud, Digital, NoSQL, Python, Scalability.*

1. Introduction

Personal Expense Tracker is designed to track the income and expenses of the non-earning members of any family daily. It was initially arduous for these family members to keep track of his/her budget and expenses owing to a lack of an income stream and a lack of knowledge about money management. The Personal Expense Tracker is developed keeping in mind the type of users who are most likely to use this application as it can help him/her manage his/her expenses and budgets. "PET", as we call it, is developed to manage everyday costs more proficiently and reasonably. By utilizing this application., we can decrease the manual estimations of day-to-day costs and monitor them.

In this application, users can provide his/her initial budget to be maintained, and these results will be stored per user and displayed on the dashboard along with their weekly and monthly expenses. The app notifies the user of his/her current budget standings every time he/she logs in to his/her account using a notification service. Using expense tracking management software will help control unnecessary expenses as a graphical representation of the expenses is provided to the user. Hence, this application suitably handles the necessities of a non-earner of any family.

2. Existing System

In the current design, we expected to keep up with the Excel sheets, CSV and so on documents for the client's day-to-day and month-to-month expenses alongside wallet balance support. There was no complete solution to monitor its day-to-day consumption without any problems. To do such, committed staff were expected to keep a log in a journal or on a PC. Likewise, every one of the computations should be finished by the client, which may, in some cases, brings about mistakes prompting misfortunes.

Limited computing resources backed application designs of previously implemented Expense Trackers. So, the problem with creating this application is that user data representation and management lacked scalability. With the ever-growing user market, requirement management has become a crucial part of easily running applications. To overcome the restricted server space in managing the application, we turned to Amazon Web Services (AWS).

3. Related Work

The creators Babad and Balachandran (1993) expressed that conventional expense bookkeeping systems keep upwith all overheads in a single pool and give equivalent load to movements of every sort and cost in it. We have always known that "pen is mightier than blade". However, that thing does not fit with each errand; it fluctuates from a need to a needwhen the sum of information is huge. It turns out to be much harder to deal with them disconnected.

An exploration at college in Tennessee on cost tracker by Dan Underwood (2011): In which utilizing success, the bookkeeping group planned an Expense Distribution

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instrument 1 in which a calculation sheet is utilized to dispense the item class both by site and the collaboration and an Expense portion instrument 2 which is a created to additionally coordinate and designate expense to distinguish which producer is beneficial or which is not. This examination succeeded and planned this Feline apparatus in which both the calculation sheets are expected to be used to distinguish where we could diminish costs or betteroversee it.

Girish Bekaroo (2007) explored a canny web-based spending plan that deals with the costs and is used to give the graphical examination of data. It utilizes an Objective Brought together Strategy (RUP), which was much more productive and worthwhile in the manner it usedto advance code reuse and encapsulation. In which CSS and XML innovations have been utilized.

Scientists of Nandha and Anna university (2016) made an android rendition of cost supervisor in with they involvedpost and comment procedures for underlining the costs and a portion of the information-digging highlights for examining the market esteem well.

Ravi Sharma (2017) expressed that clients now andagain feel awkward in imparting their own data to an application, and he recommended that security and convenience are the two main issues. Indeed, even the high-level UI needs to keep up with maintenance.

Specialists of Mother Teresa University, Andhra Pradesh (2019), likewise expressed a web-based pay and financial plan tracker in a site mode. The venture utilized CSV mode to store information which had a downside in its current model as it cannot deal with the information effectively.

Some of the previous research include amicable solutions to the expense tracking conundrum. However, it is quite apparent that when it comes to scalability and security issues, most of the earlier projects faced problems. Hence, we resorted to using Amazon Web Services as part of our solution to protect the information better while handling modern-day requirements. This report presents the changes that are still needed and highlights the importance of transitioning into cloud computing from conventional computing measures.

