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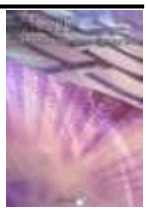

Ticketing System Using Mobile IOS Application

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ABSTRACT

Under the acceleration of the wheel of technology around the world, various ways of automating information have occurred to replace old-fashioned ways that don't serve the pace of everyday lifestyle. There are many things that we should change in our work systems such as paper, stand-alone systems, phone calls or even email. Every kind of companies has different sections that help the process of paperwork concerning personnel and maintenance. However, some of this paperwork might be overlooked or delayed, which could lead to slow down the outcome of the organization. So, they need to improve their system work to save time, effort and make an efficient mechanism to follow requests and tickets of any organization or customer. So, we should replace any old system with mobile application database system to facilitate the work of supporting and following tickets. As a solution to that, we have come with the idea of the " Help Desk Ticket System Using Mobile IOS Application." The application aim is to support, facilitate, and solve problems regarding time, effort, priority and type. It is a modern way to solve problems.

Keywords: Ticket system, IOS, Helpdesk smartphones

1. Introduction

The world is now in a remarkable developmental state with the use of modern technology. Despite the everyday use of social networking; technology is farther and more advantageous than that; it serves humanity in ways yet to be discovered.

Modern technology has developed ideas via smartphones where it helped to create a new mechanism of communication without needing sending emails or phone calls and waiting a long time for a reply. It rather became accessible regardless place and time. A particular service through the mobile phone [1].

The application cuts down the everlasting procedure of collecting signatures from upper/or concerned ranks. It eliminates the problem of lost documents like leaves or maintenance

requests which might even be a more significant issue especially when it comes to employee's payments. It also shows the party that's neglecting their work, and where the shortage stands. Every step will be documented to preserve employees' rights as well as obligations. This application will only operate on IOS (iPhone Operating System).

It might be difficult for users to deal with IOS at first, but when they get used to it, they will have a hard time accepting other operating systems of mobiles. IOS is one of the highest operating systems regarding security. It is hard to penetrate, unlike Android and PDA. IOS is one of the best-operating systems; it meets all the needs of users thus resulting in extended period usage of the same phone. In the case of phone theft or loss, it is hard to access any existing data [2].

2. Problem Description

One may encounter various problems with the computers, system accounts, providing a service, or receipting a request. One may also have a question or a comment that would like to inform the technical support about it. The concerned department will fix all the related problems. Technical problems, for example, are most likely to be reported, and responded to, very fast. In the case of delay, the reason might be behind the lack of knowledge of where to send requests for support or assistance [3].

Reporting a problem of any kind requires either electricity or phone calls, which might encounter an issue in the first place; given that the application operates on phone networks which are widespread these days, reporting any problem should be easy and at hand.

If an employee has a problem with AC, elevator, plumbing, or electronic devices, the letter would be sent to maintenance, and then maintenance will contact the people in charge, this is some extra steps that can be eliminated by using " Help Desk Ticket System Using Mobile IOS Application " division for maintenance. Letters will be directly sent to the concerned department; comments can be added to clarify the nature of the problem. For instance, if an employee has a problem regarding his computer, he/she will deliver the message precisely whether it is a software or hardware problem. If the message is referred to by other people, they might change or deliver wrong or incomprehensible information. Direct contact is always better; this also applies to leaves and any administrative requests.

In addition, users might consider some problems simple or easy to resolve. Many users do not appreciate the time required to understand the problem or solution in a timely manner. Thus, " Help Desk Ticket System Using Mobile IOS Application " gives the authority for the admin to decide the priority of tickets whether normal or urgent.

There is also the problem of complaints. If an employee has a complaint about some issue, the feeling of discomfort and embarrassment is always there which might lead to conceal many problems. Help Desk Ticket System Using Mobile IOS Application gives the opportunity to send complaints without having the need for face to face communication; as well as suggestions, which can be organized and highlighted for priority. The suggestions will inevitably be viewed and responded to if necessary. The employee will have access to the status of his complaints and suggestions [4].

3. Related Work

Different forms of assistance desk and help services are required in many different fields to provide users with demanded information. Thus, intelligently automated help desk systems must be provided to help the user in retrieving the required information. The system should be maintained easily and be suitable for varied of users [5].

The development of a system based on the smart case for help desk operations is increased around the world with the use of modern technological systems. However, it requires the availability of the modern electronic system to arrange, follow-up, and resolve problems separately by describing the problem and the statement of importance by numbers, and track the problem to be solved in the best way without the need to refer to it again and again [6].

In 2005, González et al. designed a helpdesk system called Knowledge management-centric help desk to minimize the required time to solve problems and improve the helpdesk system functionality [7].

