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Progressive Web Application for Question and Answer (Q&A) Platform

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Abstract: *The Question and answer (Q&A) platform as an important tool for knowledge exchange, this project aims to create a platform that is available for a closed group such as students in a college, employees in working environment, etc., to share knowledge in specific areas.*

The platform would be available over web and accessible via browser though it can installed effortlessly in smart devices just like a native app.

This would be developed as a Progressive Web App (PWA) to provide user a native app experience. Where users would be able to add the application to their home screens, work offline, get push notifications, etc., Progressive Web Apps are progressive, responsive, app-like, fresh, safe, discoverable, re-engageable, installable, linkable. Progressive Web App was not available earlier because the capabilities such as location finding, access to camera were possible only with native app. It was not possible to interact with hardware through browser for web application.

Due to technology advancement in recent days it is now possible through PWA to have such integration through browser itself. This application is Platform and Operating system agnostic and it is helpful to reduce development costs and time to market.

Keywords: *Closed group, knowledge, Progressive web app, push notification*

I. INTRODUCTION

As someone explores new things or involved in new work, it is natural that people get questions. Students, Working professionals and Public get questions that are relevant to their areas but it is common that others in the same group already has answers for it. People also get new ideas and perceptions as they explore others questions and answers.

In Existing system question and answer forums are generic and open to all the users. There is a need for Question and Answer platform to post questions and get answers in a closed community in specific areas.

This platform should be available at all the time and easily accessible to the user. Q&A platform can be both Desktop-based and Internet or Mobile-based since it is developed as a Progressive Web App and doesn't need any installation.

Progressive web App (PWA) is a software development methodology and they are the hybrid of web pages and mobile application. It opens as a normal webpage in browser and can also be added to home screen if user wishes. It can even hide the browser UI controls and appear as an app once the webpage is opened from home screen.

Progressive Web Apps are,

- 1) *Reliable:* Loads instantly even in certain network condition but never slows down.
- 2) *Fast:* Quickly respond to user interactions
- 3) *Engaging:* Gives a native app experience to an user.

A. *Benefits of Progressive Web App are,*

- 1) Can install PWA as a native app – users can experience it as a mobile app
- 2) Provide secure environment for User – site run under HTTPS.
- 3) Provide a faster web experience for web customers – site loads fast.
- 4) Provide offline experience to users – users can use their app even when network lets them down.
- 5) Provide Push notifications to user – makes users alert by providing push notifications.
- 6) Can create text file and icons – users can have icons for the home screen that is referenced to an manifest file.

B. Reasons To Develop Progressive Web App Are

- 1) PWAs are not tied to any specific app store
- 2) PWAs are device-agnostic
- 3) PWAs don't take up space
- 4) PWAs are very fast in speed because they can be updated and released without app store approval process
- 5) PWAs can effectively engage and re-engage any customer
- 6) PWAs don't take ages to download and can be instantly download without visiting any app store
- 7) PWAs can be shared easily via social media, email, SMS, online advertising, or even QR codes.
- 8) PWAs have better SEO (Search Engine Optimization).

II. LITERATURE SURVEY**A. Progressive Web App-Review**

In this paper we understood about basics of Progressive Web App like what is PWA, characteristics of PWA, benefits of PWA, pros and cons of PWA and how PWA came. Google was first to develop their application using PWA. Here the comparative study between native app, web app and PWA has been also seen.

B. Progressive web App for Educational System

In this paper we came to understand how progressive web app is useful in Educational system. PWA does not require installation, doesn't take up space in smart phone and help user during offline by information stored in cache memory by using service worker. Progressive Web App is used for educational system because it can be used by user even during network connection is bad condition and it send push notification relevant to user. It helps in gather information about new technologies easily and quickly by user.

C. Step Towards Progressive Web Development in Obstetrics

From the literature survey we understood about how PWA is useful in recording medical details about the patient. The installation of app is not required. Then push notification help user to gather information about the patient by themselves as by doctor quickly. Here in this paper they mainly stored information about pregnant women by PHR(Personal Health Record).

III. Q & A PLATFORM FOR LEARNING

Q&A platform is an Information Retrieval system which is used to automatically answer the questions asked by the students in their natural language. It provides students an opportunity to interact with each other online around exam time. Students can review the information in offline which was discussed while they were in online this feature is provided by PWA. There are many parts in Q&A platform they are, First is Question Phrase where the students can post their questions to be searched and Answer Phrase where other students, staffs within the organization can answer to the question which was posted.

Next is Question Processing where the inputs are received from the students in their natural language to analyze and classify the questions. The analysis is used to find the meaning and type of the question which is necessary to avoid ambiguities in answers. The main approaches for question classification are Manual classification and Automatic classification. In manual classification handmade rules are applied to identify the expected answers where their rules may be accurate but it is a time consuming and tedious process. There are approaches which classify the questions as who, where, what, why, how and so on this would help for better answer detection. Finally the answering phrase where other students and staffs with an organization can able to answer to the posted question with reference to different sources and their knowledge. The answers must be simple and understandable to user. The best answers posted can be chosen according the votes and comments given by other students and staffs. So there may not be any uncertainty or contradiction in the answers.

IV. Q&A APPLICATION

Our application consist of following features they are

- 1) User will be able to create account using Google / Linked-in account
- 2) User will be able to add their questions
- 3) User will be able to answer to others questions
- 4) User will be able to comment on others questions & answers
- 5) User will be able to up vote & down vote others' questions & answers
- 6) User will be able to follow other users and see their question & answers on the home page

- 7) Admin will be able to remove users questions and answers
- 8) User will be able to add this as an application in Android / iOS Mobiles.

