Project Report

On

CROSS PLATFORM MOBILE APPLICATION DEVELOPMENT

Submitted by:

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***In partial fulfillment for the award of the degree* of B. Tech. (CSE)**

In

Department of Computer Science & Engineering and Information Technology

Jaypee University of Information Technology Waknaghat, Solan-173234,
Himachal Pradesh

CERTIFICATE

I hereby declare that the work presented in this report entitled **“Cross Platform Mobile App Development On Water Complaint Redressal System”** in partial fulfillment of the requirements for the award of the degree of **Bachelor of Technology** in **Computer Science and Engineering** submitted in the department of Computer Science & Engineering and Information Technology**,** Jaypee University of Information Technology Waknaghat is an authentic record of my own work carried out over a period from August 2018 to May 2019 under the supervision of Dr Pradeep Kumar Singh (Assistant Professor Computer Science and Engineering). The matter embodied in the report has not been submitted for the award of any other degree or diploma.

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ACKNOWLEDGEMENT

I would like to express my deepest appreciation to all those who have been helping me throughout the project and without whom this project would have been a very difficult task. I would like to thank all of them.

I am highly indebted to Dr Pradeep Kumar Singh for his guidance and constant supervision as well as for providing necessary information regarding the project & also for their support in doing my project. I would like to express my gratitude towards members of JUIT for their kind co-operation and encouragement which helped me in doing this project. My thanks and appreciations also go to our colleagues who have helped me out with their abilities in developing the project.

This is to certify that the above statement made by the candidate is true to the best of my knowledge.

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ABSTRACT

Nowadays, everyone has smart phones and there is a need of apps for these devices , we have to develop apps both for IOS and android devices but it takes a lot of time to develop apps for both the platforms, so we need a platform that can develop apps in both the platforms for android and IOS. For this purpose we have chosen the react native to develop the cross platform applications. In this project we have tried to develop a application on the Water Complaint Redressal System and this application can provide us the interface that can decrease the efforts of the users to make a request or a complaint. The react native is basically a java script . Till date react native can work with only IOS and android platforms but it has a potential to work with other platforms also in the future.

CHAPTER 1

INTRODUCTION

The final results after the completion of the project are mentioned below

- Booking of Water Complaint made online
- Installing Hand pumps and new water connections
- Status bar for login/logoff for customer user’s
- New policies and plans updation

Earlier a phone was used in offices, banks , schools etc to make different tasks practical. But as the mobile phone came it made that same task even more easier. The features like menu, contact lists , call logs ,photos/videos enhanced the functionality of the user and the process of communication became a lot faster.

In the era of late 20th century, cell phones became a major influence for the people and a lot of real time implementation were also made. Thus the start of a successful mobile industry started to grow which incremented exponentially with the time .

Features like Bluetooth, multimedia ,call reference ,IR media ,the mobile technology has taken a sharp turn which has culminated into millions of users subscriptions .

Web applications or mobile web sites are built using standard web technologies , including HTML, CSS and JavaScript. They run inside of a standard web browser like Chrome ,Firefox Safari . They're built and hosted just like any web application or website on the Internet .The only real difference is that they're built to look good and to function well on mobile devices. This usually means that they're responsive and they're designed with a mobile-first approach. Meaning they would start with focusing on the mobile view but also make it work for desktops as well.

Let’s take another advantages of building a web app so first they're built using just regular web standards like HTML, CSS, JavaScript so you don't need to learn any difficult languages like Java or Swift or anything like that . Any web developer can build a simple web app or mobile web site. This also makes the app very easy to host and maintain simply upload to a whole staying account with a domain .

If you use a technology like Cordova PhoneGap which is like a wrapper for hybrid apps they can actually build this. You can use that one code base , that same application for iOS and Android and I believe even Windows Phone and Blackberry. Essentially you have one code base to maintain as opposed to multiple apps .

As hybrid apps run in a web view there's no browser needed like with a web app so they can be published on all of the app stores, there's really not anyways for a customer to even figure out that it is a hybrid app and not a native app . They can be installed the exact same way hybrid apps also have access to device internal API's and they can access features like the camera geo-location storage, things like that a lot of this does depend on the actual framework you use because there are quite a few but most of them do allow you to do stuff like that hybrid app development. It is also much faster than native app development. Because you do have that single code base and you do have to know easier languages to work with so instead of you know having an Android app and iOS app, a Windows app and maintaining all three of those separately in one code base.

1.1 OBJECTIVE

Taking a suitable way for making a mobile application is to use local programming methods, local application, objective principles, and minor locally optimized increments so as to obtain better and solid application .

Some issues which are considered while developing the project are to develop the application which should be viable to the widespread commercial mobile network and their associated programming costly plans.

The idea behind cross platform mobile app development is it generates a code which can be deployed anywhere. Currently the market is quite efficient in developing tool kits for crossplatform development programs. Given below is a list of different tools which provide a growing environment for developing the app design and implementation.

Adobe Air	BlackBerry	ReactJS	NS Basic
Marmalade	Bluepring	IwGameEngine	OpenPlug
alcheMo	Brew	Jmango	Particle SDK
AppFurnace	Canappi	July System	PhoneGap
Application Craft	CellSDK	Kony	Rhomobile
Appcelerator	Celsius	Lazarus	Ionic
Appception	CloudPact	Meme IDE	Total Cross
appMobi	CoStore	MobiFlex	Unity
Aqua	Corona SDK	React Native	WebORB IS
Apache Cordova	DragonRAD	Moscrit	AdobePhonegap
BatteryTech	FeedHenry	MoSync	IBM worklight
Bedrock	GeneXus	NeoMAD	Fivespark

Figure 1.1 : Cross platform development tool kits [10]

CHAPTER 2

LITERATURE SURVEY

Heitktter, Henning, Sebastian Hanschke [1]: In this research paper the evaluation of the various of the cross platform application is done. In this research paper the various cross app development platforms are evaluated that which cross development platform is best suited for which condition.

Kyle Lutes[2]: In this research paper kyle lutes in 2012 have discussed the various issues that we have deal while developing the application using the cross platform application development systems.

N. P. Huy and D. vanThanh[3]: In this research paper they both have provided the various assessment or the evaluation criteria for the cross platform mobile application systems they can only discussed this but they haven’t given the exact way to do that , they have only discussed how to do that. There idea is to take the viewpoint to both the users and the service providers.

A. Charland and B. Leroux[4]: In this they both have discussed that the web technology can be helpful to extend the platforms. Developing the web apps can be useful way to develop the cross platform applications

A. Hudli, S. Hudli, and R. Hudli[5]: In this research paper they have provided a evolution framework for the cross platform applications development they have the criteria definition and also provided the qualitative comparison.

R. T. Allan Hammershoj, Antonio Sapuppo[6]: While developing the mobile applications using the cross platform development for both kind of mobile devices that is android and IOS we have to face different kind of challenges all these challenges are discussed in this research paper.

V. G. Sarah Allen and L. Lundrigan[7]: In this research paper they have discussed the various kind of operating systems and they have also given the four mobile application tools.

React Native Drawer[8]: In this it is given that how we can integrate the side menu together with the react native drawer.

J. Ohrt and V. Turau[9]: In this research paper it is shown that the previously existing approaches such as the phone gap is not a good cure for the cross platform mobile application development.

CHAPTER 3

MOBILE APPLICATION DEVELOPMENTS

The technology that combines different smart gadgets, general problems versatile stages in work and valuable key factors .This technology helps in exchanging and incorporating the different segments.

BACKGROUND INFORMATION

3.1 EVOLUTION OF MOBILE INDUSTRY

The technology started with telephones network which were based on radio frequencies with wired connections installed in the different places. Initially the telephones were very costly and a high amount is to be paid by the people for a short duration call.

The Company Motorola came up with a device with half an hour conversation around fifteen inches tall and of weight 1Kg, irrespective of the fact that it was not made for pocket size but became a massive technology among the people.

Who would have believed this device would have changed the communication history so much with various of updates and new smart technology. The device gave freedom to individuals , constant support and the ability to organize their own business to make it practical in real time world.

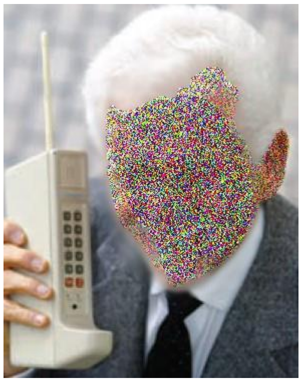


Figure 3.1 : Motorola DynaTAC 8000X

The following years came up with new types of technologies to get more vibrant and and enhanced features such as big screens, IR and Bluetooth ,Wifi, and moreover combining extreme number of small devices so that the interlink management can be easily made. The Mobile companies also invest a huge amount in endorsements and advertising which makes this industry one of the ten biggest in Media telecommunication.

3.1.1 PHONES

A mobile phone is a plastic device that incorporates the different internal processing and calculations which takes data from the user and furnish the result with optimum solution through internet and programming.

A Mobile comes up with features like alarm clock , video and still camera , Timer , and a companies trademark which takes care of the service and maintenance of the device.

Although due to their slim design structure and long battery backup, they are generally reassigned to Personal Computers business and given a fair amount of arithmetic computing to some extent which aligned the PC Companies to focus more on Mobile Development.

Previously multicore processors have been used among all for a lot of years but towards the beginning of 2011, all the phone producers decided and pertained to down scale the technology by making the phone dual core chip with internal memory of one GB and memory of 32 GB which enables the phone to be viable of HD videos , connections to HD screens , and give appropriate data framework for most of the clients such as gaming , and net surfing .

From then came a completely new kind of technology which was one GHz quad-core chip enabling High Definition and transforming the phone completely into a full functional PC when connected through a HDMI interface. This brought a clear sign of the broad spectrum of cell phone industry and created new paths.

Figure 3.2 : Various newer smartphones

3.2 PROBLEMS OF OLD TECHNOLOGY

Mobile applications is more complex time-consuming and costly process compared to traditional desktop and web applications testing the reason being , mobile applications need to be tested on various mobile devices and operating system under different network conditions .

TESTING OF MOBILE PHONE

The major challenges involved in mobile applications testing in different mobile operating systems in the market such as Android, iOS, Symbian ,Windows and Blackberry testing. Mobile application across multiple devices running on same platform and every platform poses a unique challenge for testers . Mobile device diversity is an especially acute problem for Android devices , official mobile device gallery includes over 60 devices of various screen sizes resolution and form factors providing testing coverage for all the devices is a major challenge even for the big organizations. Mobile devices can be connected with Windows or Mac using Wi-Fi , USB or cloud network and so greatly affect mobile testing strategy as all the three options are different from one another. Major n- OS updates keep test teams continuously involved testing new application features or rectifying the app against our new operating system versions mobile application behavior can be affected by the changes in network conditions.

PROBLEMS FACED BY MOBILE INDUSTRY

The Wi-Fi 2g ,3G ,4G, GSM ,CDMA bandwidth connection speed etc requires additional testing to ensure acceptable application behavior in real-world conditions. A mobile application can be a web app / native or a hybrid app which has both contents testing of each such application type is different than another as their implementation is quite different from one another. Test execution across different devices and browser , is also a huge challenging effort consider a test which needs to be executed on multiple Android and iOS devices and versions designing a test execution matrix of this is both complex and time-consuming as mentioned in the introduction , testing mobile applications is more complex compared to desktop or web application with the increase in complexity there are actually less tools available to support mobile testing and the selection of most appropriate tool out of available is another tough task typical mobile application needs to be tested on five to seven iOS and ten to fifteen Android devices this list grows every quarter making almost impossible for the organization to test mobile applications.

WIRELESS COMMUNICATIONS

More noteworthy transfer speed rendition from top to low data transfer capacity, defenselessness to security issues, signal defilement, demonstrate blocking structures, and regular landscapes and this prompts extra overhead in wireless systems. The challenges mentioned must be considered when creating mobile applications and there should be a strong software development procedure.

3.3 MOBILE PHONE FRAMEWORK

The meaning of cell framework is vastly improved characterized by the point of view of exemplary working frameworks. A working framework is the decreased degree focus programming including the uncovered equipment alongside the product application. Working frameworks offer equipment deliberation, driver and media plan, security structure, memory and procedure the executives offices for ideal use of equipment source.. Newer mobile OSs are coming up with new technologies like audio player , GPS , Voice Recorder etc .

CHAPTER 4

CROSS PLATFORM MOBILE APPLICAION DEVELOPMENT

4.1 APPLICATION DEVELOPMENT

There are various tasks involved whether the app is native , or cross platform structure , so in order to achieve that various tasks are includes as

DEVELOPING STAGE

In this programming structure the main focus is on the improvement technique . The development begins by optimizing informations for the application clients . Additionally the framework considers to overlook and focus on the strategy . One of the used structure is MOWAHS which helps in planning of each task by creating instruments for cell phones and also helps in composing a game plan for organizing and functioning of each task.

