Building an E-Commerce Application Efficiently

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Abstract - *In this scenario, the demand for e-commerce has never been high. The businesses are getting good at adapting to this e-commerce scene and meeting the growing customer demands. Keeping this in mind we have decided to take advantage of this by creating and e-commerce platform solely for farmers. This paper divides the process in two parts, front-end and backend.*

Key Words: Domain, Architecture, Frontend, Backend

1. INTRODUCTION

B2C stands for Business to Consumers this relationship is efficiently established on e-commerce platform like amazon and flipkart. The purpose of this project was to design an application for farmers on which they will be able to buy crops in their vicinity from greenhouses (shops which grow crops in a controlled environment). This application is designed to make an average farmer's struggles to buy crops grown in greenhouses easier and with the help of the growing demand of e-commerce we hope all the people involved in this transaction are benefited.

1.1 Background

Before Plants like papaya are grown in a controlled environment, in green houses by greenhouse owners and then sold to farmers after they reach a certain height. They have limited space to grow the plants, which results in limited stock. Because they are limited so in most cases the greenhouses are sold out even before the farmers have bought the crops. The place where they buy the seeds from also matters. A common farmer has to call around every greenhouse around them to check if the green house has the type of crop which the farmer wants. If they have the preferred type then they check if they have the number of plants the farmer wants according to their farm area and this process goes on unless every point is checked which in itself is a time-consuming process. We might think the process is over but are only half way there After the farmers buy and sows the plants they are subjected to some environmental factors like extreme heat, extreme rainfall, animals like rabbits eat roots of plants. In this subjection almost 5% to 15% of crops are destroyed. So, the process of enquiring the greenhouses begins again. And by this time, they rarely get the same quality of crops they

first bought because the greenhouses are already sold out. So the application will make this whole process very efficient and fast they will be able see all the greenhouses in around them and they type of crops they are selling with their capacity number displayed, which updates as the crops are being sold. So they can buy the crops very easy and efficiently.

1.2 The Problem

The process of buying crops like papaya and chilli is very inefficient for farmers. There is a need to centralize the whole process into an application. The information about the nearby crops' seller, the types of crops they are selling, capacity of each crop to sell should be in the application. In addition, the whole information should be updated, if necessary, after every successful sell. There should be a way for the farmers to order an optimal number of crops according to their land area.

1.3 The proposed solution

To overcome the difficulty of above problem we need a lightweight application for which Android based applications are the best choice as frontend development in this scenario. As a backend option we can go with firebase or Mongo DB Atlas just because it much faster this way. We can go for SQL but firebase is much faster.

2. FEATURES

An end-user in our case farmers who will be able to register themselves on the application, while registering they will mention the city. So, when they enter the application, they will see the shops near there area(city). The shop cards will display the types of crops they are selling their respective capacity of particular crop. Which will update after every single successful order. They will be able to order the crops from the application. If the farmers want, they can put their land area and they can get a suggestion on optimal number of crops to buy. Integrating maps can be another addition which might help the customer access the information better. The maps might also help the customers (farmers) to calculate their land area and then order crops according to their land area.

3. LITERATURE SURVEY

3.1 Estimating the Object Size from Static 2D Image

The problem to tackle with this paper was to calculate the farmers land area according to which they would be suggested the optimal number of crops to buy.[4] This paper tackles the problem by following steps-

1)Clicking the picture of environment without the object.

2)Now from the exact position clicking the picture with the object.

3)Every pixel of second image is subtracted from a pixel with same position on the first image. This subtraction removes the background as it was identical in both images.

3.1.1 Limitations

1) We cannot really take the farm out and re-insert it into our frame again.

2) The papers would only work for mobile objects and a huge farm is not exactly that.

3) The algorithm needs to many parameters.

4) Which would not compliment the projects aim which is the need to make the whole process less complicated.

5) For an average farmer, even clicking the picture form the same exact position would not work.

3.2 Automated land area estimation for surveying applications

The problem to tackle with this paper was to calculate the farmers land area according to which they would be suggested the optimal number of crops to buy.[5]

1) Systems obtains the GPS location in Gpx table format, Plot Latitude vs Longitude plot area using python.

2) Pixel perimeter is calculated; actual perimeter is computed using latitude and longitude points.

3) Pixel area is computed using these computed values original area is calculated.

4) Which would not compliment the projects aim which is the need to make the whole process less complicated.

5) For an average farmer, even clicking the picture form the same exact position would not work.

3.2.1 Limitations

1) The proposed device requires a GPS sensor and a processor preferably Raspberry Pi 3B which is what is being used here. The GPS sensor used is VK162 GPS Module or a GPS NEO 6M module preferably the former taking into consideration the size constraints. The method also makes use of google maps which is open sourced and available to everyone.

