Youth Compass: A Flutter Application for Volunteer Management

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Abstract*—People in the modern world do not always have access to fundamental necessities like health care and education because of poor socioeconomic situations and rising poverty. As a result of people and other organization becoming aware of these urgent challenges, efforts to address them have increased. These Non-Government Organizations(NGO) team up with the people that are willing to help with these challenges and accept them as volunteers to achieve their goals. They are active in various fields that are in immediate need of help. Fields like education and health are some of the most important fields that require constant care and attention, and these organizations are willing to devote time and resources to make a net positive change. In order to do so, they must be efficient in handling large amounts of volunteers that are willing to dedicate their efforts towards these fields. The administration of volunteers will become all the more important as volunteer-based organization expands. Thus, it is important for such large organizations to consider modern approaches of guiding all these volunteers. The web-based Youth Compass monitoring application is a tool that will designate certain tasks that volunteers must perform throughout the day. This application is typically accessed using a web browser, and can be used from any device that has an active Internet connection. This application allows the volunteers to view their assigned site, and the tasks they will perform at that location. Volunteers may be assigned to schools or hospitals in their locality, and the tasks that are to be completed there are mapped to them. The administrators will be able to monitor data such as the tasks and activities that are to be completed, the list of volunteers for that particular day, the schedule of volunteers for that particular day. Volunteers will be able to post proof of completion of their tasks for the day. They will also be able to enter the feedback received after completion of the activities, and also any issues that they faced while doing so. This application can also be used to provide visualizations of the recorded data to the administrators. Overall, a web-based monitoring application can be a useful tool in order to streamline the process of maintaining a large number of volunteers while still achieving the desired goals.

Keywords— Volunteering, Analysis, Web Interface, Communication, Management.

I. INTRODUCTION

The Ministry of Health and Welfare's Volunteer Service Act formally defines persons who provide voluntary services as "volunteers" and volunteer services as "supplemental services provided by persons who voluntarily, i.e., not as the result of personal or legal obligations, and sincerely wish to contribute their knowledge, stamina, labor, experience, skills, or time to society, not for the purpose of obtaining remuneration but for increasing the effectiveness of public affairs or improving social welfare" [1].

A volunteer contributes his/her time, talent, and effort to a need, cause or mission without financial gain. The rewards of volunteering are about the satisfaction of putting something back into the society, gaining useful experience and skills, and meeting new people. Anyone can volunteer irrespective of their socioeconomic status.

While some people volunteer a few times in the calendar year when they have time to spare, others are ready to provide a regular commitment on a full-time basis, spending several hours towards their cause. It gives people self-confidence and satisfaction, social contact, the ability to use their skills and enhance them, and also a chance to use their passion.

Some principles include: it is always a matter of choice. It respects the rights, dignity, and culture of others. Sharing of knowledge and experience with others. Volunteering helps build a more cohesive, safer, stronger community and increases the social network and bonding between communities and neighborhood. Voluntary organizations are key players in the economic development as employers adding to the economic output of the country and reducing the burden on the government.

Volunteer-based non-profit organizations are often faced with a paucity of resources in their operations, and volunteers serve to supplement the paid staff in supporting general operations and achieving organizational goals [2]. Despite widespread recognition of the immense value of being a volunteer, the process of managing the volunteers by

the NGOs and other volunteering organizations effectively can be challenging It's easy to be disorganized when managing a group of volunteers as distribution of the right task to a volunteer with the right skillset proves a challenging task. The burden of reporting to the authorities at regular intervals about task progress is a tedious job. Records tend to get lost or misplaced and logs fail to be updated regarding progress of the volunteer due to the immense volume of volunteers juggling to complete their tasks and report it to the organization.

The volunteers need to submit proof of the tasks that have been completed which needs to be submitted as a document to the organization. There is a chance that since a large number of volunteers submit their documents to the organization few of them can get lost. Data intolerance is a huge problem in the case of manual submission of proof. Suppose the volunteers need to know how much they have progressed after a few months. This is difficult because the volunteer may not have tabs of everything they have completed over a period of few months or needs to be completed. Hence keeping tabs about the progress of an employee is challenging.