The technologies that help in rendering the versatile programming are HTML5, CSS, Java Script

INTEGRATING STAGE

Integration is the point where the different versatile applications can be united with the core focus on the developing foundation with the help of cloud , devices , and through the alternate framework based on devices and internet storage.

BUILDING STAGE

Build is the task where altogether compiling ,change and code streamlining for the corresponding pair of packages is implemented and executed .This stage is the crux of practicing the improvement in extreme cross platform programming .

DISTRIBUTION STAGE

This stage makes the application viable to the people by a medium so that they can utilize it , like addition of app on play store and istore etc . Users can now download this app without charge and can use it.

MANAGING STAGE

Management of the app is taken care by managing remote establishment ,the purchased version of the app comes with the correct program variation for assembly ,streamed information of board , data execution and stage improvement. Frameworks like Ionic and ReactJS also helps a lot.

4.1.1 APPLICATION DEVELOPMENT (NATIVE)

Native development includes the making of application exclusively for a particular device, chip, and own arrangement bearings. The software focus on predictable functionalities , local API codes ,rational libraries .It includes explicit SDK language and various pitfalls from OS.

Parallel execution of documents of a program are handled by native projects. The extra layering of cell phones into working framework is also incorporated in this step moreover this methodology also tells to compare the end clients with cellular application procedures.

4.1.2 DEVELOPING STAGE

With Various Gadgets such as pagers, PDA, setofboxes , DVD players ,Sun Microsystems thought of a java 2 micro edition

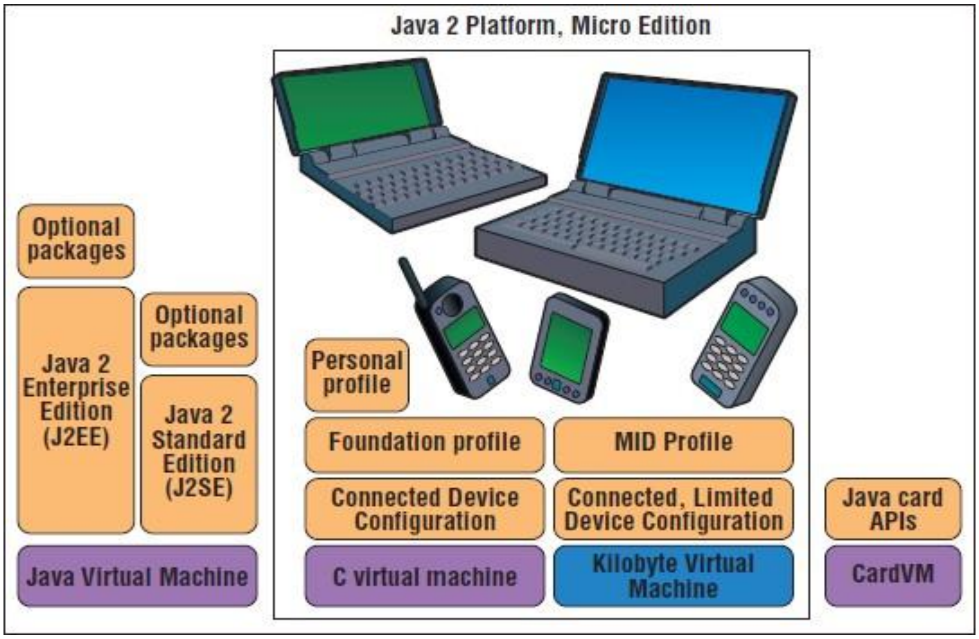

Java 2 Platform, Micro Edition
Optional packages
Java 2 Enterprise Edition (J2EE)
Optional packages
Java 2 Standard Edition (J2SE)
Java Virtual Machine
Personal profile
Foundation profile
MID Profile
Connected Device Configuration
Connected, Limited Device Configuration
C virtual machine
Kilobyte Virtual Machine
Java card APIs
CardVM

Figure 4.1 : J2ME

Java ME provides basic layering structure to the equipment producers and application engineers . Java ME ensured an advancement condition for all sort of cell phones at the time.

4.2 ADVANTAGES OF PLATFORM INDEPENDENT

Cross Platform OS saves time and money of development as the same base code can be used to compose for the different devices and platforms.

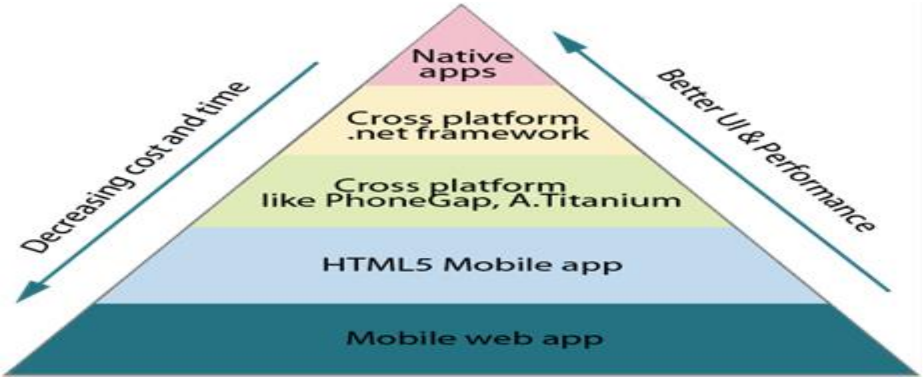


Figure 4.2 : Stages of a cross platform

Cross OS development focuses on the future advancements on the project as it makes the base code simple for the developers and designers for development.

Advantages of Independent development through OS are-

i. Inter stage improvement is found in using HTML5 improvement through innovation by software engineers is to use their ability.

ii. Web learning innovations is accepted in all stages.

iii. Devices comes with a wide variety of advancements and trademark so in order to build up a program cross stage improvement has to be made to function everything with less exertion.

iv. Composition of cross staged projects is made by utilizing OS,and SDK kit for improvement and less capital venture.

v. For locally composed applications cross staged program attempt a better approach

4.3 TOOLKITS FOR CROSS PLATFORM DEVELOPMENT

4.3.1 TITANIUM SDK

Introduction to obliterate the titanium tutorial series now what is titanium it is basically a platform for developing mobile tablet and desktop applications using web technologies. Now I could go on for explaining to you what the hell exploit Appcelerator titanium it is in for details but basically long story short it lets you create iPhone Android and iPad apps using JavaScript as well as desktop applications however mostly it's used for creating iPhone Android and maybe iPad apps now why is tighten up serrated titanium or titanium mobile so popular until now most of the time you in order to create a native iPhone or Android apps.

Either learn objective-c in order to create iPhone and iPad apps or learn a Java and a bit of XML to learn and to develop Android apps however with titanium mobile you can create both or all three app off iphone Android and iPad. Apps just using javascript now because there are loads more web developers who has a knowledge of JavaScript than people who have knowledge of either or both Objective C and Java titanium .Mobile became an easy and really popular platform or an ever so increasingly popular platform to create these native apps using javascript now in order to play around with absolute at item what you need to know basically is JavaScript now in my the series a basic understanding of and learn it's all over there now what you need what you need is titanium studio it's basically the IDE the the desktop environment to create apps and also you need Android SDK and X dot Xcode if you're using Mac to create a iPhone and iPad apps .

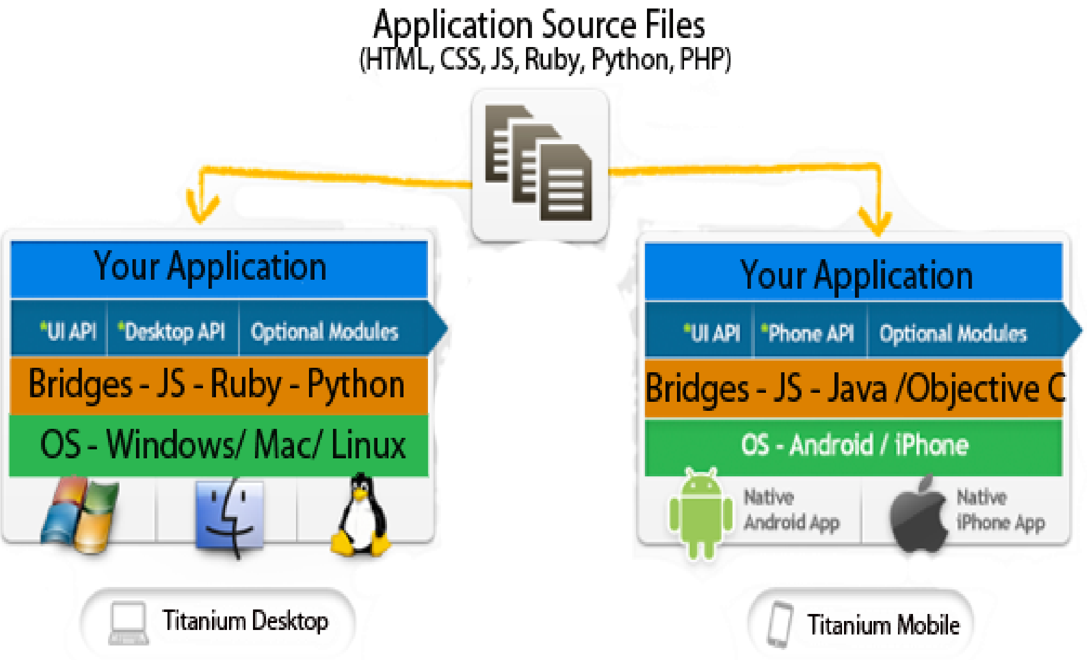


Figure 4.3: Architecture

Either learn objective-c in order to create iPhone and iPad apps or learn a Java and a bit of XML to learn and to develop Android apps however with titanium mobile you can create both or all three app off iphone Android and iPad. Apps just using javascript now because there are loads more web developers who has a knowledge of JavaScript than people who have knowledge of either or both Objective C and Java titanium .Mobile became an easy and really popular platform or an ever so increasingly popular platform to create these native apps using javascript now in order to play around with absolute at item what you need to know basically is JavaScript now in my the series a basic understanding of and learn it's all over there now what you need what you need is titanium studio it's basically the IDE the the desktop environment to create apps and also you need Android SDK and X dot Xcode if you're using Mac to create a iPhone and iPad apps .

4.3.2 APACHE CORDOVA

Config dot XML file or which is also referred Phone gap build interface will create account in phone gap bill also of the phone gap builder interface our device as well as our PC for debugging after that we'll create a to as config files which is important for creating phone gap apps which is the main configuration file also we'll add plugins to our PhoneGap app we'll add icons and splash screens as well then after that finally we will build our app and then we will build four different versions of Android then a bit about the signing key and it will create the actual signing key and after that we'll sign our app and prepare the app or upload into the Play Store .

4.3.3 XAMARIN

Windows devices are good measure but creating so many different apps is expensive time-consuming and it takes a lot of engineering effort unless you're using Xamarin..It’s a whole ecosystem of tools that helps you create apps for all platforms with just one technology stack c-sharp language running on dot net framework. Xamarin apps while created for different operating systems share all business logic database access and network communication only user interfaces designed separately to maintain the native look and feel of each platform .When building your app first c-sharp dotnet and visual studio with installed xamarin these are the only three components required to create apps for all operating systems. There are emulators available for all mobile platforms but for a Mac fan its free to create iPhone apps. Options for debugging weather from desktop emulator or directly on a device xamarin apps also boast an unmatched performance level compared to hybrid or other cross-platform development tools for instance image loading and native apps is only 14% faster than using xamarin and even a more significant difference in image saving speed is simply unrecognizable by a mere human .

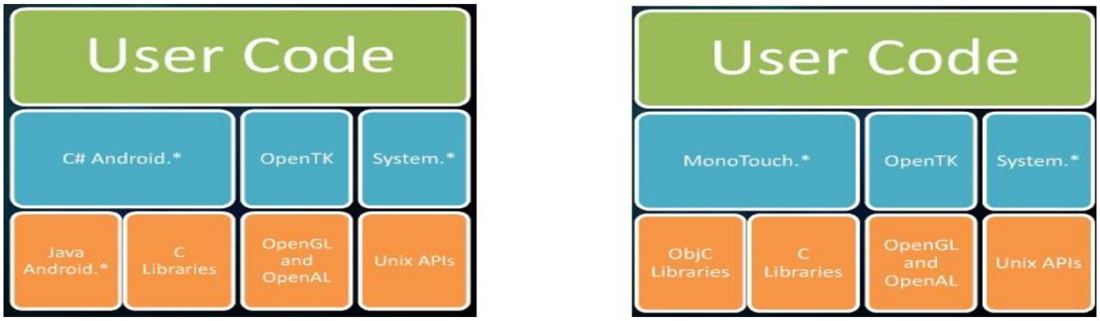


Figure 4.4 : Xamarin architecture for iOS (left) and Android (right)

4.3.4 IBM WORKLIGHT

Work light allows you to rapidly deploy debug and test your mobile application. This is true whether you choose a completely native , completely hybrid or combination of the two in your application. Developers can choose their own IDE or use the work like development studio work lights . Mobile test workbench provides the developer a complete repeatable functional testing suite to assist with bug detection and lie device simulation the built in mobile browser simulator allows for application profiling and testing much earlier in the development cycle. Additionally , worklight includes customizable UI templates so your development team can certify publish and reuse assets in multiple applications saving valuable development.

