Find my Recipe

An intuitive android cooking app powered by aws

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Abstract— **'Find my Recipe' is an Android app that helps users to access cooking recipes on the internet based on ingredients list provided by the users. This paper describes the design and implementation of the app and how it interacts with Amazon Web Services (AWS). The cloud services of AWS used are AWS Cognito for User authentication, Amazon Lex for chat-bot based ingredients collection and AWS Dynamodb for storage and retrieval of the Recipes.**

The android app for this application app can be downloaded from `https://github.com/lx18327/COMSM0010-Programming-Project`

Keywords: Recipe, Cloud services, amazon lex, Cognito and Dynamodb

I. INTRODUCTION

Cooking is an art that has now been made easier with the advent of technology, mainly the internet. There are thousands of recipes online that individuals can get access to and try. Most of these recipes will need to be browsed to, through a desktop or a laptop - there are only a few mobile based apps that help an user to access such recipes. Even these apps provide directions along with the list of ingredients required. After experiencing a few apps that are freely available, I have designed a chat-bot based app called 'Find my Recipe', that helps users to find recipes on the internet based on the ingredients provided by the users - in short, it helps the users with recipes that can be referred to cook with what they have. This app is an android app that has been created with amazon web services at the background. The app has an intuitive interface with an integrated chat-bot that is capable of getting the list of available ingredients from the user and fetch the recipes that have been stored on the cloud's database. The user needs to authenticate to use the app. User authentication is based on the cognito service of AWS and the chat-bot is based on Amazon Lex. The database used is another AWS service of DynamoDB. This article specifies the details of the app design and implementation. The app is currently designed to fetch a limited set of recipes and is extensible to include a wide range of recipes.

II. COMPONENTS OF THE APPLICATION

Find my Recipe has been built on Amazon Web Services Mobile Hub. Mobile hub has been used to integrate the following amazon web services (fig 1):

A. Amazon Cognito

Amazon Cognito is an amazon web service that helps with user authentication and management for applications. There are two ways in which users can be authenticated direct entry of an user name and password (user name can be a unique name or an email ID) or users can log-in via other social networking credentials such as Facebook, Google, Amazon etc. In this case of Find my Recipe app, we have used the user authentication using Email IDs. Users can sign up for the application and relogin when required using the sign-in function.

B. Amazon Lex

Amazon Lex: Most of the cooking applications that are available online allows the user to specify ingredients by either typing in or selecting from a range of icons. In order to make the app highly intuitive and also a bit more advanced, 'Find my Recipe' app uses the Amazon Lex service. Lex is a service that can be used for building conversational interfaces into any application using voice and text. Amazon Lex uses Automatic Speech recognition (ASR) and Natural Language Understanding (NLU) to decipher voice and convert to text. In the case of Find my recipe, Amazon Lex has been used to enable user input for ingredients based on voice. The user can click on the built-in microphone to input the ingredients. Amazon Lex will accept the user inputs for ingredients and will store the ingredients for the recipes search.

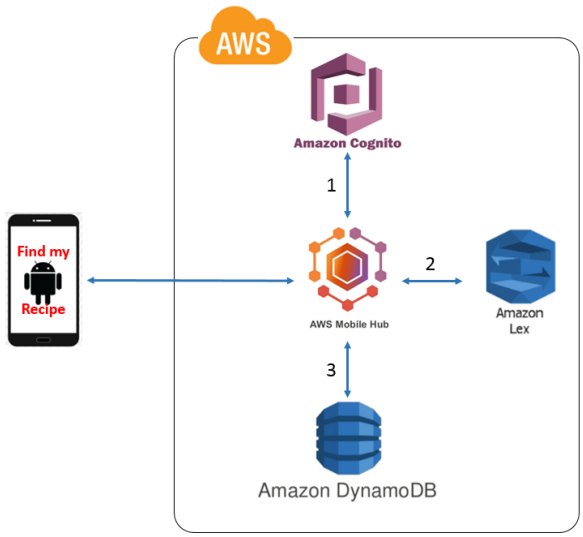

Fig. 1. AWS Services

C. DynamoDB

DynamoDB is amazon web services fully proprietary NOSQL Database that can be used for storage and retrieval of data. DynamoDB is highly scalable, performant and robust for storage and retrieval of data. As per amazon, DynamoDB can handle more than 10 trillion requests per day and support peaks of more than 20 million requests per second. In case of Find my Recipe, DynamoDB is used for storage and retrieval of recipes. This is based on a single table with the below structure and the recipe is pre-populated with recipes.

TABLE I
RECIPE LIST DATABASE TABLE

Column	Data type	Constraints
ItemID	Integer	Primary Key
ItemName	Varchar(100)	None
Ing1	Varchar(50)	None
Ing2	Varchar(50)	None
Ing3	Varchar(50)	None
WebpageURL	Varchar(100)	None
VideoURL	Varchar(100)	None

III. HOW IT WORKS

A. Login Screen

Find my Recipe app has been developed to be user-friendly, even for a beginner. The login screen allows the user to either Register if the user is using the app for the first time or Login if the user has already registered. The app has also been designed to login using Facebook - this can be extended to include other social network login credentials such as Google.