II. LITERATURE SURVEY

Volunteer applications are a relatively low-cost resource that volunteer organizations might use. Humans are better to remember pictures than words, which can be explained with a phenomenon called the picture superiority effect [3]. Data Analysis and Visualization use data from different sources to make meaningful insights on data available to the user. This gives users more clarity on their progress. The tools used for this methodology are generally cloud-based and open source which is beneficial for non-profit organizations.

According to [6], it is evident that non-profit organizations reserve very little budget towards the incorporation of technology. Some reasons include lack of understanding, and assumptions that a lot of investment will be required. Our application will aim to change this notion, and encourage the use of technology in order to streamline the tasks related to volunteers.

The research conducted in [5] tells that every user must be given the option to input their available hours for service over multiple months. The users can select the dates they are available over multiple months. The volunteering on giving the available service hours within the date range, the application allocates accordingly based on activities available to each volunteer.

Volunteering events are generated and registered under specific category, with additional features of city coordinates mapping, of timeline declaration, of competencies and skills required etc. The platform's authoritative administrators are responsible for coordinating volunteers and organizers, having the ability to communicate with involved stakeholders and verify the two-sided validity [4].

Many approaches have been used by different developers in developing the application. One approach includes a portal where volunteering organizations can post their activities in their portal and on approval of admin the activity is posted on the portal. Users can also search for various voluntary activities available. The statistics tab shows the analytics of earlier volunteering tasks and best practices are indicated revealing places as volunteering hubs where frequent volunteering activities take place.

Andrew Wong talks about leading and motivating teams in volunteer organizations as stated in [9]. An inquiry is made on the challenges associated with leading teams in volunteer organizations. The challenges arise due to distance, time, cultural diversity, and challenges in technical aspects due to equipment costs and meeting base technology requirements. So specific considerations are required to produce effective volunteering approaches which can maintain their effectiveness throughout till the end of their purpose.

The approach used by us assigns various super users to take care of a particular area which makes the functioning smoother. Tasks are assigned by sub-administrators nominated by the administrators. These tasks are assigned to volunteers. Upon completion of tasks, users and their administrators are updated about their progress. This seems to be a generalized and optimistic approach to voluntary applications.

III. OBJECTIVES

The main objective of our work is to facilitate communication between the different layers of management of an NGO. The objective of this project is to develop a full-functioning mobile application that bridges communication between the administrators, trainers, and volunteers that are involved in volunteering activities. The app should enable seamless and timely communication between volunteers and trainers. It should provide features like notifications, and alerts to ensure that volunteers and trainers can easily exchange information, clarify doubts, and receive updates on tasks or assignments. This application can eliminate the manual labour involved and thus automate the process of assigning tasks to different tasks to volunteers and monitoring the progress of completion. However, the objectives can be categorized as below:

- The app should provide a platform for trainers and volunteers to communicate easily and efficiently.

- To facilitate the functionality of enabling trainers to assign various tasks to eager volunteers that are to be performed by them.

- To facilitate the process of evaluating volunteers' performance and gathering feedback. Trainers can use the app to conduct assessments or surveys, and volunteers can provide feedback on the quality of training or suggest improvements.

- To enable real-time updates on task statuses and progress. It should allow volunteers to update the status of their assigned tasks, mark them as completed, or seek assistance if needed.
- Trainers should be able to monitor the progress of tasks and provide guidance or feedback to volunteers as required.

IV. PROPOSED METHODOLOGY

This section of the paper presents a detailed analysis of the Youth Compass application and the technology stack that will be used for its implementation. The application can be divided into two major parts – the frontend and the backend. The front end is a web interface running on the Flutter framework. The backend will be implemented using Google's Firebase platform. Firebase provides a cloud-hosted real-time database, and many features will use the same to store all the records collected by the end user, through the web interface provided. Firebase also provides User authentication via the authentication API.