Multi-touch Helpdesk Management System with Communication enables working on the mechanics of support for the customers and users through theories and algorithms for each problem on its own, so it can be classified into sections according to the extent and importance to solve [8]. Helpdesk is an intelligent design system for the internet. Downing paper discussed this system and how it assists and supports institutions with its quick access to the technical assistance department within the institution through a web system design. This system goes back to NASA technical support [9].

Vuolle et al. discussed an application running by reporting problems through incoming phone calls to technical support so that it is pursued the purpose of quality control in institutions. It can access, analyze the problem, and work to find the right solution for every problem [10]. Examples of helpdesk system implementations were discussed in [11] and [12]. As Perez-Carballo et al. designed a help system for digital libraries, and Imroz and Alzahmi improved the help desk system of payment systems company by using Ajax Web technology.

Siti-Nabiha et al. conducted a study to test the help center system performance and to provide recommendations to improve the performance of such systems. The study resulted in the conclusion of poor communication and troubleshooting, and late service delivery [13]. Thus, continues improving is required to keep the system valid.

Automation of helpdesk using case-based reasoning is a system concerned with solving customers' problems. Through Case-Based Reasoning (CBR). It classifies the problem and makes it easier for the competent authority to without any delay; the manager can keep track of all the problems and return to it at any time [14]. Furthermore, an automated Help Desk was developed to provide a variety of online resources for the clients for the aim of resolving problems related to IT [15].

In addition, Help Desk queries could be classified into different categories based on its information by using a semantic classification technique. This reduced time and effort consumed in answering these queries, and redirect to queries to the correct authorities [16]. According to Fajar and Shofi, to develop a successful system, the requirement analysis step should be the most critical phase of software development [17]. Therefore, helpdesk systems must always meet with its purposes.

Jidin et al. implemented paperless queue management ticket system in their paper. The system used SMS ticket to replace the paper ticket and reduce the paper consumption at customer service. Also, it reduced the waiting time and reminded the customer with their turn. [18].

Smartphones are massively used among people, regardless of their age, position, and interest. An experiential study was carried to find the impact of smartphone applications on forest products industry and academia in the USA. The study concluded that people use a smartphone as a help tool in their job [19]. Another study was conducted by Martínezto et al. to test the influence of smartphone applications in medical education. The use of smartphone applications enhanced the students' academic performance [20]. This indicates the importance and influence of smartphone applications in improving lifestyle. However, it is essential to understand how people are accepting the use of knowledge management system and how the factors of individual and organizational influence the people use of such system [21].

4. System Design

The proposed system is designed to upload readings provided by many sensors connected to a Raspberry Pi, providing data analysis and early warning. In this system, various software and hardware are used. In this application, there is two deferent GUI (Graphical User Interface) for the end users the first one is for the individual user and the second one is for the administrator.

4.1. User system design

The main menu of ticket system application. It contains three buttons: Open Ticket, Track Ticket, and Logs In. In the beginning, the client through this view can open a new ticket or track ticket if he/she already have one. Additionally, the employees who are working on ticket system service. They can press login button and start to follow the tickets and request from the clients.

In **Error! Reference source not found.**, after the client press the "Open Ticket" button in the main menu, he/she must fill all the fields in the ticket form. The ticket form has two main parts, and each part is in a separate view. The first view of ticket form is the "General Info" which contains different fields such as today date, department, floor#, phone #, applicant's name and applicant's ID.

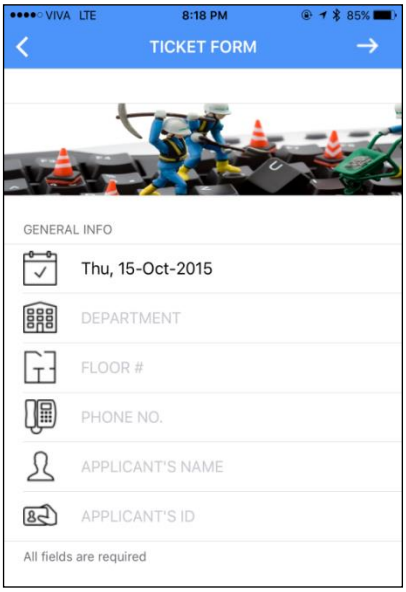

Figure 1. Ticket form for the ticket system application

The second view of ticket form is "Ticket Details," This view contains the most relevant fields in ticket form such as subject and description of their request. After that, the client needs to determine the type and subtype of the ticket then press the "Send" button.

The **Error! Reference source not found.** shows "Ticket Type" view. The client has four main type of the tickets: Administrative request, Maintenance Ticket, Purchase order and complaint & suggestion. In this list, only the administrative request and maintenance ticket have a subtype. "Administrative Request" subtype. The client has three choices: salary certificate, vacation request, and sick leave. “Maintenance Ticket" subtype. There are four subtypes of “Maintenance Ticket": electronic devices, air conditioner, elevators, and plumbing.