The login functionality has been developed using the signUpBackground and/or SignInBackground methods of cognitoUserPool. AWSHandler handles the return outcome from these methods. The password requirements have been made very simple for the purpose of this project and can be extended. Once the registration/ login is successful, the user is directed to the Homepage of the app.

B. Homepage and AWS Lex

As highlighted before, the most important feature that has been incorporated into the app is the intuitive nature Amazon Lex service has been added on the homepage to reinforce this. The user is expected to feed the ingredients to the app on the homepage. To make this process user-friendly, the entry of ingredients has been enabled as a voice-over function. A microphone icon embedded on the homepage is used for this. Once the user clicks on the icon, Amazon lex service is invoked using the AWSMobileClient function. InteractiveVoicelistener function of lex is triggered and the conversational inputs from the user are passed on the the Lex Backend Chatbot. The CHATBOT service manages the dialogue and adjusts the responses dynamically. Once the conversation is finished and the list of ingredients are finalised, the user will be asked to click a confirm button to proceed.

C. Recipe Listing and Display

Once the user confirms the ingredients and the list is finalised by Lex, DynamoDB call is invoked. AmazonDynamoDBClient class of AWS is used for this with the credentialProvider. The query for fetching the recipes from the Database is trigger by the app using the setter() and getter() methods. Result from the query which is obtained in a JSON format is then parsed and displayed as icons on the mobile screen. The app has been designed to display webpages as well as video links if available.

For the purpose of this project, the app functionality has been limited to get upto three ingredients from the users; however, the choice of Dynamodb has been carefully made to extend the functionality to include more options by making a change to the Database and data extraction/ storage process this has been covered under the Future work section of the document.

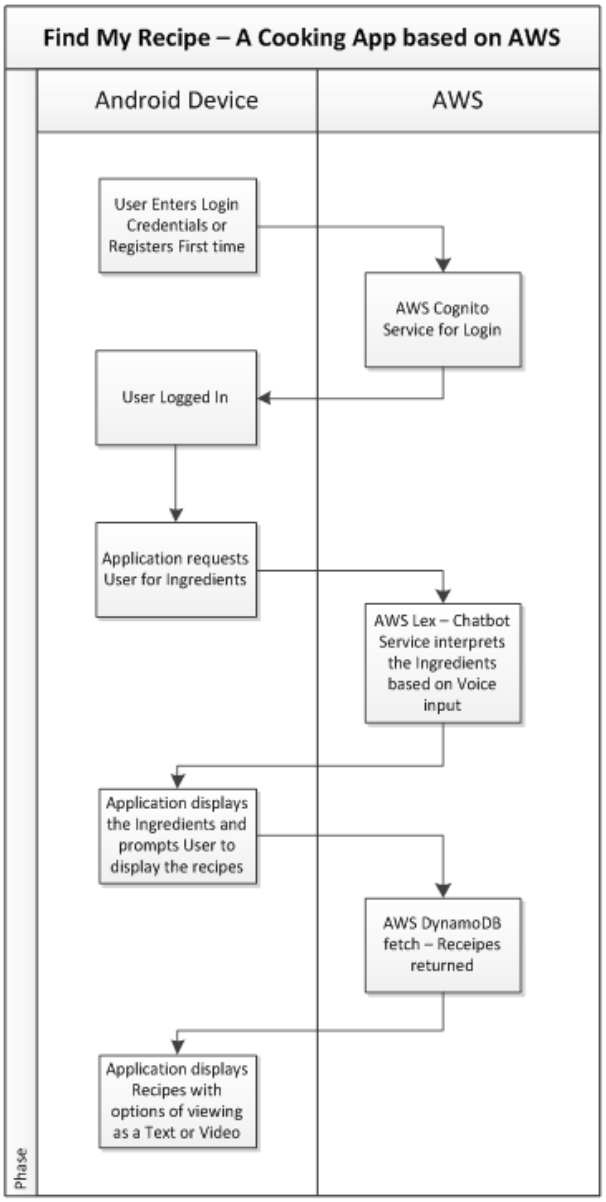

Fig. 2. Application Workflow

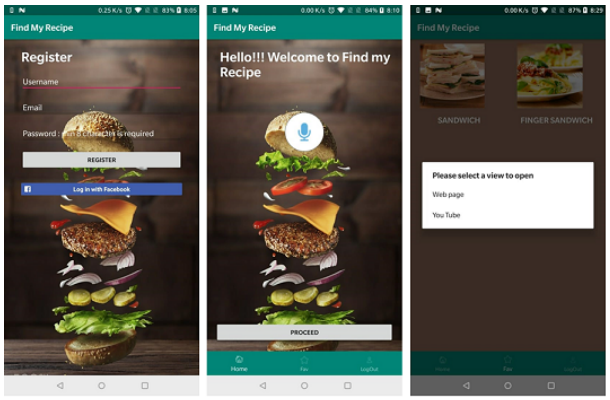

Fig. 3. Application UI

IV. Scalability

A. Extension of Functionality to include inputting of Recipes

Find my Recipe, for the purpose of this project has been designed with the search functionality; however, the design and concept of the app can be scaled to accommodate input functionality too i.e. users can store their own recipes in addition to searching for recipes. Amazon Lex chatbot used by users for inputting the ingredients and storing the recipe links on the Database. For this purpose, we have plans to split the home screen to contain 2 options Feed your recipe and Find my Recipe. Whilst Find my Recipe function works as described in this document, Feed your recipe function will direct the users to recite the ingredients through Amazon Lex and store the recipe link by providing the link to webpage or video.