A. FLUTTER

Flutter is an open-source UI toolkit and programming language that is gaining significant popularity among developers for building cross-platform mobile applications. Developed by Google, Flutter allows developers to write code once and deploy it on multiple platforms, including iOS, Android, and even the web. The language utilizes Dart, a modern and efficient programming language, which offers features like a reactive framework, a rich set of widgets, and a hot reload feature for instant code changes and updates. With Flutter, developers can create visually appealing and performant user interfaces, thanks to its customizable widgets and extensive library. Moreover, Flutter's "write once, run anywhere" approach significantly reduces development time and effort, making it an ideal choice for developing feature-rich mobile applications.

B. FIREBASE

Google Firebase is a comprehensive mobile and web development platform that provides a range of powerful tools and services to simplify the development process and enhance app functionality. It offers a scalable and secure cloud infrastructure, enabling developers to store and retrieve data effortlessly. Firebase includes real-time database capabilities, allowing developers to build reactive and collaborative applications.

Additionally, it provides authentication services, enabling easy user management and authentication flows for seamless login and registration. Firebase also offers cloud messaging services for sending targeted notifications to users. It provides hosting services to deploy web applications quickly, and its analytics feature provides valuable insights into app usage and user behavior. Moreover, Firebase includes features for in-app messaging, dynamic links, crash reporting, and A/B testing. With its extensive set of tools and services, Google Firebase empowers developers to build high-quality apps with ease and efficiency.

C. *FRONTEND SERVICE*

The frontend service in this application serves as the interface that allows users to interact with the database and perform various tasks. Its primary purpose is to bridge the gap between all parties involved in using the application, ensuring seamless communication and collaboration. A web-based application is chosen for this system because it proves to be highly effective for the target age groups of the volunteers. Web applications are easily accessible and can be used on a variety of devices, making it convenient for volunteers to engage with the platform. For administrators, the frontend service provides a range of functionalities. They can monitor their organization's reach through volunteer programs and gather valuable feedback. Administrators can add tasks that need to be completed and assign them to available volunteers using the web interface.

The service also offers in-depth analysis of targets reached and activities completed by the volunteers, empowering administrators to strategically plan their next steps and understand where critical resources are being utilized. By offloading manual work to the server, the service significantly improves efficiency and speeds up the entire workflow. Volunteers, on the other hand, can utilize the frontend service to access and manage their schedules for the day. They can easily check their assigned tasks, update the progress or completion status in the database, and provide prompt responses to administrators. The location-independent nature of the system allows volunteers in different locations to coordinate their tasks effectively and receive real-time updates while working in the field. The service also enables volunteers to plan their tasks, prioritize them as they are received, and ensure efficient utilization of their time and resources. Once a task is completed, the same service can be used by volunteers to upload proof of task completion, such as photos or documents, and provide any additional feedback related to the task.

D. BACKEND SERVICE

The backend service is a crucial component that serves as the foundation for the entire application, providing the necessary infrastructure and functionality to support its operation. At the core of the backend service is the database, which acts as a central repository for storing and managing the data required to present content on the web interface. One of the primary functions of the backend service is to collect and store real-time data from all users of the application, including both volunteers and administrators. This data encompasses various aspects of the volunteer program, such as the tasks and activities that need to be completed, the list of volunteers participating in the program, their availability, and the schedule of volunteers active on a particular day.

Additionally, the backend service also captures valuable feedback provided by users after the completion of tasks, enabling continuous improvement and evaluation of the program. In addition to data storage, the backend service plays a crucial role in providing the necessary infrastructure for data analysis. The collected data is processed and analyzed on the cloud server, leveraging its computational power and resources. This analysis helps derive meaningful insights, which are then made accessible to users through the web interface. By offloading the processing tasks to the server, the backend service ensures efficient handling of data and enables users to make informed decisions based on the analysis results. To ensure secure access to the application and protect sensitive data, the backend service incorporates an authentication mechanism. Users are required to provide their credentials, typically in the form of a username and password, before they can access the application and its associated data. This authentication process not only verifies the identity of registered users but also ensures that they are granted appropriate access privileges based on their roles and responsibilities within the volunteer program.