4. Proposed System

The proposed work consists of the following modules:

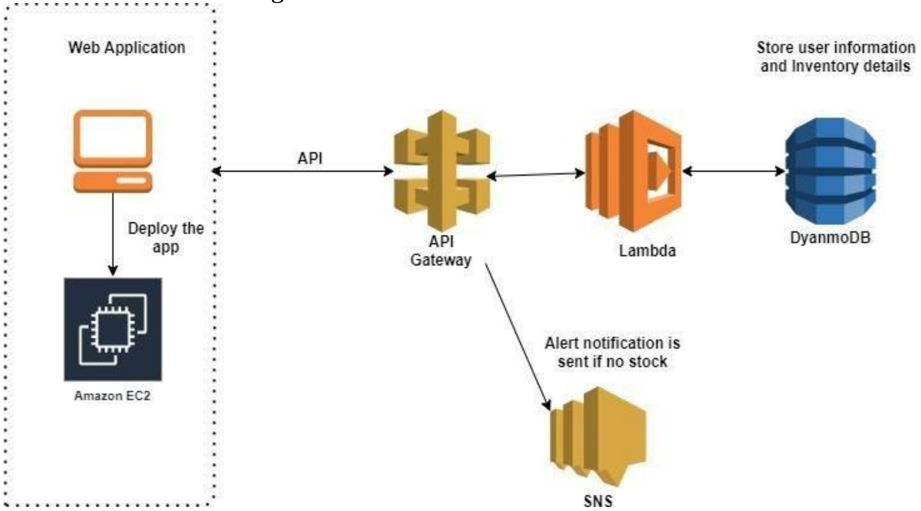

Web Application
Deploy the app
Amazon EC2
API
API Gateway
Store user information and Inventory details
Lambda
DyanmoDB
Alert notification is sent if no stock
SNS

Fig. 1 AWS Architecture (This is the architecture used to realize the Personal Expense Tracker application. It is a combination of a variety ofSaaS, PaaS and IaaS models)

4.1. AWS Services

This is the backbone of our application, allowing it to work in real-time. Initially, all the services must be run, and necessary changes are made to each of these services to enable them to integrate with the other parts of the website. Some of these services are DynamoDB, i.e. used for creating tables and helps act as a database.

4.2. HTML

HTML pages based on the requirement of our system, we created a Registration page, Login page, and Dashboard page to display the current wallet balance and an option to update the balance, add expenses and display a graph of the expenses. Each of these web pages is linked to one another and to the necessary services to enable the working prospect of the website.

4.3. Flash Application

Used Python - Flask framework as amiddleware to merge the services with webpages.

4.4. Docker

It is an open platform for app development, deployment, and operation. Docker let quickly delivers software by separating applications from the infrastructure. The infrastructure can manage just like managing the applications with docker. In this scenario, we utilize docker to pull our project from the git repository. All the files related to the existing system are pulled from docker and run on the EC2 instance generated via command prompt.

5. Implementation and Results

In terms of the implementation of the project, we make useof the following AWS services:

EC2 represents Amazon Versatile Register Cloud, apiece of Amazon's distributed computing stage. It is essential for Amazon Web Administrations; it permits clients to lease virtual PCs to run their PC applications.

Elements of Amazon EC2:

- Virtual processing conditions, known as cases
- The cases are limited by various processors, memory, stockpiling, systems administration designs, oroccasion types.
- Secure login data, for example, utilizing key match.

5.1. DynamoDB

DynamoDB is an AWS Administration's information the base framework that upholds information structures and key valued cloud administrations. It permits clients the advantage of auto-scaling, in-memory reserving, reinforcement and re-establish choices for all their web-scale applications utilizing DynamoDB.As a component of Amazon.com's portfolio of Amazon Web Administrations, Amazon DynamoDB is a wholly overseen exclusive NoSQL information base support that supports key-worth and record information structures. DynamoDB permits clients to make information bases equipped for puttingaway and recovering any measure of data and traffic.

5.2. Lambda

Clients of AWS Lambda make capabilities, independent applications written in one of the supported languages and runtimes, and move them to AWS Lambda, which efficiently and adaptably executes those capabilities. The Lambda capabilities can play out any sort of registering task, from serving website pages and handling floods of information to calling APIs and incorporating with other AWS administration.