B. Increase in number of users

One of the prime factors that influence user experience for mobile applications is responsiveness, especially when the app is related to search function, users expect the search results to be popped up fairly quickly. Considering this fact, Find my Recipe app has been carefully hosted on the DynamoDB of Amazon Web Services. DynamoDB is a proven NOSQL Database that provides consistent, single-digit millisecond response times at any scale. DynamoDB global tables replicate data automatically across and automatically scale capacity to accommodate the workloads. With global tables, globally distributed applications can access data locally in the selected regions to get single-digit millisecond read and write performance So, this means that even if the app is used by 1000s of users globally, DynamoDBs global tables design will ensure that the response to queries is very quick. Additionally, AWS DynamoDB also provides the option to use DAX (DynamoDB Accelerator) - As an in-memory cache, DAX reduces the response times of eventually-consistent read workloads by an order of magnitude, from single-digit milliseconds to microseconds.

V. Limitations and Challenges

Given below are a few challenges that had posed a risk to the successful implementation of the application:

- The application development for this project was aimed at utilising the AWS services primarily from an Android application client; this posed a significant challenge in posting complex database queries to the dynamodb. This issue may not have

been a challenge had the application been designed with a server-side code processing. By implementation a traditional client-server architecture, most of the complex database fetch queries or stored procedures could be handled at the server side thereby reducing a significant processing load on the client-side.

- Testing the application on multiple devices and different versions of Android OS was a challenge. This challenge required a wide range of test scenarios covered with devices running on different Android OS versions. It was also a challenge to use the available emulators as most of them were slow to respond due to compatibility issues

VI. Future Work

A. Feed my Recipe

Find my Recipe is currently aimed at providing the users with recipes based on the ingredients that they provide as input. In future, as detailed under the scalability section, this app can be updated to provide users an option to store links to their recipes online for other users to search.

B. Addressing increase in source recipes

As the popularity and usage of Find my recipe increases, it is expected that the number of recipes available may also need to be increased along with an increase in number of ingredients for search. The DynamoDB is currently designed to store the list of ingredients as columns; however, this may not be a feasible with a dynamic change in number of ingredients. So, in order to accommodate the increase in number of ingredients, the database design can be modified to store the ingredients in alphabetical order as a string of fixed length (15 characters for upto 15 ingredients) on one column. Each of the ingredients will be converted to an equivalent single character string based on a Reference Data table. For example, is there is a list of Tomato (T), Onion (O), Potato (P), Spinach (S), Pepper (Z) and Chilly (C) is given, the ingredients string can be stored as COPSTZ this approach can be taken for upto 26 ingredients and further increase can be handled by storing the ingredients names as 2 Alphabets in the Reference data.

C. Rating the recipes

In addition to storing and accessing recipes through the app, this app can also be used for rating the recipes that are available online. Based on the rating given by users, the app can be added with suggestions on most popular and favourite recipes. Also, based on the number of times a particular recipe(s) is/ are accessed, the app can also be used to pop up the most accessed recipes. Further Data analysis could be implemented to display a number of other useful parameters such as most accessed cuisine, regional preferences, seasonal preferences etc.

D. AI based source inputs

Another visionary future enhancement that this app can be extended to, is the use of Artificial Intelligence (AI) techniques for entry. In addition to the feature of chatbot entry of ingredients, this app could be enhanced to allow the users to feed pictures, either live or from the library, of ingredients that are available to them, either in their storage or at the store. For example, users can click picture of a grocery store's shelf and feed it to the app as source of available ingredients. The app can then, through AI, frame the list of ingredients.

VII. Conclusion

In this paper, I have presented Find my Recipe an intuitive recipe finder android application powered by Amazon Web Services. The salient feature of this app is that it helps users access recipes stored online by providing a list of available ingredients through an user-friendly chatbot interface. Whilst there are a number of online sites and mobile apps for recipes, there seems to be an extremely low number of online platforms for searching recipes based on available ingredients. This app is aimed at providing a platform that would not only increase the number of users accessing such recipes but also act as a unified window for a wide range of recipes online.

For the purpose of this project, the app has been designed to display recipes; however, as detailed under the Future work section, the app functionality can be expanded to provide users with an option to store links to their own recipes, thereby increasing the number of consumers who would access these recipes.

VIII. References

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