3.3 Web GIS Development using Open-Source Leaflet and Geo server Toolkit

The problem to tackle with this paper was to calculate the farmers land area according to which they would be suggested the optimal number of crops to buy. This paper tackles the problem by introducing us to a very light library called leaflet, which will help us incorporate maps easily in our application.[6]

Tools Used:

1)Geo server 2.12

2)PostgreSQL 9.4

3)QGIS 2.18.15

4)Apache Tomcat 9.0

5)Leaflet 1.3

Popularity of location-based web and mobile applications is increasing day by day. The visualization of locations is bit complicated than tabular data. Specialized software is required to build a web GIS (Geographic Information Systems) application providing easy access to geo-spatial data to a large number of people. There is many software both commercial and FOSS (Free and Open-Source Software) available on the internet to develop a web GIS application. In this study an attempt has been made to develop a web GIS application using the open-source JavaScript library Leaflet, Geo server and PostgreSQL database.

3.4 Implementation of a Multivendor E-commerce Website

The paper gives a detailed explanation of architectural pattern, which also applies to this application's context. Although the paper is about making an e-commerce web application.[2]

3.4.1 Limitations

1) This paper talks about developing an e-commerce web-application, and we have to interpret the process in terms of android application.

2) Here the database design is explained in terms of sql database(tables) which clears a lot of confusion but this projects database is going to be implemented in firebase which is a NoSQL database.

3) Its does not help in terms of front-end aspect as, the whole process is in web-development. The tools are all HTML, CSS, JavaScript.

4. THE PLANNING PROCESS

The goal is to disentangle an application that would be simple and attractive enough, have a professional look and user favorable. So that, a common farmer should be easily be able to handle the application. The entire planning process is discussed here.

4.1 Defining use case models

Writing use cases or stories of using a system is an excellent technique to explain and describe requirements. An end user with internet browsing facility can register into the site. By signing in, they can find all the shops and their products provided; users can find the products using the search option. Items to be purchased are added into the shopping cart. By providing payment type, the order will be completed by generating e-bill.

The following are the primary requirements

1) Registration page

2) Search option

3) Shopping cart

4) Admin page

5) Payment page and so on.

4.2 Domain Modeling

To overcome the difficulty of above problem we need a lightweight application for which Android based applications are the best choice as frontend development in this scenario. As a backend option we can go with firebase or Mongo DB Atlas just because it much faster this way. We can go for SQL but firebase is much faster.

4.3 Architecture

This following paragraph will explain how does a mobile app with backend data storage, real-time synchronization, and user-event logging using Firebase works. Java servlets running in the Google Cloud Platform (GCP) App Engine flexible environment listen for new user logs stored in Firebase and process them. The instructions show how to do this using Firebase and the App Engine flexible environment. If we want our app to process user data or orchestrate events, we can extend Firebase with the App

Engine flexible environment to perform automatic real-time data synchronization. The Fig-1 shows the client architecture.[7]
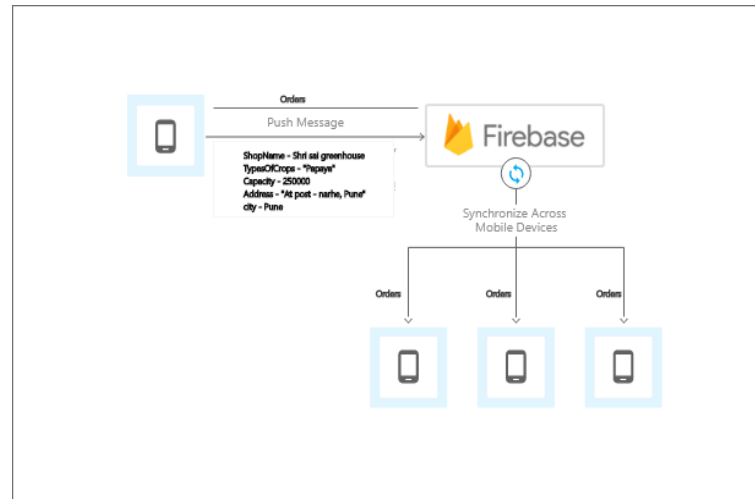

Fig-1: Client Architecture

A set of Java servlets running in the App Engine flexible environment register as listeners with Firebase. The servlets respond to new user-event logs and process the log data. The servlets use transactions to ensure that only one servlet handles each user-event log. The Fig-2 shows the server architecture.[7]
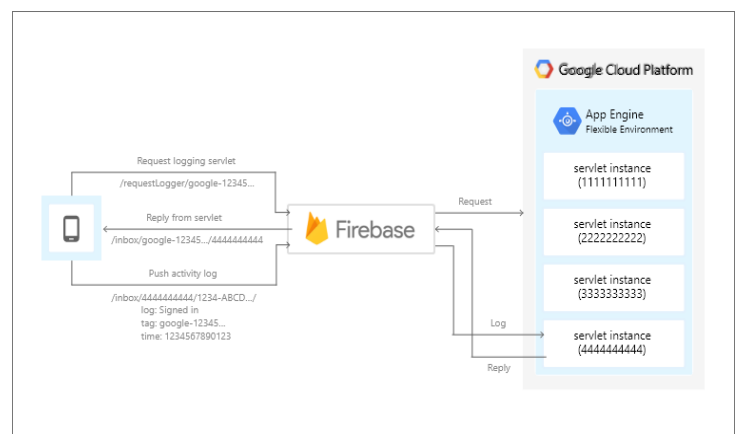