AWS Lambda is a fully supervised management that handles all the basics. So "serverless" does not mean that there are no servers involved. It simply means that the servers, workspaces, organizational layers, and otherfoundations have been pre-addressed so we can focus on building the application code.

5.3. API Gateway

Soothing APIs and WebSocket APIs, which enable applications that enable continuous two-way correspondence, can be created with the help of an API gateway. Web applications, containerized and serverless tasks, and programming interface Door are supported. Programming interface Passage takes care of all the tasks that come with handling up to a lot of simultaneous programming interface calls. These tasks include traffic management, approval and access control, choking, checking, and programming interface rendition of the executives. The programming interface Entryway does not have any initial costs or base costs.

5.4. SNS Service

It offers a cheap infrastructure for the widespread distribution of communications, primarily to mobile users. Amazon Simple Notification Service (Amazon SNS) is a messaging service with complete management for application-to-application (A2A) and application-to-person (A2P) communication. It may reach many users with messages using SMS, mobile push, and email thanks to A2P capability.

There is a two-way link between all the services this is because all the services either show data or use it in some other way with another service. For example, the data is stored in the DynamoDB tables using the help of lambda code and API gateway. The notification alerts are used when the wallet balance falls under a minimum threshold. Using the ec2 instance all the components of the service are linked together; we make use of the 8080 ports.

We also generated lambda codes and corresponding API Gateways based on the requirements. Also, python flask code is written to integrate the front andbackends. Html and CSS pages are written, in this case for the login, registration, dashboard and expense managementpages.

For the app to work, we must generate an EC2 instance andusing docker pull our program codes so that we can channelthem and obtain the output. The ec2 instance is deployed byusing the docker image that we pull.

The code used for pulling and running the docker image are:

- sudo docker pull docker_image_name
- sudo docker run ~p 8080:8080 docker_image_name