Moreover the second component of worklight deals with user interaction, this includes an enterprise adapter framework that simplifies how mobile applications interact with the backend whether you're calling rest services ,soap services a database directly or even looking to execute server-side Java .The were cloud adapter model can secure an optimized the interaction along with the data integration. Worklight also includes other platform benefits these include a unified push notification service that allow developers to use a single set of API to manage and send push notifications a set of server-side geolocation services specifically for creating applications with contextual awareness and an enterprise-grade analytics engine enabling you to monitor and identify client and server-side trends .

Security work light uses a robust security model to ensure the highest level of application authentication and compliance this includes integration with existing security infrastructure whether it's DMZ or data center based fully encrypted local storage of data offline user access an application authenticity validation and finally work light also allows the business to retain operational control of applications even after consumer deployment this is accomplished through the use of application versioning .

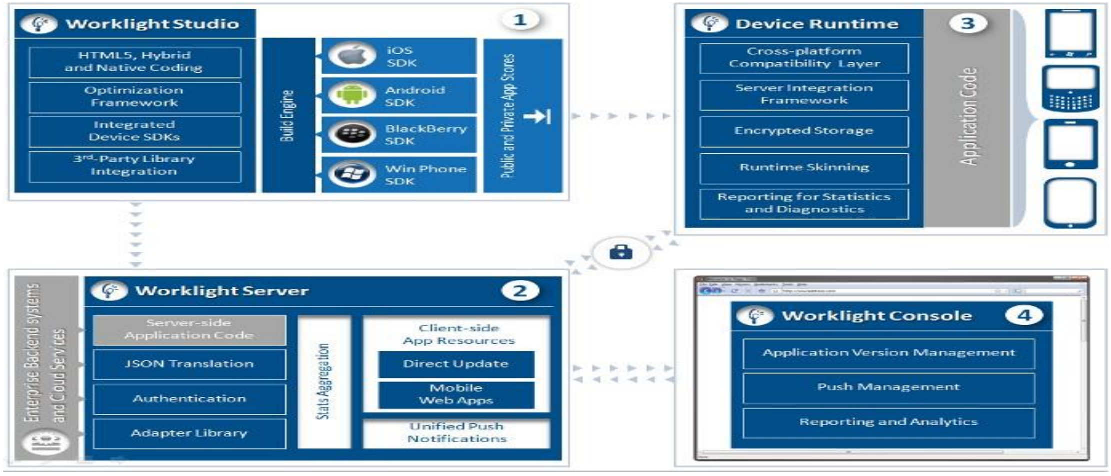

Worklight Studio
1
HTML5, Hybrid and Native Coding
Optimization Framework
Integrated Device SDKs
3rd-Party Library Integration
Build Engine
iOS SDK
Android SDK
BlackBerry SDK
Win Phone SDK
Public and Private App Stores
Device Runtime
3
Cross-platform Compatibility Layer
Server Integration Framework
Encrypted Storage
Runtime Skinning
Reporting for Statistics and Diagnostics
Application Code
Worklight Server
2
Enterprise Backend systems and Cloud Services
Server-side Application Code
JSON Translation
Authentication
Adapter Library
Stats Aggregation
Client-side App Resources
Direct Update
Mobile Web Apps
Unified Push Notifications
Worklight Console
4
Application Version Management
Push Management
Reporting and Analytics

Fig 4.5 : Worklight Studio Interface

Adobe Air consults with the stage explicit Adobe Air runtimes to get the local APIs of their phones. All through its runtime, Adobe Air gets to the network, database and different APIs.

4.3.5 IONIC FRAMEWORK

Ionic is a framework for building apps , it's built on web technologies that allow’s developers to reuse their already existing skills most importantly. Ionic is free and open source so developers can use the framework and also contribute back to the project as well with ionic you can build apps that not only target iOS and Android but can also target the web or DES native desktop .All this can be done from the same codebase with a hundred percent code reuse at it’s core .Ionic is a collection of web components ,these are our web standard made into every major browser using web standards not only allows ionic’s components to ship with the smallest code footprint possible but allows us tobe resilient against breaking changes in framework.

We also ship integration libraries for the most popular frameworks, currently we have support for angular and the angular CLI ship support for view pre act and react but to work with ionic before getting into any frameworks you can just use the JavaScript in CSS directly to get started.

4.3.6 REACT NATIVE

React Native is actually a platform which gives you a full native app for both iOS and Android, when you are done this is not a cordova solution where you're using what's called a webview and just simply outputting a website. Here what in react native we use real native components and real native api's to interact with our code again this is not just HTML being rendered inside of a webview, we're using actual things like the iOS navigator or the just the native buttons or things like that we use alert and toast messages like you do exactly within native

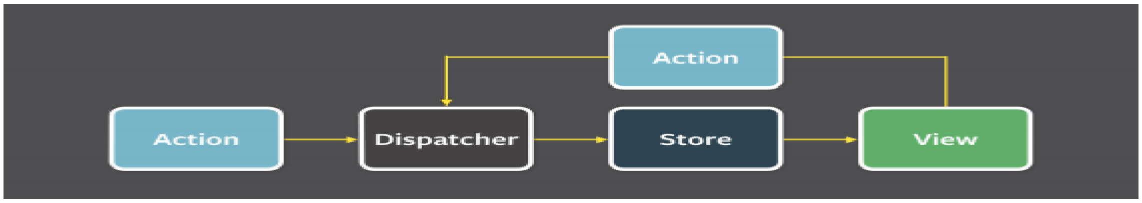


Fig 4.6 : React Native Interface

With react native we build apps that we still tailor for iOS or Android but we don't have to write any Java or Swift code and we learn the technology once to then write apps for iOS and Android . React native is not an app which provides you with a component library of pre-styled components that look like material design on Android and iOS design on iOS , it instead gives you core building blocks which you can take which you then have to style and compose on your own application

The real native apps are not wrapped in some webview or anything like that with, JavaScript and react antireact native library , which gives us a lot of utilities helpers and a couple of our things. A react native app and maybe more importantly what is it not when you build an app with react native you're not building a web page running in the browser on your mobile , Device that's not the case you're not building a web page ,you're also not building a web app that's hosted in a webview. The case for ionic or Cordova apps there you typically or you build a web app with CSS, HTML and JavaScript and then Cordova gives you a wrapper that will lead to a native app being created that is distributed over the app stores but that wrapper just wraps your web page .A native app but don't really have native code under the hood and that can lead to for men's issues thus it is so functional.

Why built app using React Native framework?

React Native got all the web stack technologies at your disposal and you build your native app just as you build a web app for react native. It's different there ,we have a real native app because all the UI is going to get compiled to native code that's really important. We're going to get a native app out of that the JavaScript part is going to stay JavaScript but all of the UI elements, the buttons and so on will be the native equivalents depending on which platform we're running on. It also gives us better performance but it also makes a development a bit harder because we're not really working with just HTML, CSS and JavaScript. To be precise we won't work with CSS at all it's not supported , we won't work with traditional HTML elements at all. It's not in there you will see what we got instead and we can use JavaScript but only the features that are supported by the environment react native gives us .

4.4 COMPARISON OF FRAMEWORKS

Platform independent mobile programs come in numerous forms. Each tool may approach platform independent mobile software/app development in lots of methods. Some come as runtime usage or significantly interpreter abstraction layers and if there should arise an occurrence of permitting a couple is totally open source while others are business and exclusive. The level of native component backing of a cell phone changes comprehensively that much.

The native service tools give is more extensive notwithstanding a variety of different ones likewise outfit a confined help yet may likewise offer a distinctive element a particular engineer could be happy to use. For some engaged with stage autonomous portable programming advancement, picking one apparatus might be a precarious one. With every one of these alternatives, conditions and highlights to survey preceding settling on any decision, arrival one programming and moving cross stage may demonstrate to be a significant troublesome encounter. In the wake of having seen a few devices, picking one is substantially less straight forward.

SUPPORT FOR DEVICE FEATURE SET

When an application is chosen, another assessment will be the measure of local property the instrument accommodates the period it supports and how great it underpins them. Thinking of some as particular element one instrument gives different people can't appreciate cloud information synchronizing, interpersonal interaction reconciliation.

PROGRAMMING LANGUAGE THE TOOLS USES

Finding a more current coding language may procure a software engineer less profitable or might build time and exertion. Software engineers will likewise think about the advancement/coding language of the assets in their instruments seeing sessions. Somebody that has been in web advancement will discover it significantly simpler to hold onto tools, such as, PhoneGap while someone with C# development foundation may think that it’s simpler to embrace tools like Flutter, Xamarin.

4.5 MULTI-PLATFORM SYSTEM ARCHITECTURE

We use the firebase SDK for cloud storage in each of our apps that means that we write a file straight from maybe the iOS app and then later we can access that same file from within our web app because we're using the firebase SDK to access file storage .We can share the file with users worldwide, since in this case we're tracking expenses and we're actually storing receipts that are probably somewhat sensitive information so we can also lock it down

4.5.1 MOBILE WEB APPS

A standard web browser like Chrome ,Firefox, Safari .They're built and hosted just like any web application or website on the Internet. The only real difference is that they're built to look good and to function well on mobile devices, this usually means that they're responsive and they're designed with a mobile-first approach meaning they start with focusing on the mobile view but also make it work for desktops .Some of the advantages of building a web app are first they're built using just regular web standards like HTML, , JavaScript .You don't need to learn any difficult languages like Java or Swift or anything like that .Any web developer can build a simple web app or mobile web site, this also makes the app very easy to host and maintain simply upload to a whole staying account with .

Another advantage is that you can use any type of web technology and stack that with laravel app or python nodejs. There are no limitations in that aspect optimum web apps are also by far the cheapest option. If you're not a web developer yourself hiring a web developer is much more cheaper than hiring for instance a Swift programmer .

Another advantage which is that you can build one application for all platforms so iOS , Android , blackberry and Windows Phones . The app is going to run on any device with that head as long as it can run a browser all right even an old-school flip phone this year your web app will run on as long as it has some kind of browser.

4.5.2 ABSTRACTION BASED CROSS PLATFORM SYSTEM

Data abstract is really the premier multi to your database application framework. It's built on our word winning room objects SDK services platform and it just takes database to your database applications development to the next level. It also makes it very easy to use and it's very powerful and secure. It's a multi-platform which means we have different flavors of data abstract, one for delphi in free pascal ,one for net mono ,one for xcode for iOS and OS 10 and then we have javascript . Actually it is built into those other platforms so you can build javascript clients. you'll be able to run dart effect on any platform out there and the great thing about

Data abstract is that it's a native for each of those platforms so the library is rewritten from the ground up to work on each platform natively. Data abstract also makes building cross-platform applications with centralized data very easy and you can have your application developed a native application for each of these platforms .

Platform and then all those applications can then share a centralized data source .There's the Windows platform on the Windows platform you have a number of tools options available to you but most likely everybody here at least is going to pick Delphi and the reason we picked Delphi among other reasons is because we like the fact that Delphi gives access to the native widgets to that platform so when we build an application in Delphi it looks like a Windows application as opposed to if we're using Java for windows application .

The development usually in a java application doesn't look native because it uses the java components instead of the native windows components .Thus that's the reason we choose delphi for windows application development . If we're building a web application we're probably going to use asp.net just because asp.net has some great support with the MVC framework. Taking an example for a lot of the latest web technologies, so the FBI that's a great way to get to the web platform again we have a lot of choices when it comes to building Mac OS 10 applications or iPhone applications but if we want to get the native widgets available on Mac OS 10 and iOS we're probably going to go with Xcode and so

that's why it's important that we have data object available for all these platforms because then if you choose these native options to reach these platforms you can use data abstract and that all of these are able to talk to each other and share information .

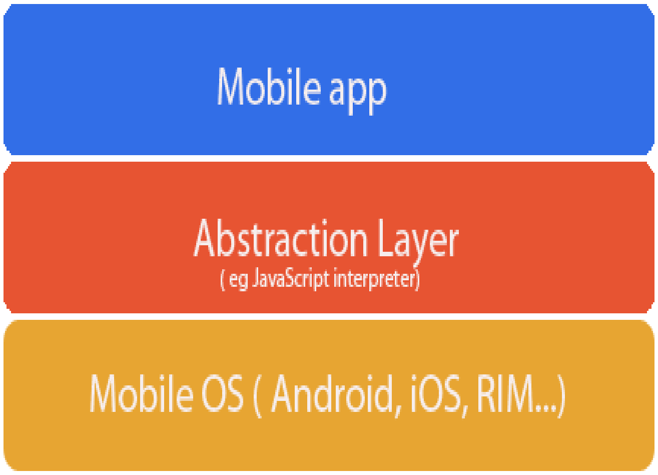

Mobile app
Abstraction Layer
(eg JavaScript interpreter)
Mobile OS (Android, iOS, RIM...)