By implementing this authentication approach, the backend service safeguards the confidentiality and integrity of the data, limiting access to only authorized individuals. The backend service is a critical component that underpins the application, providing data storage, processing, and analysis capabilities. It collects and manages various types of data from users, facilitates data analysis on the cloud server, and ensures secure access to the application through an authentication mechanism. By effectively supporting these functionalities, the backend service ensures the smooth operation and success of the volunteer program management application.

E. HARDWARE REQUIREMENTS

The hardware requirements include:

- 8GB RAM (At least)
- Intel Pentium 4 processor (At least)
- 50GB of Hard Disk Space (At least)
- 5 Mbps Up/Down Network Connection

V. IMPLEMENTATION

The implementation of our Android application can be classified into these categories, namely:

- Database Structure
- User Authentication
- Task Creation and Assignment
- Task Management
- Data Analytics
- User Interface and User Experience

Let us analyse these categories in further detail:

A. DATABASE STRUCTURE

This app uses Firestore Database that is provided by Firebase in order to store all relevant details needed for the app to function properly. Firestore is a fully managed NoSQL document database provided by Firebase. It offers real-time updates and synchronization, allowing changes made to data to be immediately propagated to all connected clients. With offline support, Firestore enables apps to continue working seamlessly even when offline and syncs data with the server upon reconnection. It scales horizontally to handle large amounts of data and concurrent users, while providing low latency reads and writes. Firestore's powerful querying capabilities allow for flexible data retrieval and filtering. It integrates with Firebase Authentication for secure access control and seamlessly integrates with other Firebase services. Firestore stores data in the form of collections and docuements to effectively store and manage data.

The "Tasks" collection stores task documents. Each document represents an individual task and contains relevant fields such as title, description, status, assigned (volunteer's user ID) and feedback. The "School" collection stores School documents. Each document represents a school and contains the school email. This helps trainers assign the locations to the volunteers as to where they must perform their tasks. The "Users" collection stores users that have logged in to the app. The user ID is created by firebase automatically. It includes fields like name, email, role (e.g., Trainer, Admin or Volunteer) and an approved field that verifies that the volunteer has been approved by the trainer or that the trainer has been approved by an administrator.

B. USER AUTHENTICATION

User authentication is an essential component of any app that involves user accounts. It ensures that only

authorized users can access the app and its features, and their data is kept secure. In our app that assigns tasks to volunteers, user authentication is implemented using Firebase Authentication, a popular and easy-to-use service. Firebase Authentication provides a secure and easy-to-use authentication service that supports various authentication methods such as email/password, phone number, and social authentication like Google, Facebook, or Twitter. The service is backed by Google's infrastructure, ensuring that authentication requests are handled quickly and securely.

In our app, we have added the email/password and phone number authentication options for the users. To use Firebase Authentication in a Flutter app, we have integrated the Firebase SDK into the app and used its API to implement sign-up, sign-in, and sign-out features. The SDK also provides support for password resets, email verification, and multi-factor authentication to enhance the app's security. Firebase Authentication provides several benefits, such as reducing the development time and effort required to implement user authentication, providing a secure and reliable authentication service, and offering various authentication methods to suit the needs of the app and its users. This will help us build user trust and confidence in our app, which can lead to higher engagement and user satisfaction.

C. TASK CREATION AND ASSIGNMENT

Task creation and assignment are essential features for any task management app. Administrators should be able to create tasks, assign them to volunteers, and track their progress. Volunteers should be able to view the tasks assigned to them, mark them as complete, and report any issues or problems. Firebase Firestore Database is our choice for implementing task creation and assignment in our app. Firestore is a more advanced version of the database that supports more complex queries and indexing. It offers real-time synchronization of data, which allows administrators to see the status of each task and volunteers to see the tasks assigned to them in real-time. We have made use of Firebase APIs to create, update, and delete tasks, as well as assign them to volunteers.