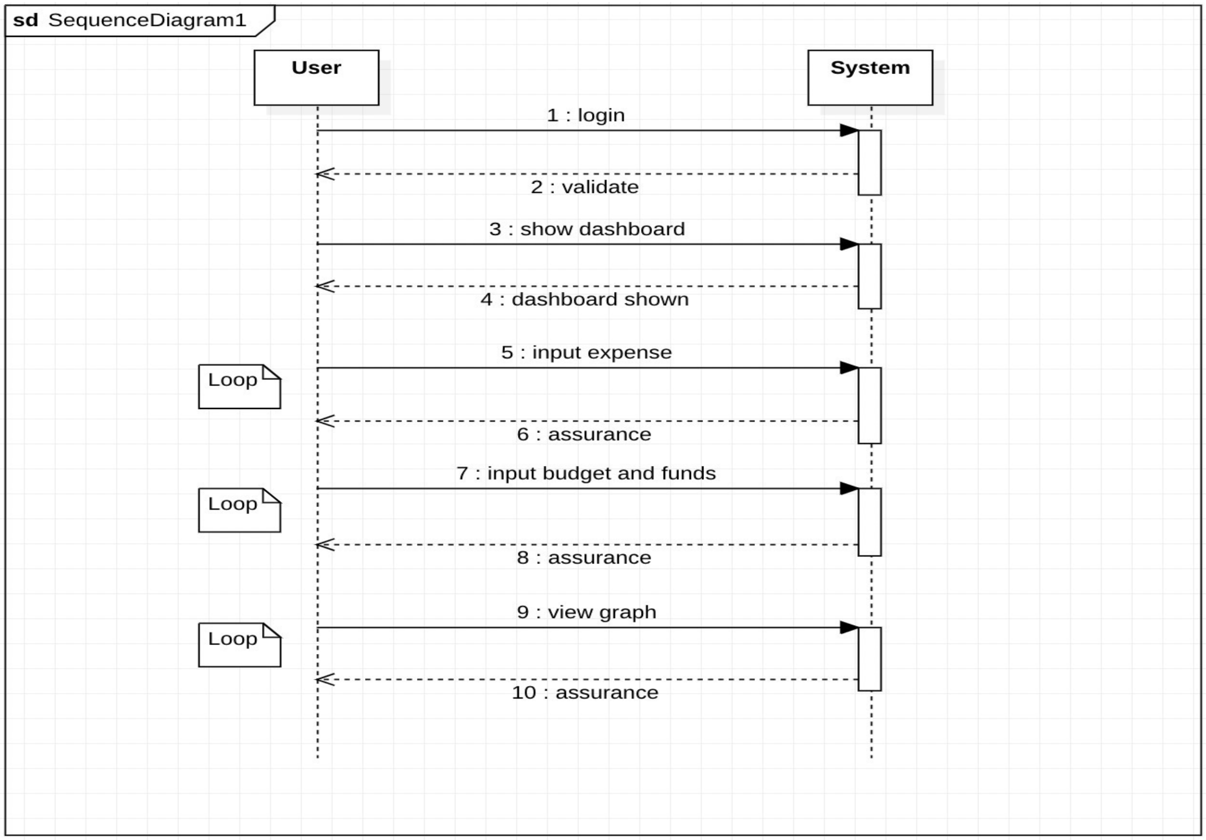
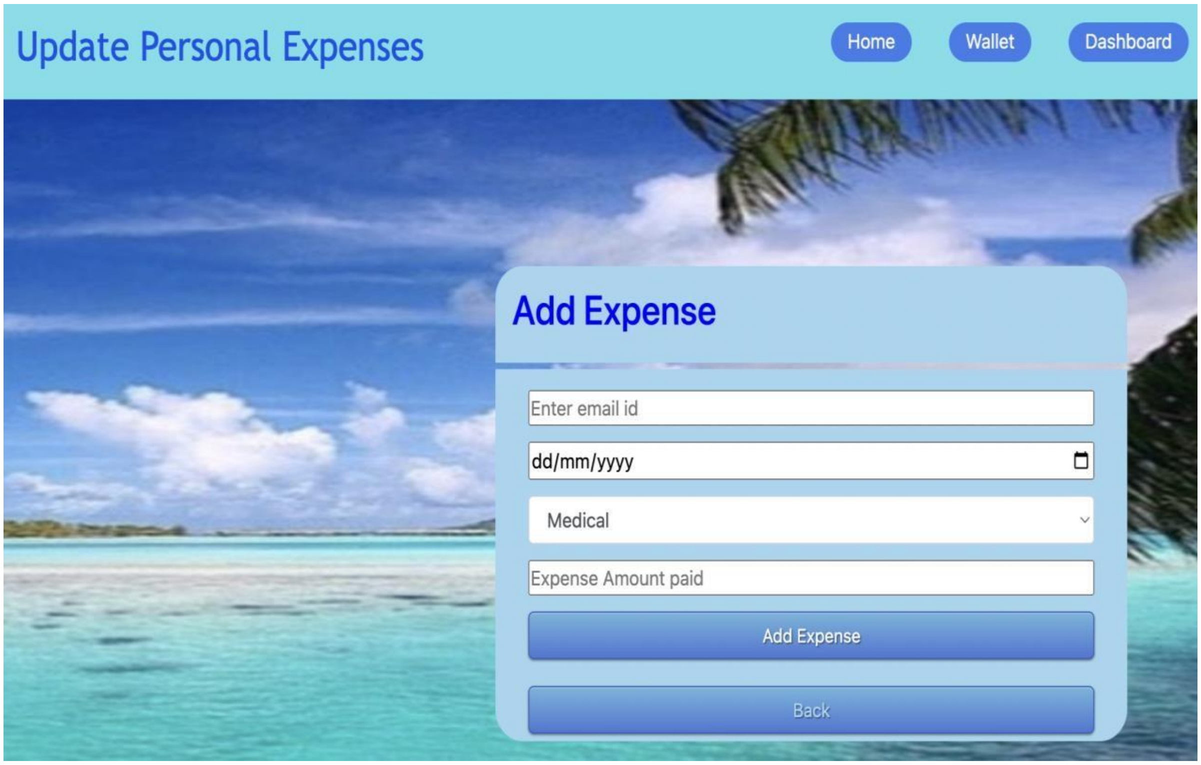