Figure 4.7 : Abstraction based cross platform overview

4.5.3 HIMIPH APPLICATION BACKEND

As earlier mentioned we tried to develop a cross platform mobile application for water complaint management and addressal system . The main objective of this app is that the residents of Himachal Pradesh can put forward their grievances and common water related problems by logging into the HIMIPH app , and their problems are addressed by the different engineers and management of the local Municipal body. The framework used in this app is Apache Cordova powered frame named Ionic.

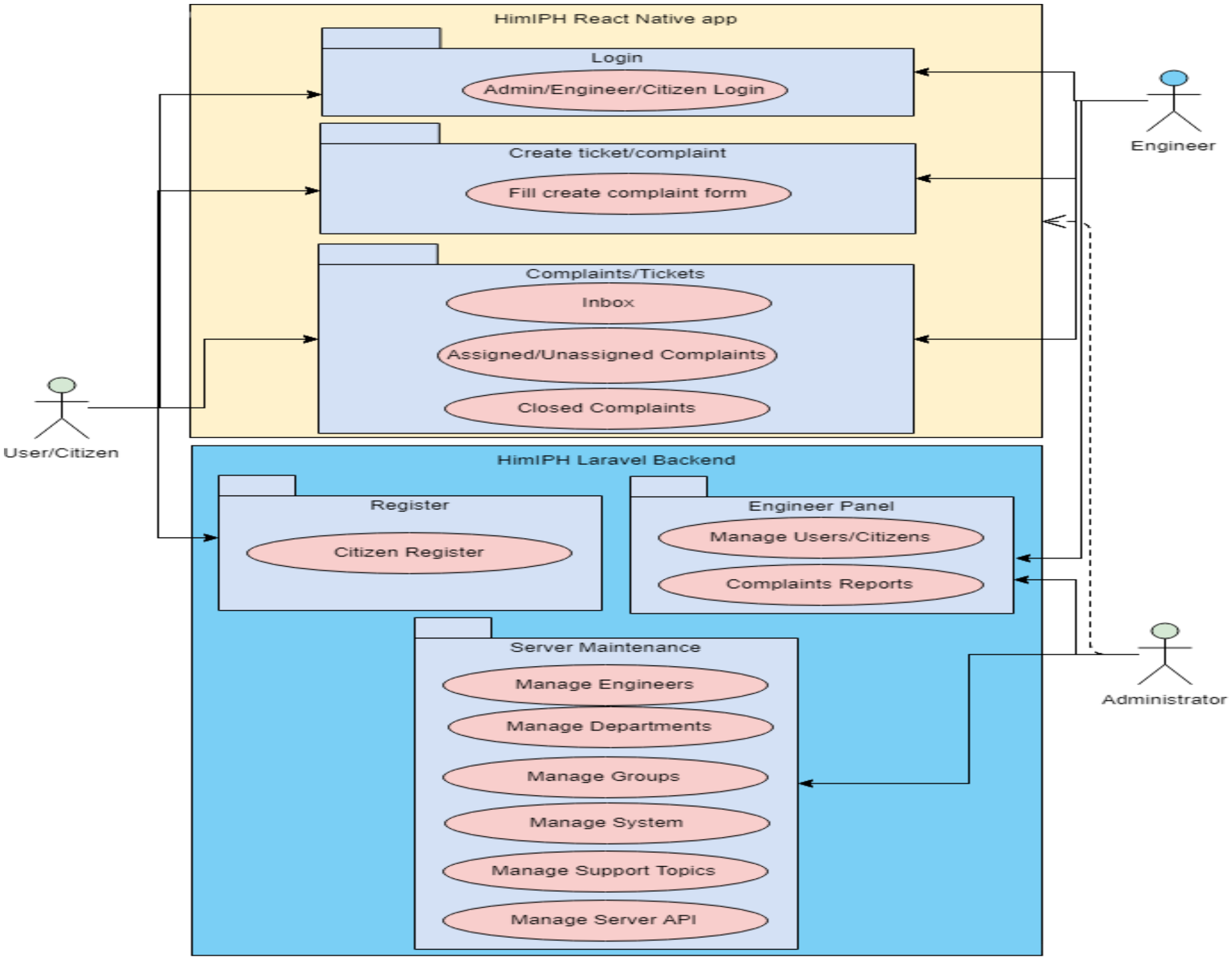
In the backend there is an administrator panel dashboard , where the admin can manage user/engineer, insertion and deletion of an engineer ,the updation of details and passwords etc.

For keeping all the records such as complaints queries engineers/users details , requests etc we have used MySQL database .We are also working on status update in form of notifications (Currently being in process)

The working behind the app is the user first register him/her on the app, then login afterwards he/she would submit his/her complaint or query and asses the status. The complaint then is forwarded to some junior engineer if the problem is solved by the junior then he marks the complaint and send it into the fixed list of complaints , which automatically sends a notification to the user . If the problem is not solved by the junior Engineer it is given to a senior engineer thereafter the programs continues if by chance the problem or complaint is not solved by anybody , the complaint goes to rejected complaints .

The Use Case Diagram of React Native app and Backend panel:

In mobile app, any Administrator/Engineer or Citizen can login and create a new ticket/complaint. They can also check the replies and steps that have been taken to resolve their issues. Users are allowed to register only from backend for security. Engineers can also manage users who have registered their accounts and also check complaints' report having information regarding the number of complaints, still unassigned or open.



Here are the some of the screenshots of the panel/dashboard of admin:

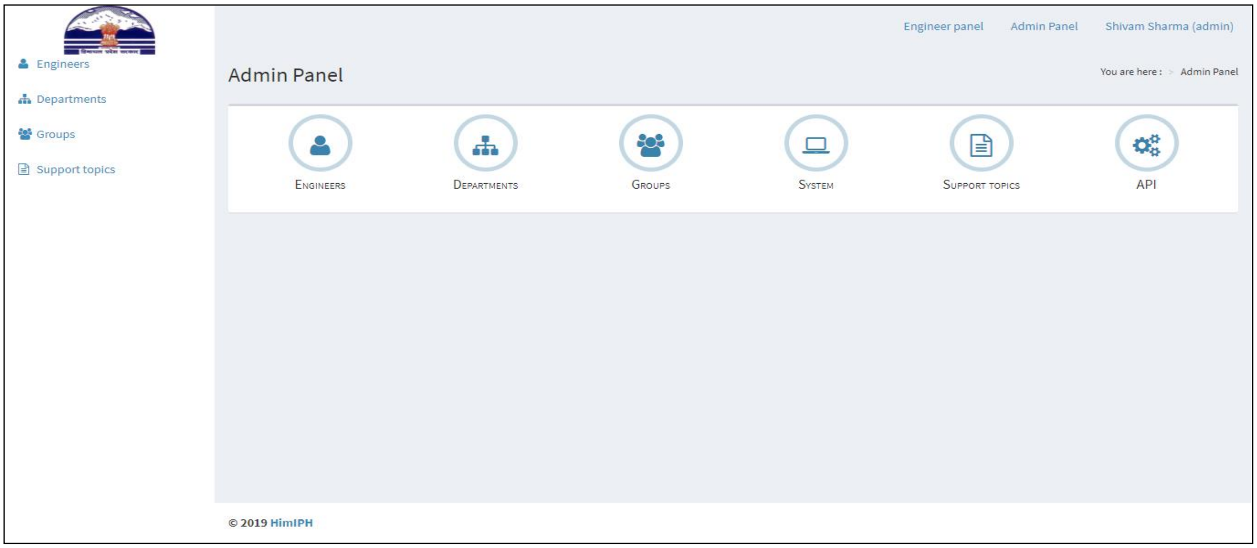
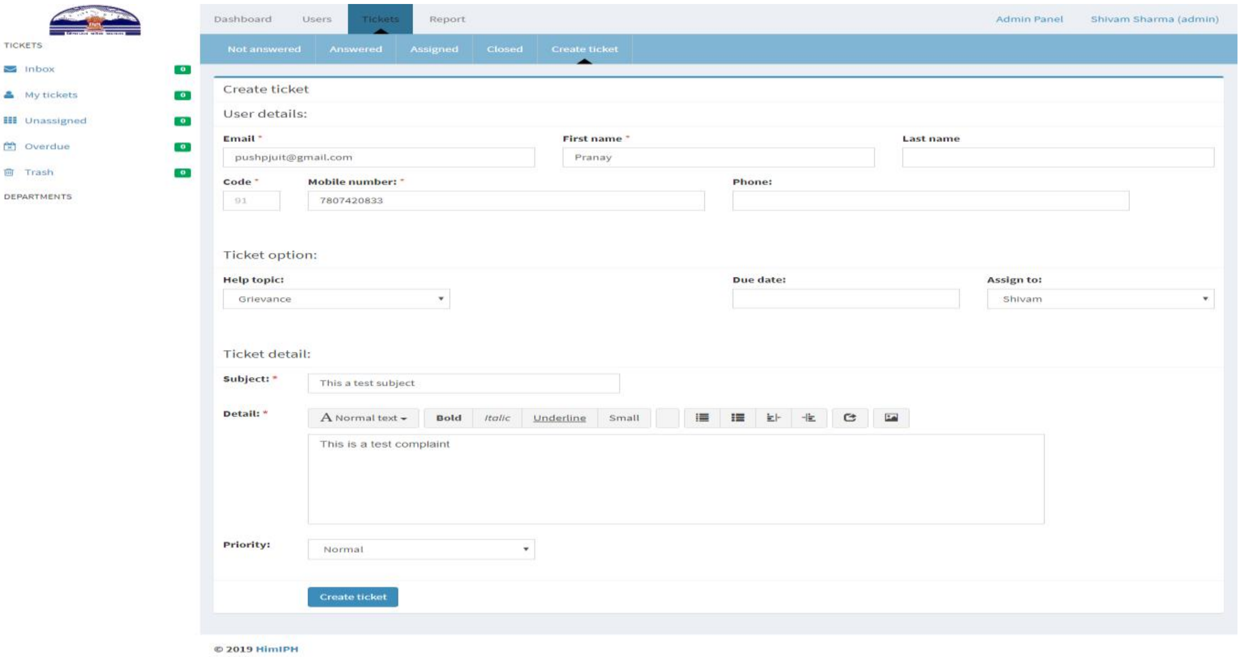


Figure 4.8 : Admin Panel Dashboard

Administrator can perform several server tasks using the options present on admin panel dashboard.



Create ticket

User details:

Email *: pushpjuit@gmail.com
First name *: Pranay
Last name:
Code *: 91
Mobile number: *: 7807420833
Phone:

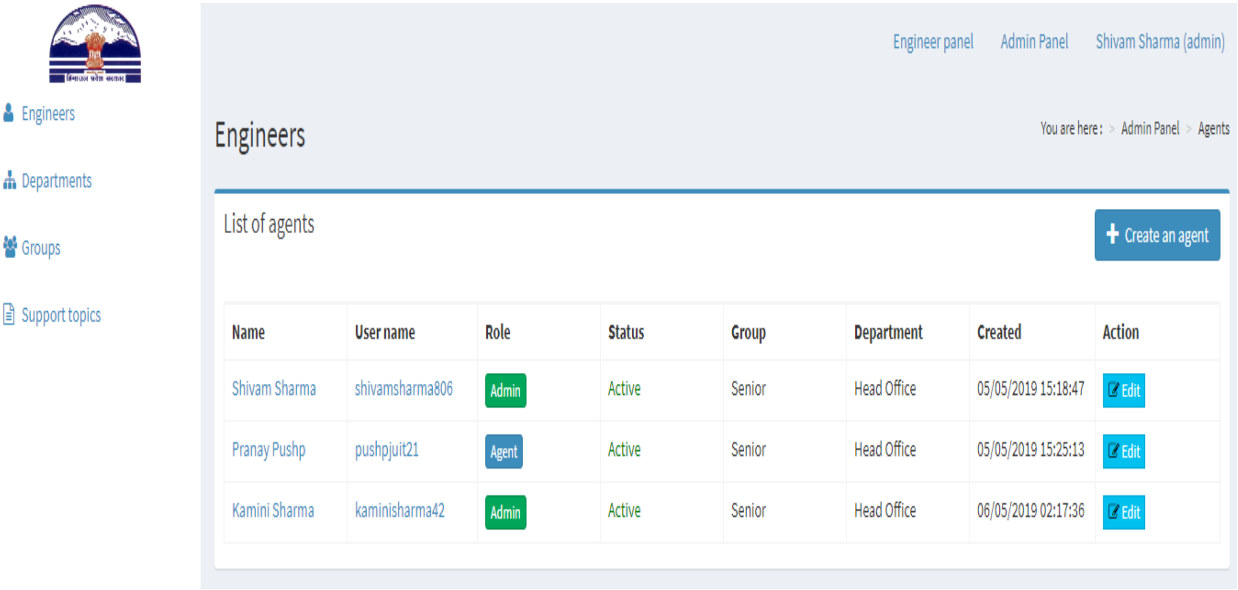
Ticket option:

Help topic: Grievance
Due date:
Assign to: Shivam

Ticket detail:

Subject: *: This a test subject
Detail: *: This is a test complaint
Priority: Normal

Figure 4.9: Create Ticket



Engineer panel Admin Panel Shivam Sharma (admin)

- Engineers
- Departments
- Groups
- Support topics

Engineers

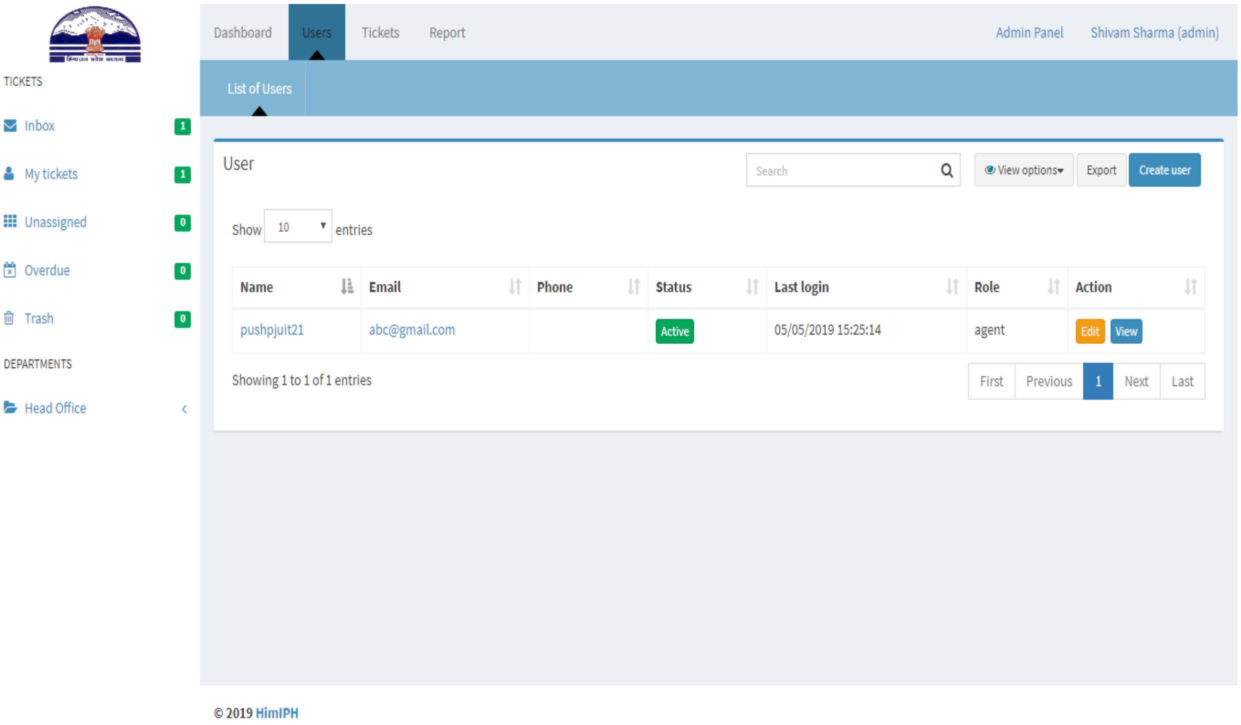
You are here : > Admin Panel > Agents

List of agents

+ Create an agent

Name	User name	Role	Status	Group	Department	Created	Action
Shivam Sharma	shivamsharma806	Admin	Active	Senior	Head Office	05/05/2019 15:18:47	Edit
Pranay Pushp	pushpjuit21	Agent	Active	Senior	Head Office	05/05/2019 15:25:13	Edit
Kamini Sharma	kaminisharma42	Admin	Active	Senior	Head Office	06/05/2019 02:17:36	Edit

Figure 4.10: Engineers



Dashboard Users Tickets Report Admin Panel Shivam Sharma (admin)

List of Users

TICKETS

- Inbox 1
- My tickets 1
- Unassigned 0
- Overdue 0
- Trash 0

DEPARTMENTS

- Head Office

User

Search

View options▾ Export Create user

Show 10 ▾ entries

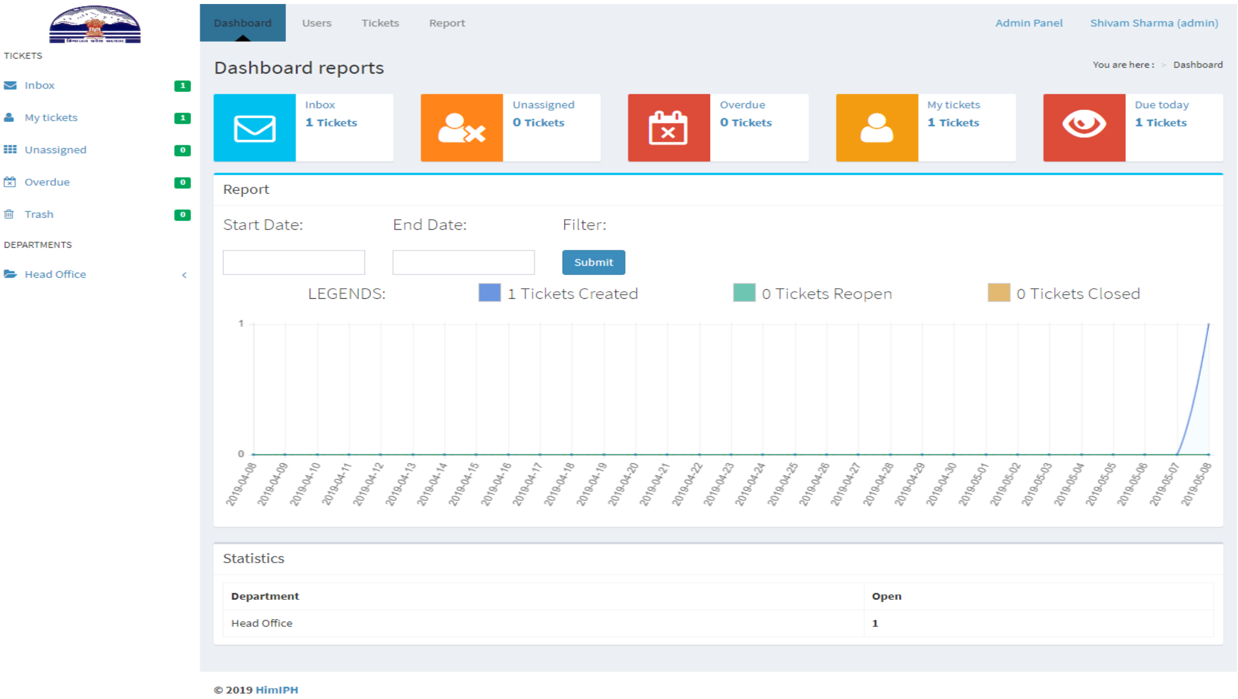
Name	Email	Phone	Status	Last login	Role	Action
pushpjuit21	abc@gmail.com		Active	05/05/2019 15:25:14	agent	Edit View

Showing 1 to 1 of 1 entries

First Previous 1 Next Last

© 2019 HimIPH

Figure 4.11: Users



TICKETS

- Inbox 1
- My tickets 1
- Unassigned 0
- Overdue 0
- Trash 0

DEPARTMENTS

- Head Office

Dashboard | Users | Tickets | Report | Admin Panel | Shivam Sharma (admin)

Dashboard reports

You are here : > Dashboard

Inbox	Unassigned	Overdue	My tickets	Due today
1 Tickets	0 Tickets	0 Tickets	1 Tickets	1 Tickets

Report

Start Date: End Date: Filter:

Submit

LEGENDS: 🟦 1 Tickets Created 🟩 0 Tickets Reopen 🟧 0 Tickets Closed

Statistics

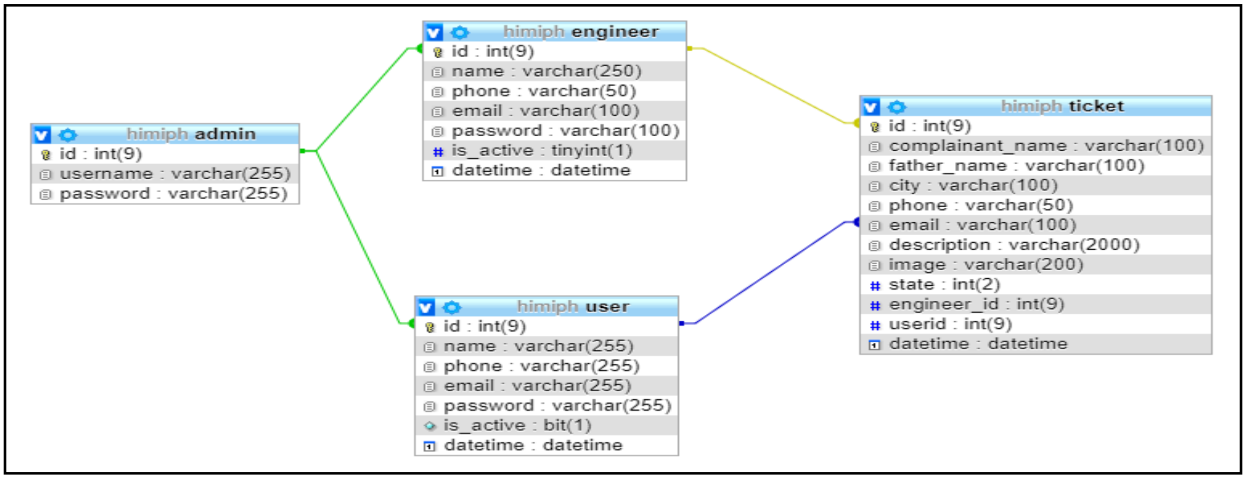
Department	Open
Head Office	1

© 2019 HimIPH

Figure 4.12: Assign Ticket

4.5.4 DATABASE OF HIMIPH BACKEND AND RELATIONSHIP BETWEEN TABLES

Relation between tables of database:



himiph admin
- id : int(9)
- username : varchar(255)
- password : varchar(255)

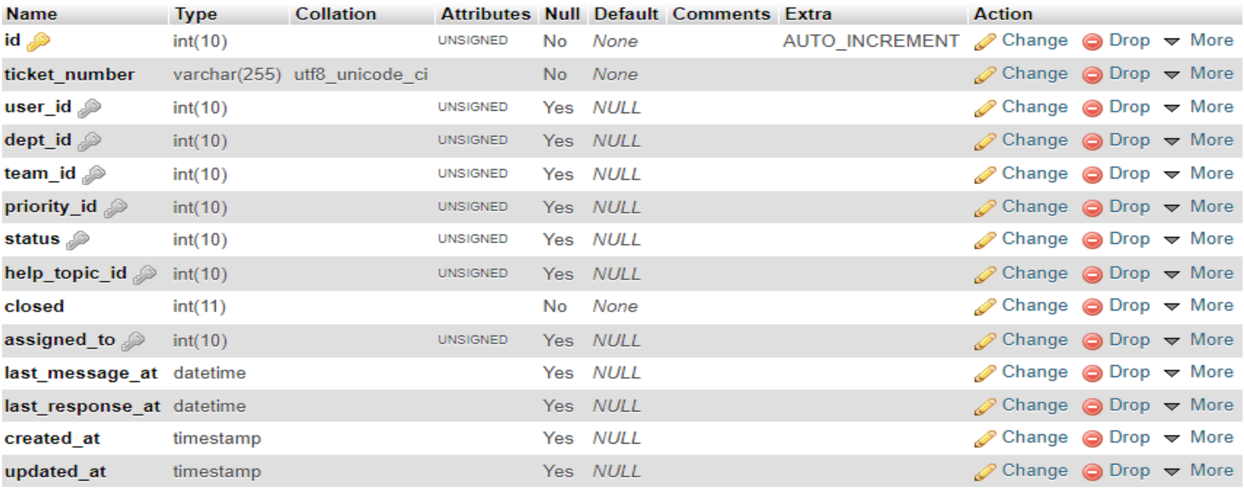
himiph engineer
- id : int(9)
- name : varchar(250)
- phone : varchar(50)
- email : varchar(100)
- password : varchar(100)
- is_active : tinyint(1)
- datetime : datetime

himiph user
- id : int(9)
- name : varchar(255)
- phone : varchar(255)
- email : varchar(255)
- password : varchar(255)
- is_active : bit(1)
- datetime : datetime

himiph ticket
- id : int(9)
- complainant_name : varchar(100)
- father_name : varchar(100)
- city : varchar(100)
- phone : varchar(50)
- email : varchar(100)
- description : varchar(2000)
- image : varchar(200)
- state : int(2)
- engineer_id : int(9)
- userid : int(9)
- datetime : datetime