A. Participant

Participants can be any students or staffs within the organization who were recruited through an invitation sent via email and posters around the campus. Users can create their account either via the Google or the linked-in account. Else user can sign-in an account by providing the required credentials in the sign-in page. Students who have their login can only be able to access the information. Since the question and answers are discussed within an closed community the information may be secured and cannot be accessed by all.

B. Procedure

After login users will be provided with a web page where they can post their questions and can even provide answers to other's questions who have posted it. The user who had posted the question would be visible to all the users and staffs within the organization where they can answer to the questions posted by even referring to other data sources and information known up to their knowledge. In this way users would be able to share their knowledge among other users. The user who had posted the question will be notified once other users or staffs started posting their answer. And the staffs who feel that the answers posted by the students are wrong can even correct it by proving comments in the comment box. The students and staffs who find that the answer posted by a user was correct can vote to their answers so that other users will feel easy to learn the appropriate answer provided by the other user. The users can post their answer only when they are in online but user can review their questions and answers even when they are in offline since the Q&A platform is developed as a PWA.

C. Question Collection and Analysis

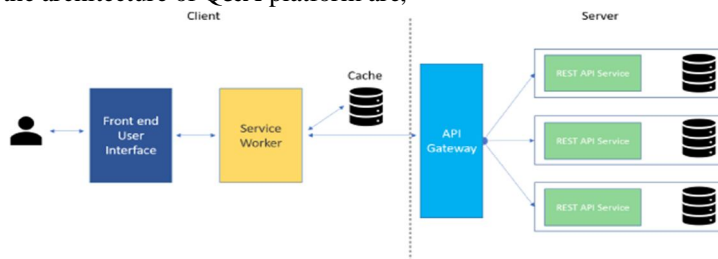
Each Questions posted by the users are collected from the front end by the server. And the questions collected are distributed among other server so that the posted questions may be visible to all other users who have their account. The questions collected by the server can even classify the questions as who, where, what, why, how and so on so that the user feels easy to answer to the questions posted.

D. Posting Answer and Selection of Answer

The answer posted by other students and staffs will be notified to the user who posted the question. The answers posted will also be visible to all the users and they can also increase their knowledge by knowing many information. Any user within the organization can answer to the question posted and they can also review others answer if they feel that the answer is so relevant and best they can provide their comment and give an vote to that answer. So that the students can pick out the correct answer relevant to their questions and they may not study the wrong answers.

V. ARCHITECTURE OF PROGRESSIVE WEB APPLICATION FOR Q&A PLATFORM

The main components involved in the architecture of Q&A platform are,



A. Front end User Interface

The webpage which is displayed to the user is the front end where they can login, add their questions, provide answer to others question, can review their notification. And the users can provide their answer for the questions posted by other users only at the front end. Front end is just a display screen provided to the user.

B. Service Worker

The service worker is the main feature of Progressive Web Application which provides the background synchronization, push notifications and offline work mode. The service worker is the JavaScript file running separately from the webpage/app. The service worker process only the specific event by the user interactions and its life time is short, active only for specific events.

- 1) *Background Synchronization*: Service worker is responsible for this feature. The actions are delayed when there is no stable connectivity. For example, the questions posted by the user during the failed connection will be sent but will not be delivered to the other users. The questions will be delivered once the connection is restored and the questions will be displayed to all other users.
- 2) *Push Notification*: Push Notification provides user the notification about the updates made to the content and prompt in the page from the website. Users can re-engage by the notifications shown to the user. When other users add their questions or when they provided answers to the question will be notified so there may not be any delay to review to their answers.
- 3) *Offline Work Mode*: The service worker provides catching an application shell so the service worker may load instantly on repeated visits. The necessary content like questions, answers, notifications is refreshed every time when the connection is back. These techniques will improve the app performance and user experience. There will not be any difference between the online and offline mode regarding interface like user can review the questions and answer even in offline but they can post their questions while they are in online.

C. Cache

Cache storage is a storage mechanism in browsers for storing and retrieving question and answer pairs that are cached when the user is in online. So the information reviewed by the user when they are in online will be available in offline too. The information in the cache storage will not get updated until user in offline and they don't get expired unless deleted. Can use `CacheStorage.open()` function to open the specific cache object and call any one of the cache method to maintain the cache. Cache Storage is not a Service Worker API, but the service worker is enabled by the cache to cache the network responses so that they can provide the offline capabilities when user is disconnected from the network.

D. API Gateway

API gateway acts as a single point of entry which gets all the requests from client and then routes the requests to the appropriate micro-service. The micro-service consists of request routing, protocol translation and composition. API gateway processes the request by invoking multiple micro-services and aggregates the result. Here the API gateway receives all the questions posted by the users and distributes them among the multiple REST API service. REST is a protocol and data-driven. REST API is a URI which works over standard HTTP. The requests are processed through CRUD methods they are GET, PUT, DELETE and POST.

VI. CONCLUSION

Progressive Web App is a mid-way approach for native app and web application. Since PWA reduce the burden like poor network connectivity and rich interface just like native app. It does not require large space on smart phones.

In this paper Q&A platform for the support of student within organization is presented. This Q&A platform is a PWA for enhanced web app performance.

Due to this development methodology this same web app become available on both computer and smart phones and proves user engagement improvement. It is one of the reasons to choose this methodology.

The Q&A platform has been developed for safe use of app within organization to prevent snooping and ensure content hasn't been tampered. The installation app is not required.

The Q&A platform using PWA loads quickly, even when the user is on bad networks. It can send relevant push notifications to the user and has an icon on the home screen and loads as top-level, full screen experience. In the future, a usability test should be performed so that the app can be evaluated and improvements can be made.

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