In our app there are three roles perform different duties, they are the Administrator, Trainer and Volunteer roles. The Administrator can create tasks, and verify the validity of trainers. They can assign tasks and mointor the progress of the tasks whether they have been completed, and whether volunteers are performing them upto the standards via the feedback posted by the volunteers. Trainers can create tasks and assign them to volunteers using the app's interface. The tasks should include all the necessary information, such as the task description, the school that task must be performed, and any additional instructions.

The app also allows administrators to assign tasks to specific volunteers or trainers based on their skills and availability. Volunteers and trainers can view the tasks assigned to them, mark them as complete, and report any issues or problems. They can then upload any form of feedback with respect to the tasks completed. This feedback is then available to the Administrator who can view it anytime they need it.

D. TASK MANAGEMENT

Task management is another critical functionality of the app. Volunteers will be able to view the tasks assigned to them, mark them as complete, and report any issues or problems. Administrators will be able to see the status of each task, including the progress made by volunteers, and take action if needed. We have used Firebase APIs to retrieve task data from the Firebase Firestore Database and display it in the app.

E. DATA ANALYTICS

Reporting and analytics can provide valuable insights into how the app is being used and how tasks are being completed. Administrators can use this information to optimize task assignment and improve the overall efficiency of the app. To implement reporting and analytics, the app has used Flutter packages that implement bar charts, pie charts. We have used Firebase APIs to track events such as task creation, task completion, and user login/logout, and analyze the data to gain insights into how the app is being used. By implementing reporting and analytics, we can optimize task assignment, improve the efficiency of the app, and provide better user experiences.

F. USER INTERFACE AND USER EXPERIENCE

User interface and user experience are critical to the success of any app. A well-designed UI can make the app more attractive and easier to use, while a good UX can improve user satisfaction and engagement. To implement user interface and user experience, we have used Flutter widgets and design patterns such as Material Design. Material Design is a design system developed by Google that provides a set of guidelines for designing intuitive and attractive interfaces. The app has Material Design widgets such as AppBar, Drawer, and FloatingActionButton to provide a consistent and familiar user interface.

Additionally, the app has used responsive design techniques to ensure that it looks and works great on different screen sizes and orientations. Overall, implementing reporting, analytics, user interface, and user experience are critical for creating a successful Flutter app that assigns tasks to volunteers. These functionalities can provide valuable insights into app usage and help create an attractive and easy-to-use interface that encourages user engagement.

VI. CONCLUSION

We developed an Android app using Flutter and Firebase as a backend to help volunteers complete tasks assigned by sub-admins and provide proof of completion. The app has three types of logins for Admin, Sub-admin, and Volunteers. The volunteer's signup process involves an OTP verification system on their phone. The app provides a user-friendly interface that allows sub-admins to assign tasks to volunteers and monitor the progress of the task completion. Admin has overall control of the entire flow.

The app's key feature is the ability to track analytics of tasks completed by volunteers. This feature helps volunteers to track their progress on the completed and incomplete tasks efficiently. The analytics feature also enables sub-admins to identify volunteers who require further guidance and support, ensuring that everyone can work and complete the tasks on time. The app provides an efficient and transparent system for managing tasks and tracking volunteer progress. It is a valuable tool for any organization looking to streamline their task management process and ensure that volunteers are working efficiently in a social-service organization.

Our team has developed an Android application using Flutter and Firebase as the backend, which allows volunteers to complete assigned tasks and upload proof of completion. The trainer assigns the tasks, and the admin manages the entire flow of the application including adding the sub-admins and viewing the tasks completed by every volunteer in a region. The analytics of completed tasks by the volunteer is also provided for better tracking. The app offers three types of logins for admin, trainer, and volunteer, with OTP verification and email messages for added security. This application will help organizations manage their volunteers' tasks more efficiently and effectively. The user-friendly interface and easy-to-use features of the app make it a great tool for organizations of any size.

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