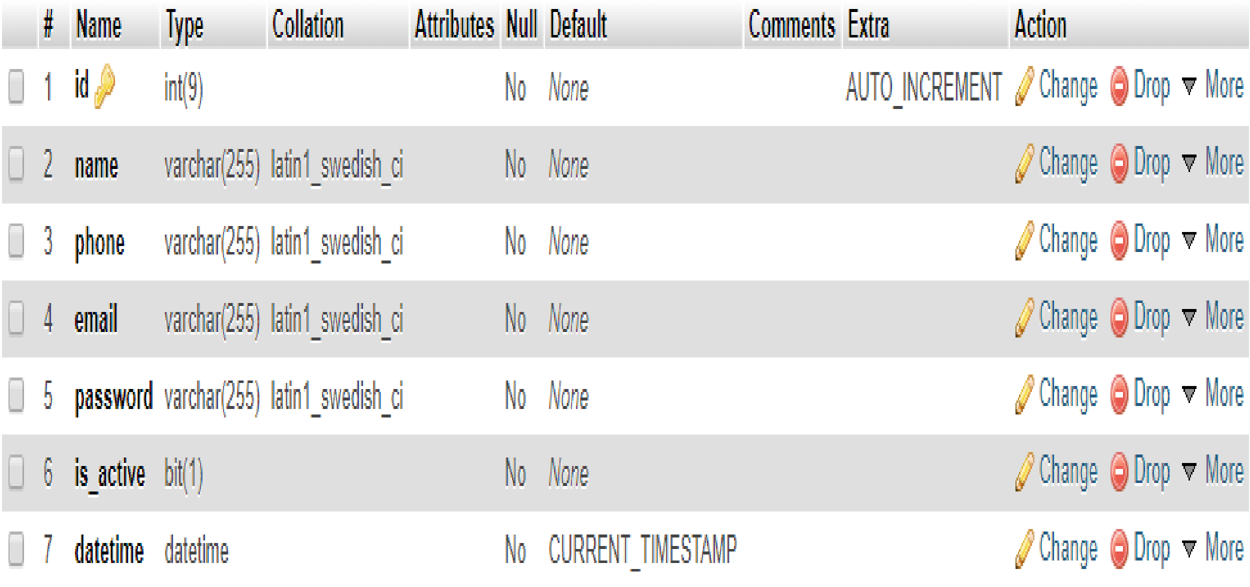
Tables in HimIPH database:

- tblticket



Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
id	int(10)		UNSIGNED	No	*None*		AUTO_INCREMENT	Change Drop More
ticket_number	varchar(255)	utf8_unicode_ci		No	*None*			Change Drop More
user_id	int(10)		UNSIGNED	Yes	*NULL*			Change Drop More
dept_id	int(10)		UNSIGNED	Yes	*NULL*			Change Drop More
team_id	int(10)		UNSIGNED	Yes	*NULL*			Change Drop More
priority_id	int(10)		UNSIGNED	Yes	*NULL*			Change Drop More
status	int(10)		UNSIGNED	Yes	*NULL*			Change Drop More
help_topic_id	int(10)		UNSIGNED	Yes	*NULL*			Change Drop More
closed	int(11)			No	*None*			Change Drop More
assigned_to	int(10)		UNSIGNED	Yes	*NULL*			Change Drop More
last_message_at	datetime			Yes	*NULL*			Change Drop More
last_response_at	datetime			Yes	*NULL*			Change Drop More
created_at	timestamp			Yes	*NULL*			Change Drop More
updated_at	timestamp			Yes	*NULL*			Change Drop More

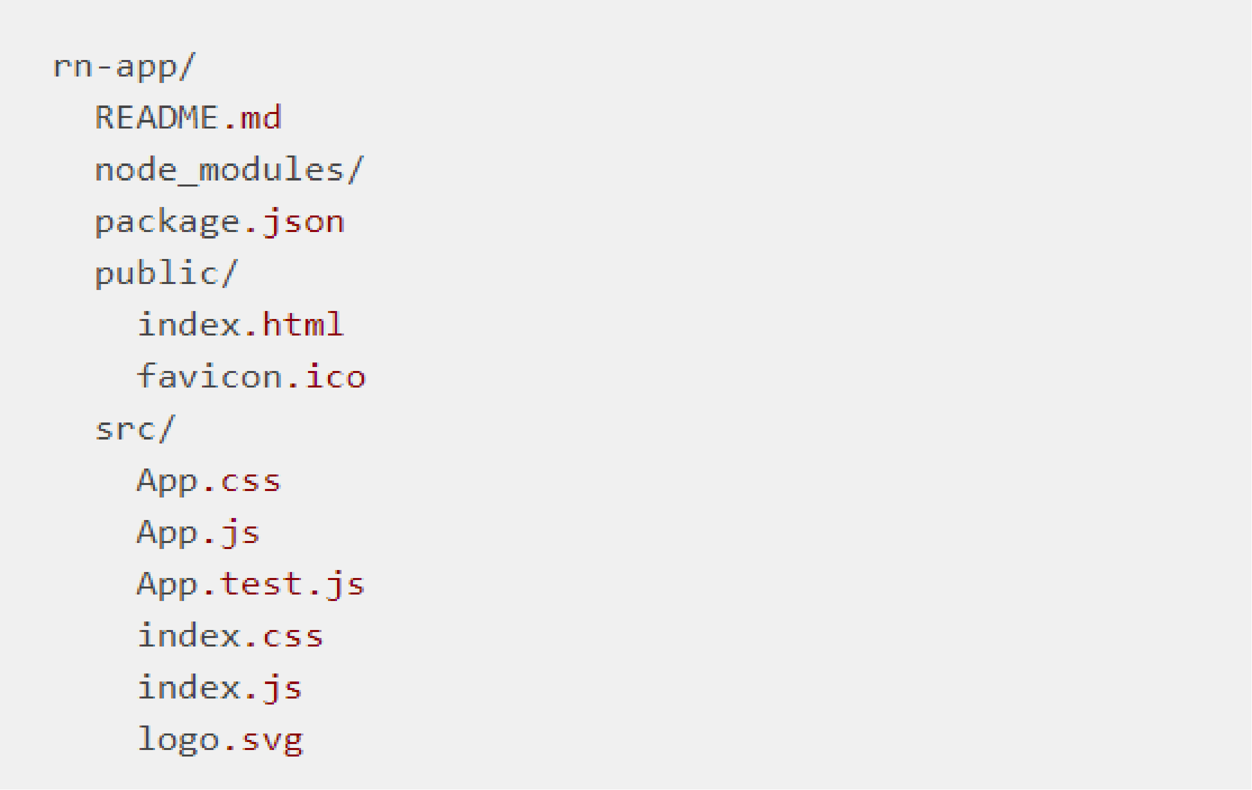
- tbluser



	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
☐	1	id	int(9)			No	*None*		AUTO_INCREMENT	Change Drop More
☐	2	name	varchar(255)	latin1_swedish_ci		No	*None*			Change Drop More
☐	3	phone	varchar(255)	latin1_swedish_ci		No	*None*			Change Drop More
☐	4	email	varchar(255)	latin1_swedish_ci		No	*None*			Change Drop More
☐	5	password	varchar(255)	latin1_swedish_ci		No	*None*			Change Drop More
☐	6	is_active	bit(1)			No	*None*			Change Drop More
☐	7	datetime	datetime			No	CURRENT_TIMESTAMP			Change Drop More

4.5.5 HIMIPH REACT NATIVE MOBILE APPLICATION

As the app is using React Native framework, so let's first take into consideration directory/folder structure of any new React Native app.



```
rn-app/
  README.md
  node_modules/
  package.json
  public/
    index.html
    favicon.ico
  src/
    App.css
    App.js
    App.test.js
    index.css
    index.js
    logo.svg
```

Now here is the explanation of React Native folder structure:

- src/index.js :   It’s the source of JS beginning point
- public/index.html : page template according to user needs
- node_modules : This folder/directory is for build tools. It contains all the required and added node modules being used for the development of React Native app.
- package.json : This in the app root defines what libraries will be installed when “npm install” is run, into node_modules folder.
- src/App.js : App.js contains main cross OS code for React Native mobile application.
- src/App.test.js : App.test.js contains main cross OS code for test/debug for React Native mobile application.
- src : In src folder, there are many important folders such as api, assets, components, features, navigation, reducers and styles.

The various core components of React Native app:

1. View : In React Native, View is a built-in component. The view is like div, it is used in mobile apps. The view is a content area where the content is displayed. Using this, content can be arranged in a very good manner.

   Usage of view: When you need to wrap your content inside the container. When you need to use different style for different element. When you need a nested element. It supports for Synthetic touch events, which is used for different purpose.

2. State : what state means every component has a particular state right so what that means is that if you change the state of your component and by state I mean a particular object in that component react would smartly check what stuff was changed in that particular state and which stuff your component needs to be updated off ,

3. props : they give extra information to your components as this text component or this view component right here would have very specific functions associated with it right now we are making use of the inbuilt components later on we can create our own custom components as well but for now let's just say I want to display text with some southern-style right so what I'm gonna do is make use of the style property which is associated with this component right prop stands for property .

4. Style : The most important thing in web or mobile app is styling. It makes application attractive. We don’t need any special language or syntax for styling. You can style your application by using the javascript object. All components accept the props style. We can pass the style by changing the CSS properties like ‘backgroundcolor- backgroundColor’. We can also use inline style but it’s not a good practice. The best way to create styleSheet object is by using Inline style or by using stylesheet.

5. Flex layout : you create some sort of styles and react just like you, do on the web and react. Native converts them into native properties associated with those particular elements so for example you can position a view somewhere you can basically

change the properties like color of the text, its opacity and background etc. All the layouts would be actually flexbox based so it means that every view container , every element is basically would follow the flexbox system which comes from the web on with CSS meaning that all these elements have by default a display Flex property associated with them and you cannot actually change . React just works on flex box system so what we can do is basically right here we can try to create a very simple kind of interface so for ex a half screen would be let's say red half be green right so

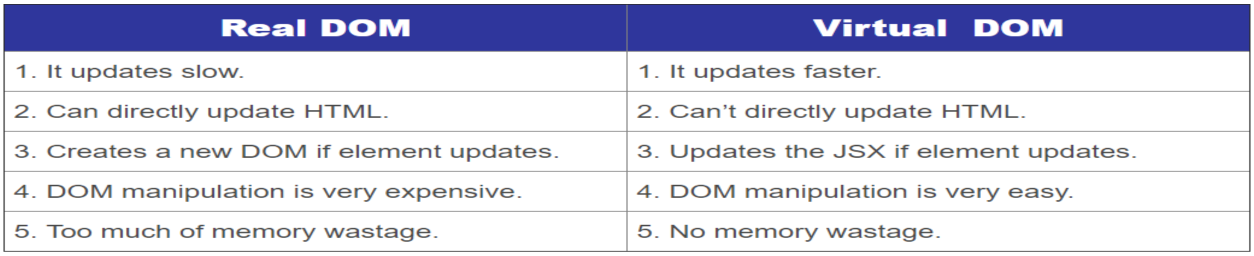
6. File Structure – As react actually organizes its files so that it's easier to work for you later on with the application for the structure , the file structure what we have right here for react native is that if we start from the top you would see that we have two folders which is android and iOS now these are basically the only folders you would spend most of your time because android consists of two files which are used to build the application for android platform and similarly on the similar basis iOS. Hence we can see these all these X Castle tiles from an Xcode background so these files would be said familiar to you so these are basically the files for the iOS and for Android .We can see that for the app we have builder cradle file inside SRC , we also have the manifest file which is basically the same thing as if you're working with Android Moreover as it's running on JavaScript we can have our additional modules with us and which would be installed inside the node modules folder and once the app is compiled then all of that stuff would be basically just managed by react .The flow config file then we had the get files so that you can actually just check out your project on a github repository .

7. React Native Navigation - Navigation is a react native application because it’s the most of the apps you have used so far, apart from calculator. For example if the first page you can see is the login activity or you can say the login page, the next one after you login you see your feed you can go to your profile you can change some settings so all of those are separate pages mostly so that kind of means and actually you can see on the facebook that you have three buttons as well on the top so you click on them so that's kind of all that sort of thing is called as a whole navigation so you're

navigating around the app . Thus you need to add navigation to your react native app if you want to make it interactive and user friendly .

The navigating between the screens you see react does not come backed with a default navigation system . It has just offloaded to third parties so there are a couple of popular ways to actually do react native navigation

In React Native, DOM is used and here is the difference:



Real DOM	Virtual DOM
1. It updates slow.	1. It updates faster.
2. Can directly update HTML.	2. Can't directly update HTML.
3. Creates a new DOM if element updates.	3. Updates the JSX if element updates.
4. DOM manipulation is very expensive.	4. DOM manipulation is very easy.
5. Too much of memory wastage.	5. No memory wastage.