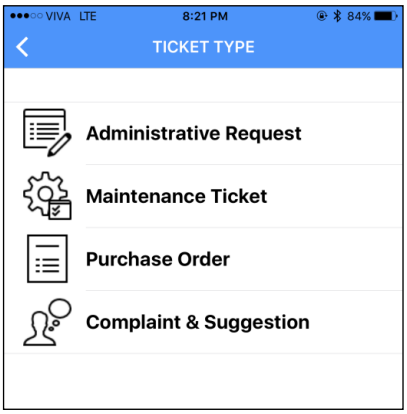

Figure 2. Ticket Type for the ticket system application

In **Error! Reference source not found.**, after the client press the "Send" button on the ticket form, the client got Ticket # so he/she can track the ticket status later.

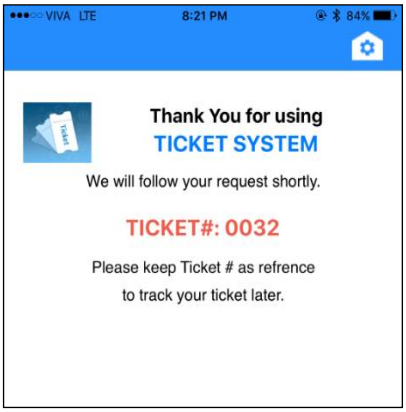

Figure 3. Ticket Track Number for the ticket system application

Track Ticket form, through this view the client can easily insert the ticket number, press on the search button and get the ticket status and status date (Pending, Redirect, Under Processing, Done, Rejected, Closed).

4.2. Admin system design

All employees who are working on the ticket system (admin, manager, employees) need to insert their employee id and password before they can start following the tickets. **Error! Reference source not found.** shows the main menu of the ticket system. The menu has four sections for every ticket type. Only the admin and manager have access to this menu, so they can easily view and follow tickets.

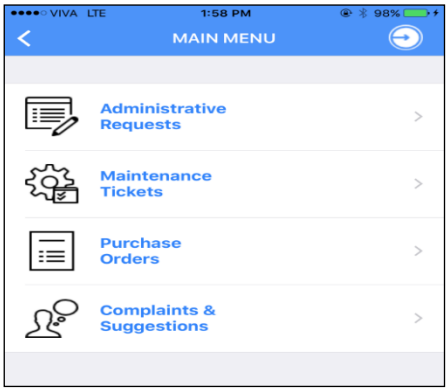

Figure 4. Application Main Menu view for the ticket system application

"Administrative Request" subtypes. There are three different subtypes of administrative request salary certificate, vacation request, and sick leave. Only the admin, manager and HR department employees have access to this view. The employees must select the subtype of the ticket before they can view ticket list. “Maintenance Ticket" subtypes. There are four different subtypes of maintenance ticket electronic devices, air conditioner, elevators, and plumbing. Only the admin, manager and construction department employees have access to this view. The employees must select the subtype of the ticket before they can view ticket list.

Ticket List View, in this view we have all ticket request depends on the type and subtype of the ticket. Every record in this list has "Ticket #" and "Ticket Date" and "Status." The highest

priority ticket has been shown in red color. On the header of this view we have the type of ticket, and in the footer, we have the total of records. Also, we have the "Refresh" button on the top right side to refresh the view. For more details, the user must click on any row in the list then the application will display the details of the selected ticket.

Error! Reference source not found. shows the view of "Ticket Details" which contain three tabs "Ticket Status," "Ticket Details" and "General Info." In the ticket status tab, the admin or employee can write comments and change the status of the ticket. Only the admin can determine the priority of the ticket and redirect and close the ticket. On the other hand, the manager has only the ability to view all ticket in the system, but he cannot make any changes or update. After the fields updated, the employee or admin must press the "SUBMIT" button to update ticket status fields.

Ticket details view on the second tab. In this view, the employee can review all ticket details such as ticket #, subject, description, type, and subtype. General info view is on the third tab. In this view, the employee can review all general information of the ticket such as ticket date, department, floor No, phone No, applicant's name and id. Priority list view; the admin has two choices: normal or urgent.

Error! Reference source not found. shows all the status of tickets in the system. In this list, we have five different statuses of ticket redirect, under processing, done, reject and close. The admin and employee can write their comments.