Fig-2: Server Architecture

5. DEVELOPMENT TOOLS

The entire development process has been sub-divided into front-end and back-end development. The front-end development consists of visually visible on the application, such as home page, login page, registration page, shop page, cart page and so on. The back-end development contains my-sql-database and its interaction with front-end pages.[1][2]

5.1 Front-End Development

Front development consists of Android studios. Android Studio has a consolidated environment where we can develop for all Android devices. It is the best platform to reach a huge audience with different backgrounds because the android devices are very cheap and accessible.[1][2]

5.2 Back-End Development

Firebase or MongoDB Atlas will provide support for back-end development. They are essentially software to create the database to add, drop, alter and update the document. The reason behind choosing firebase is that, it provides you real time updates and it is free up to 100000 requests at a time. And if an application is getting that many requests at a time, upgrade prices shouldn't be a problem. Same thing goes for mongo DB atlas.[1][2]

5.3 Database Design

One of the most important and challenging tasks is database design, refer Fig-3. The information passed by the users while registering in the application is stored in the database. The items with their identification, description and image are stored in the database. Documents in the proposed application database are: registration, user login, admin login, category, subcategory, sub subcategory, items, Wishlist, orders, logs and so on. The database design is shown below (note - the picture displays a relational diagram which can moulded into a NoSQL database diagram) The table entitled "product" has the attributes namely: productid, productid ate, category id, description and status where productid is the primary key for this table i.e., each product will have a unique identity. The attribute category id plays as a foreign key for this table i.e., this foreign key creates a link with table category having two attributes: category id and category name. When a customer registers in the website, information will be stored in the customer table with the attributes name, customer id, product id, quantity and email. Again, customer id is the unique key for this table and product id is the foreign key to link with the product table.
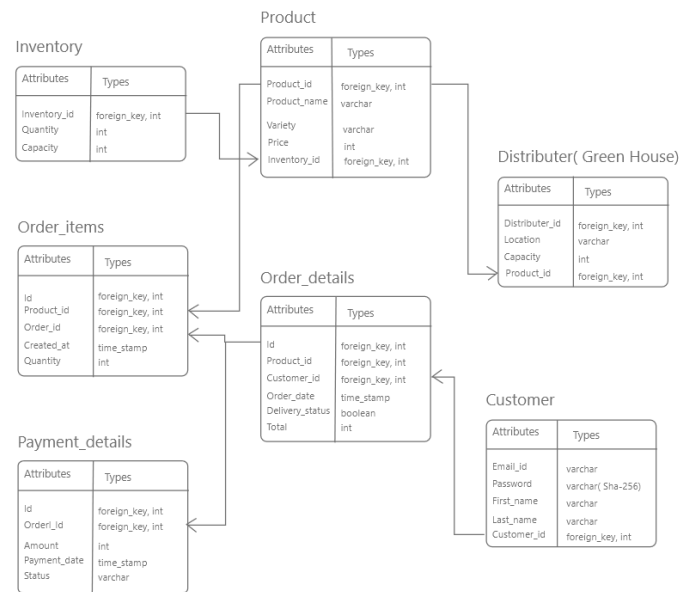

Fig-3: Entity Relationship

6. HOW THE APPLICATION WORKS

The Proposed application comprises of android activities regarding the frontend aspect. The first activity is for login, when the user enters details, the information is sent to our database, with a find operation if the details are valid then they are led to homepage where the shops which are registered in the same city as the user are displayed. If a new user comes across the application, then they can register, the information will be sent to database with a save operation and then they lead to the home page same as the previous user and the shops which are registered in the same city as the user are displayed. The information which will be displayed in each shops card in this aspect a greenhouse's details will be displayed, name of the shop, stickers resembling the crops they are selling their total capacity. When the user clicks on a particular shop's card, the home activity will be transitioned to a new activity which will contain the greenhouse details, with the shop's address pictures of crops they are selling, a particular counter to order a precise amount crop. There can be a different iteration of this application according to your idea. If the user clicks on buy option, they will be led to a checkout page where they can include their payment details. Making sure the transition from one activity to another is a small and beautiful detail which can drastically impact the user experience.

7. TESTING AND BUG FIX

This part is made easier with the help of android virtual machine which helps you load your application after every change, which makes it really easy to spot problems. The biggest potential problem which might be an obstacle in

your journey to make your own application is the app crashes caused due to lack of focus on exception handling. ex- If the maker forgets to properly handle the retrieval of information from database, and if the information is not found in our document (in terms of NoSQL and table in term of sql database) then java will throw a null pointer exception, which will definitely make your application crash, and to add insult to injury, without exception handling it's hard to spot the cause of application crash.

8. CONCLUSION

E-commerce has made our life a lot easier by providing choice without going out. The application provides you the detailed information of your choices and lets you buy them quicker and cheaper.

ACKNOWLEDGEMENT

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