The steps to create and run a new React Native app include:

- Installation of required dependencies such as JDK, Node and Python using package manager such as Chocolatey.
- Installation of React Native CLI using npm or npx
- Create new react native app using command:

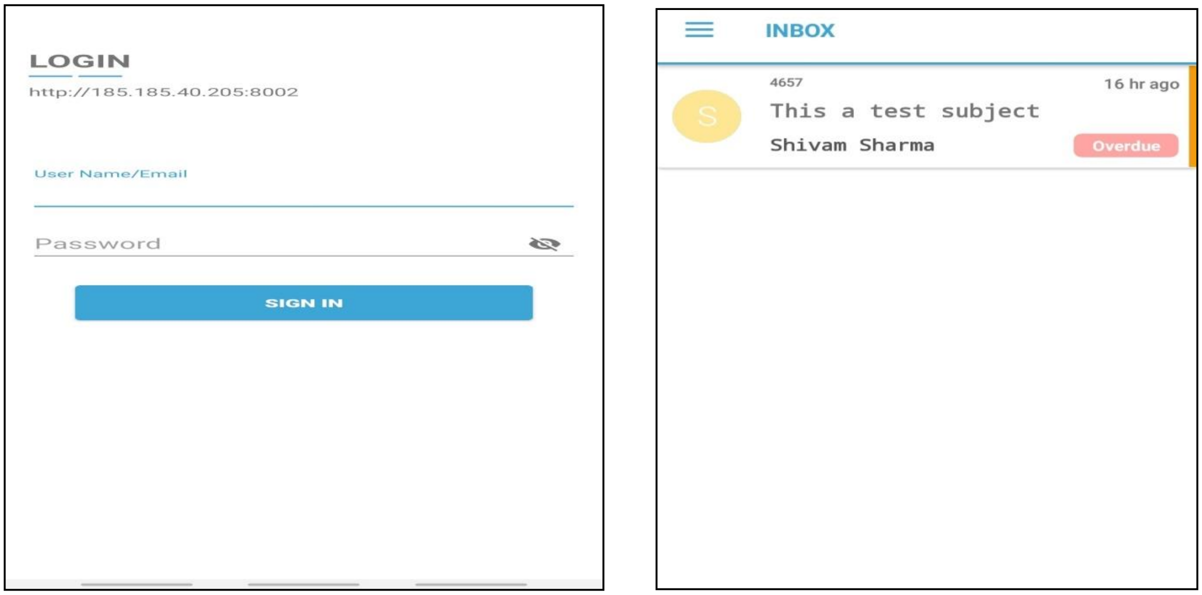
```
react-native init HimIPH
```

- Install Android Studio and/or Xcode and then run following commands:

```
cd HimIPH

react-native run-android
```

Here are some screenshots of HimIPH react native app:


LOGIN

http://185.185.40.205:8002

User Name/Email

Password

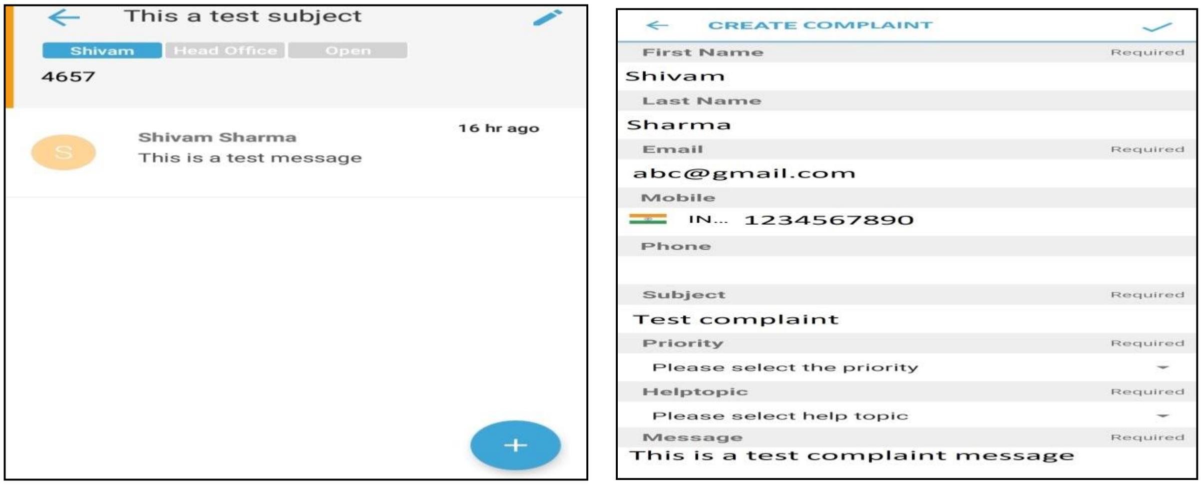
4657 16 hr ago

This a test subject

Shivam Sharma

Fig 4.13 : Login and Inbox screen

The user/engineer/adminstartor can login using username and password and then in Inbox screen, they can see any tickets/complaints and also replies for ticket. He/she can also reply using HimIPH app.


This a test subject

4657

Shivam Sharma 16 hr ago

This is a test message

First Name Required

Shivam

Last Name

Sharma

Email Required

abc@gmail.com

Mobile

IN... 1234567890

Phone

Subject Required

Test complaint

Priority Required

Please select the priority

Helptopic Required

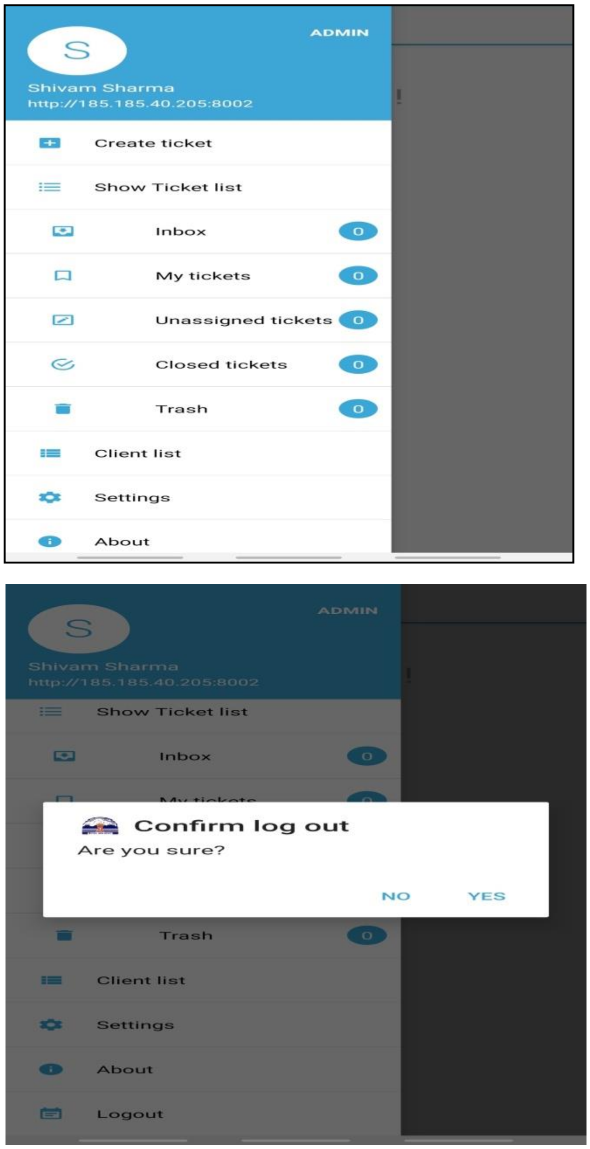
Please select help topic

Message Required

This is a test complaint message

Fig 4.14 :. Complaint body and Create New Complaint screen

They can check complaints in Inbox and also create new complaints.



Confirm log out

Are you sure?

Fig.4.15 : Navigation and Logout screen

In navigation menu, various options are available such as user list, create new ticket, tickets list, about and logout.

Now here is the Entity Relationship diagram for HimIPH react native app:

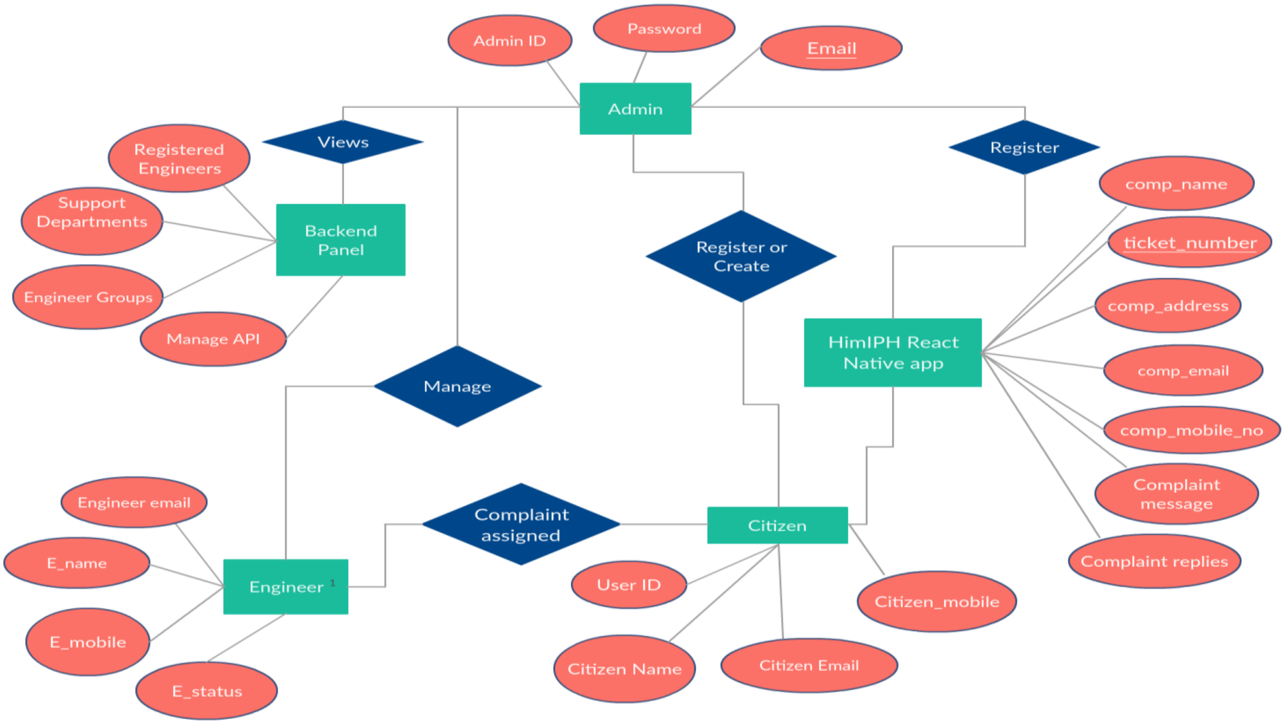


Fig 4.16 :. ER Diagram for complete complaint management system app

- The various attributes of Admin object/entity are: admin_id, admin_email, admin_password
- The various attributes of Engineer object/entity are: engineer_email, engineer_name, engineer_mobile, engineer_status, engineer_password
- The various attributes of Citizen object/entity are: user_id, citizen_email, citizen_name, citizen_mobile

The various attributes of ticket object/entity are: ticket_id, comp_email, comp_name, comp_mobile, comp_address, comp_message