Fig. 2 System Sequence Diagram


Update Personal Expenses

Add Expense

Fig. 3 Expense Updation Page

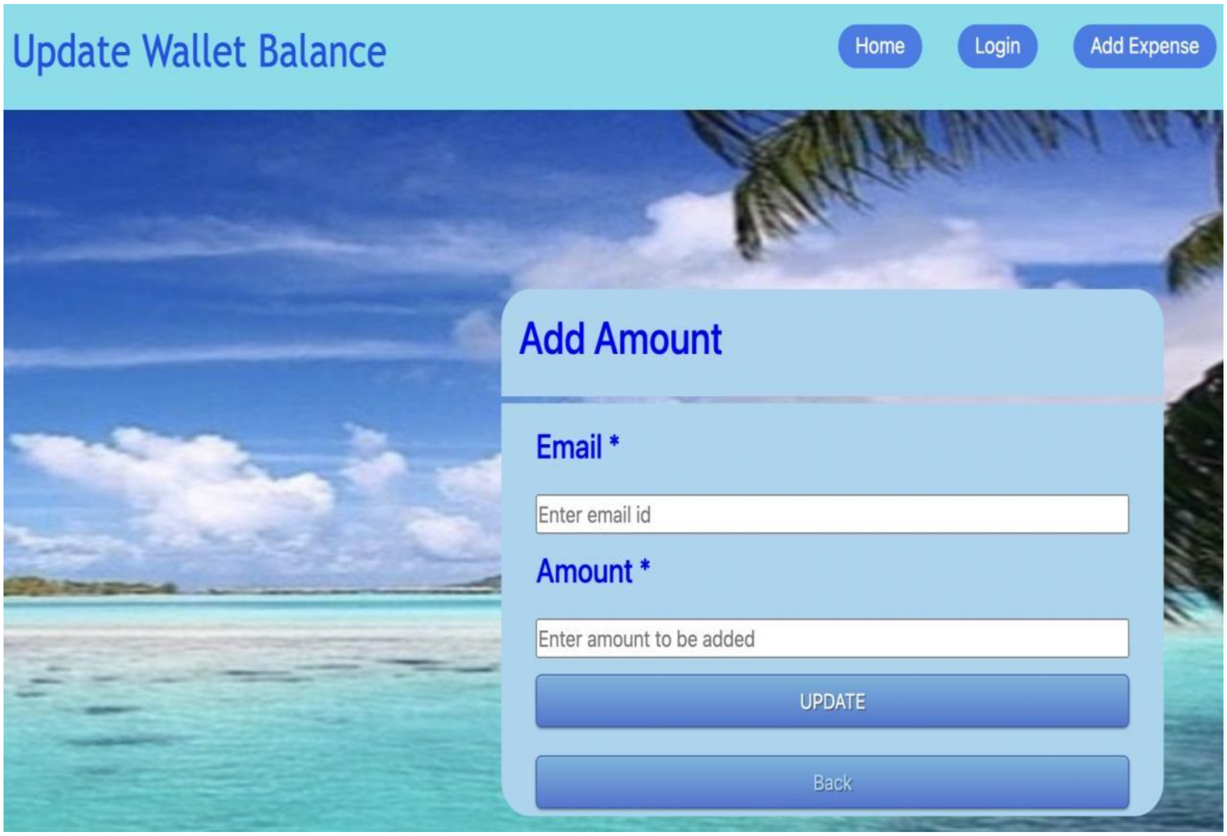


Fig. 4 Wallet Balance Updation Page

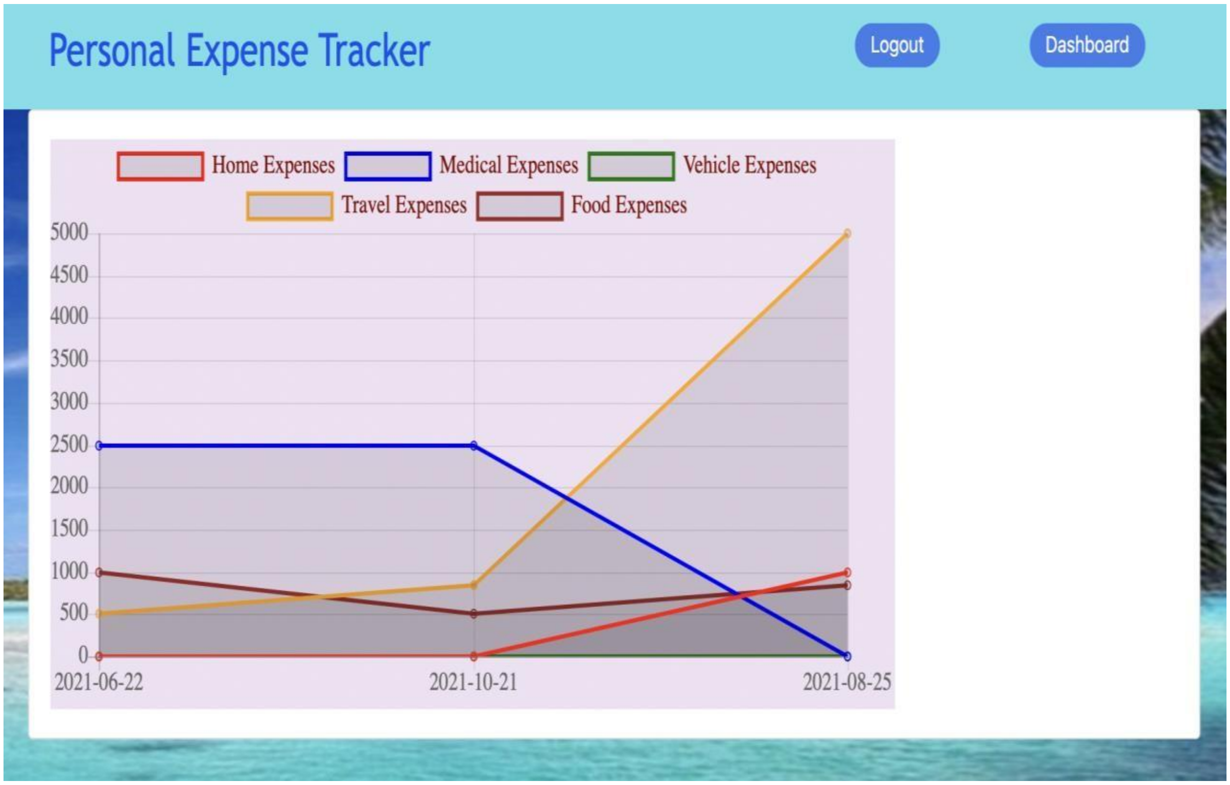


Fig. 5 Expense Visualizer Page

6. Conclusion and Future Work

Possible work which can be done on this project in thefuture:

- More functionalities like receipt capture, location settings, and backup data are in our sights.
- The project can be expanded as per the need of the users (through feedback).
- UI developments to make this application more user-friendly are something to look forward to.
- Monthly budget feature to be included soon.
- Planning to synchronize with a bank account so upcoming bill alert should be mailed to the user

In end to our discoveries and our undertaking, the PET application is useful for the essential over seeing needs of a non-earner engaged in the area of money management and expense understanding. The application is liable for monitoring a variety of expenses in each time period.

Tracking the day-to-day costs can help in shielding cash as well as help in laying out monetary objectives for what's in store. If we comprehend our everyday consumptions, it is not difficult to distinguish and fix pointless and undesirable breaks. This application is created to work more proficiently in contrast with different trackers and stay away from manual estimation on account of AWS. It is created to be effective and looks respectable to its clients.

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