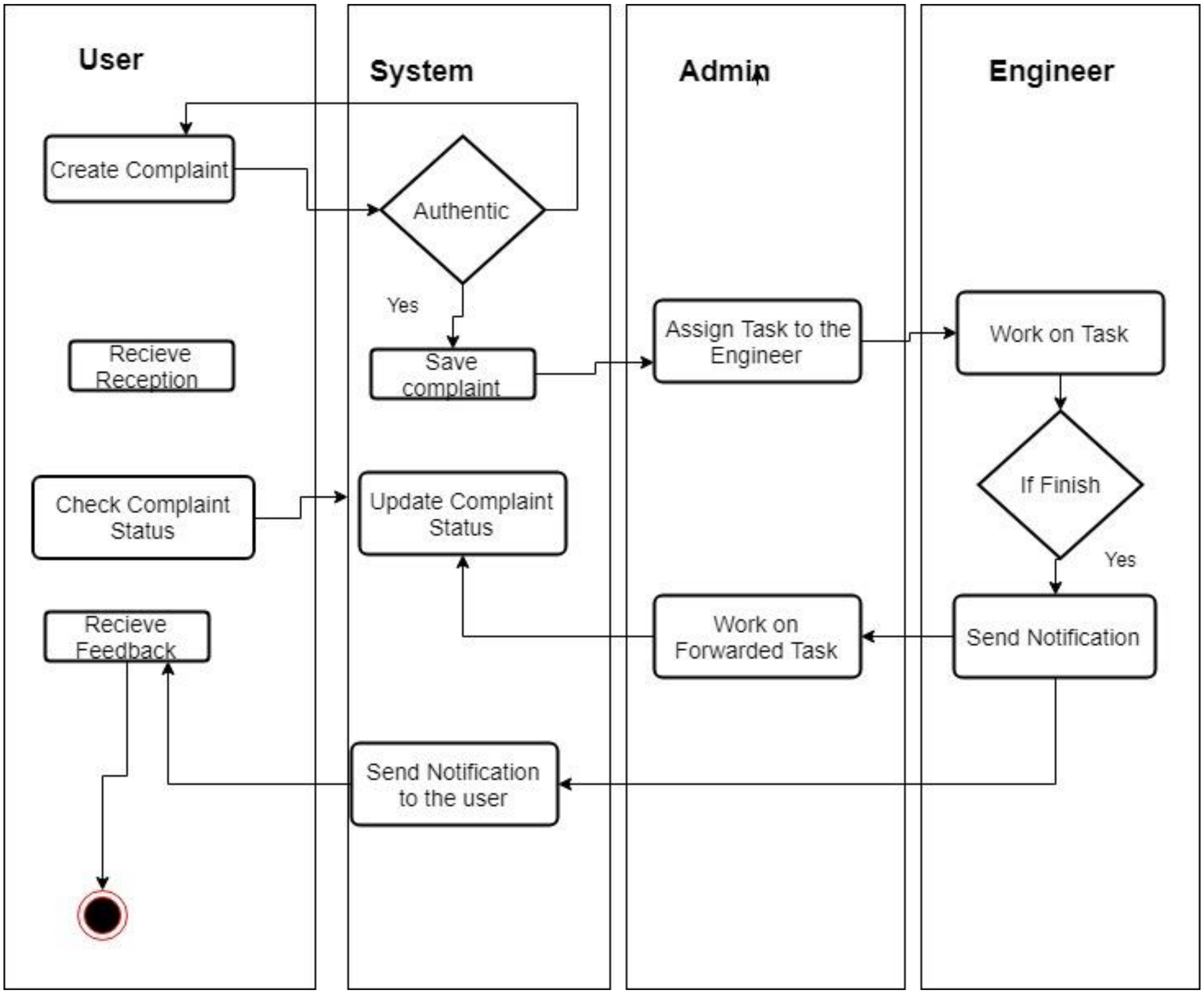


Fig 4.17 : . Activity Diagram for complete complaint management system app

s: Now here is the Data Flow diagram for HimIPH react native app

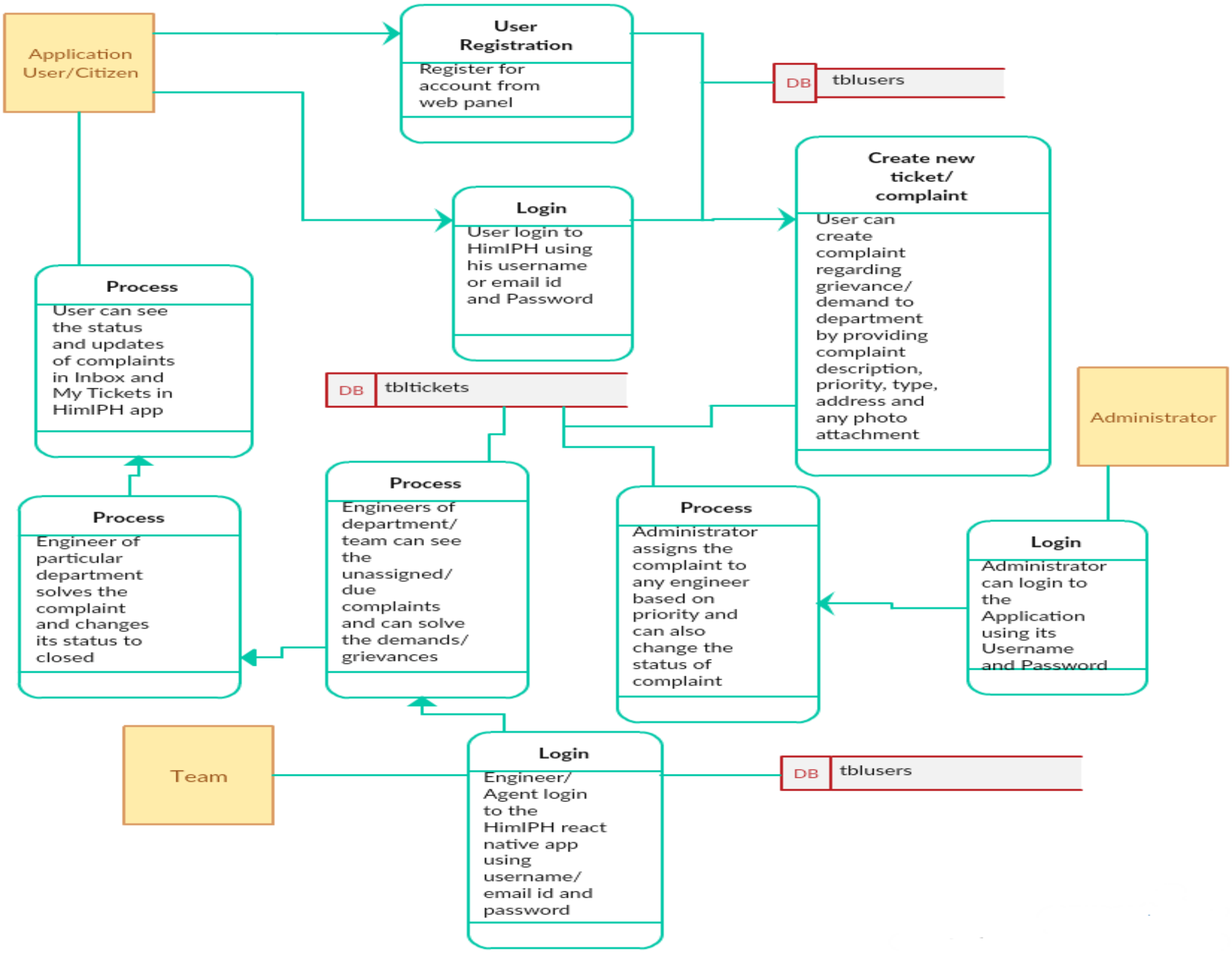
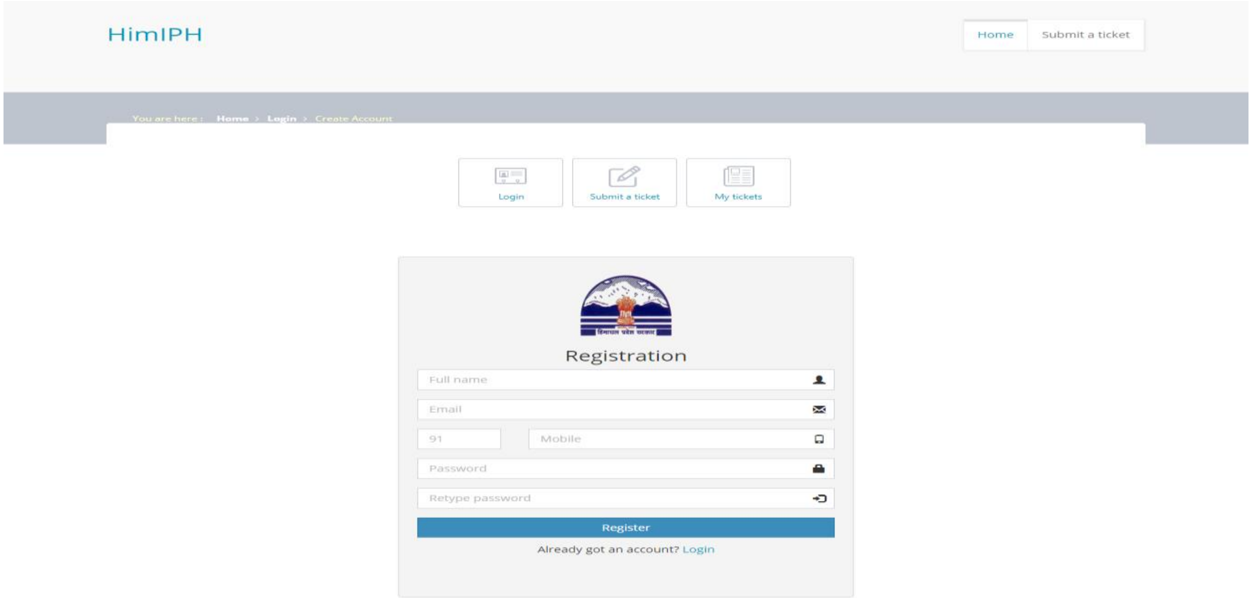

Application User/Citizen
User Registration
Register for account from web panel
DB tblusers
Create new ticket/ complaint
User can create complaint regarding grievance/ demand to department by providing complaint description, priority, type, address and any photo attachment
Login
User login to HimIPH using his username or email id and Password
Process
User can see the status and updates of complaints in Inbox and My Tickets in HimIPH app
DB tbltickets
Administrator
Process
Engineer of particular department solves the complaint and changes its status to closed
Process
Engineers of department/ team can see the unassigned/ due complaints and can solve the demands/ grievances
Process
Administrator assigns the complaint to any engineer based on priority and can also change the status of complaint
Login
Administrator can login to the Application using its Username and Password
Team
Login
Engineer/ Agent login to the HimIPH react native app using username/ email id and password
DB tblusers

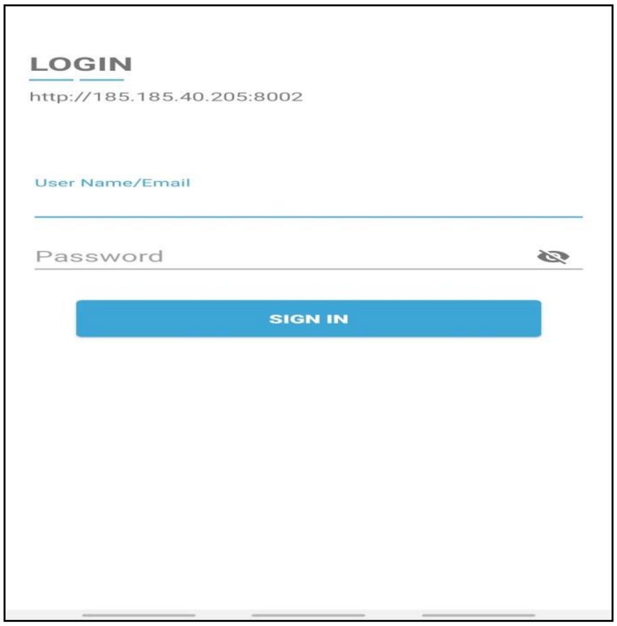
Fig. 4.18 : Data Flow Diagram for complaint management system HimIPH app

Working of HimIPH app:

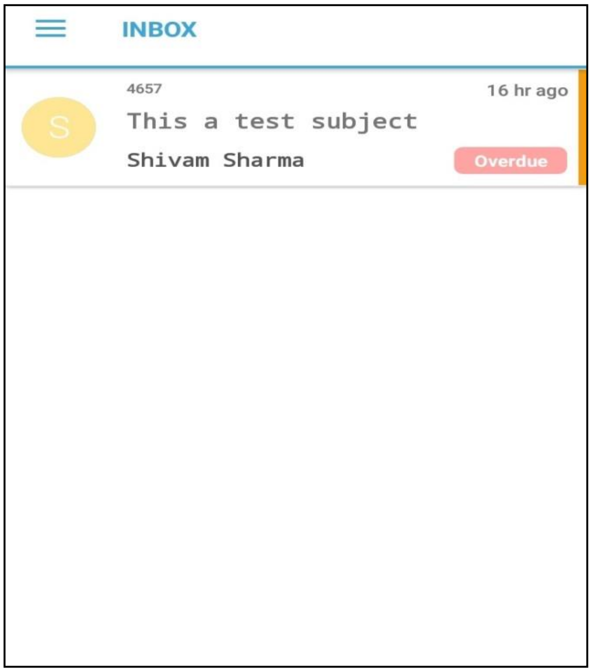
The frontend or the React Native application is the platform from where the user/citizen can register complaints and check its status and replies. The backend is in Laravel (PHP framework). For security reasons, the user has to register account from web panel only.



Then a mail containing password is sent using SMTP. Then the user can login to mobile app using the username/email id and password.



After login, the user can see the complaints and any replies/actions taken in Inbox and/or My tickets screen. The user can also create complaint by pressing “Create New Complaint” option from navigation menu. Then he/she needs to fill details such as complainant name, complainant address, complainant mobile number, complaint type (Grievance/Demand), complaint priority, complaint subject and its description. Then after pressing “Submit” option, complaint is created and a four-digit random ticket number is generated for it.



4657 16 hr ago
This a test subject
Shivam Sharma

Then administrator/senior engineers can assign the ticket to other engineers based on the priority of complaint. The administrator/engineers can also login using HimIPH app and manage tickets/complaints from there. The administrator can also manage the users/citizen accounts, details and passwords.

CHAPTER 5

FINAL CONCLUSION AND SCOPE OF IMPROVEMENT

I think that the future for most project is going to be using some sort of hybrid framework or maybe some web-based cross-platform framework whether it be maybe a flutter maybe continued growth or react native you know who knows PhoneGap . Thus it’s very necessary for a developer to optimize his/her project by utilizing these technology. In my case with the Water complaint redressal System , a lot new features like user- engineer chat and sms notifications are being worked on .

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