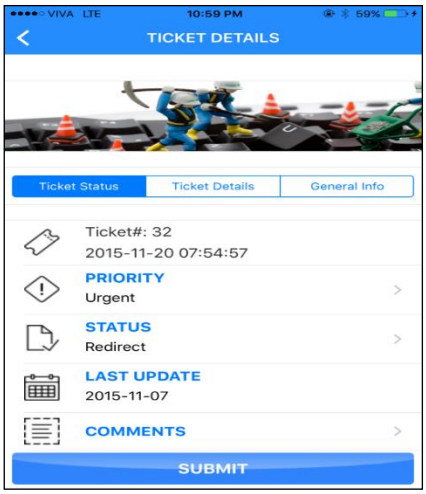

Figure 5. Ticket Status Form for the Ticket System Application

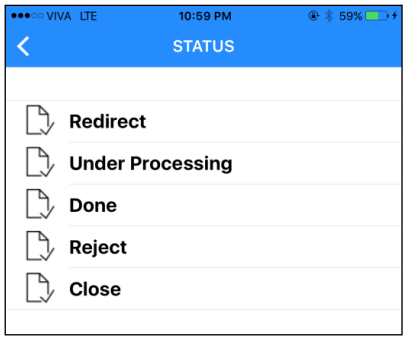

Figure 6. Status of all tickets in the system

5. Implementation

In The application is a means of communication between users in an organization with any needed department directly. After reviewing previous researchers, the idea of an improved application occurred to us. The main objective of this application is the high speed, accuracy, and history keeping for all the executed tickets. The idea of tickets gives the impression of easy and fast transactions; not to mention e-tickets which save a lot of wasted papers and effort. The users of this application are divided into four types of users; each one has his privileges depending on his status in the organization.

5.1. Type of users

As mentioned earlier, there are four types of users:

- Client: the client can open tickets, track previous tickets by tickets' numbers without needing to log into the system.
- Admin: the admin can log in, view all tickets in every department, and change the status of the tickets (redirect- reject- under processing- done- close. He is the only user that can modify the priority of a ticket (normal- urgent). He can add comments to any ticket and closes it.
- Manager: the manager can log in, view all tickets in every department, but he cannot make any changes.
- Employee or Engineer: they can log in, view tickets within his department, change the status of tickets, and add comments.

5.2. Ticket types and subtype

- Administrative request (HR department): Sick leave, Vacation request, and Salary certificate.
- Maintenance tickets (Construction Department): Electronic devices, Air conditioner, Elevators, Plumbing.
- Purchase Orders (Sales Department).
- Complains and suggestions (Costumer relation Department).

5.3. Prototyping

After the implementation of the application is installed, each user must enter the employee id and password.

5.4. System requirement

The application had been designed and developed by objective -C – PHP – JSON programming language. The software and services used to develop iPhone application are:

- Xcode: an integrated development environment (IDE) to develop the application.
- Sublime Text 2: text editor to write the PHP Code which helps to make the connection between the application and database server.
- Web hosting (https://www.godaddy.com).
- PHP MyAdmin and Photoshop.

5.5. Application features

- Open a ticket for users and obstruct others from viewing specific tickets.
- Keep track of contact information, dates, and time of submitting a ticket.
- Track tickets by clients.

- Add a comment on each ticket (example: reason for rejection)
- Ability to close a ticket (and have it reserved in the archive).
- View any ticket at any time by privileged users.
- Allow the change in the status of tickets and priority.
- Enable users to make a complaint or give a suggestion.

5.6. Data flow diagram (DFD)

As shown in **Error! Reference source not found.** (the open ticket diagram), if the user wants to open a ticket through this system, he/she need to fill some fields in ticket's form. Such as department, floor#, phone#, applicant's name and applicant's ID, ticket subject, ticket type and subtype and description. After the user is done and all required fields are valid, the mobile application will view confirmation message with ticket # show.

As shown in **Error! Reference source not found.**; The track ticket diagram, if the user wants anytime to track ticket or check on the ticket status. He/she can easily just put the ticket # then the system will search the database to find the status and last update date. Otherwise, the system will view a message that the ticket # does not exist.

As shown in **Error! Reference source not found.**, the "login" diagram, the employee, engineer, admin, and manager can only access the ticket system by entering employee id and password. After that, the system will check id and password if they are matched together. If yes, the system will let them access to the ticket system depend on their roles in the system.

As shown in **Error! Reference source not found.**; track Ticket by employee diagram, after the admin receives the tickets from a client and checks for ticket details, he/she must add comments, put the priority of the ticket and change the status of the ticket from pending to redirect. The ticket, in this case, will be redirected to the specialists such as Engineer or employee (HR Employee, Customer Relation Employee, Sales Employee).

The employee or engineer will receive the ticket, and they need to accept and review the ticket details, add comments and change the status of the ticket (Reject, Under Process, Done). After they work on the ticket task and the process is complete, the status of the ticket should be changed to "done." After that, the admin needs to review the ticket details again and close it.

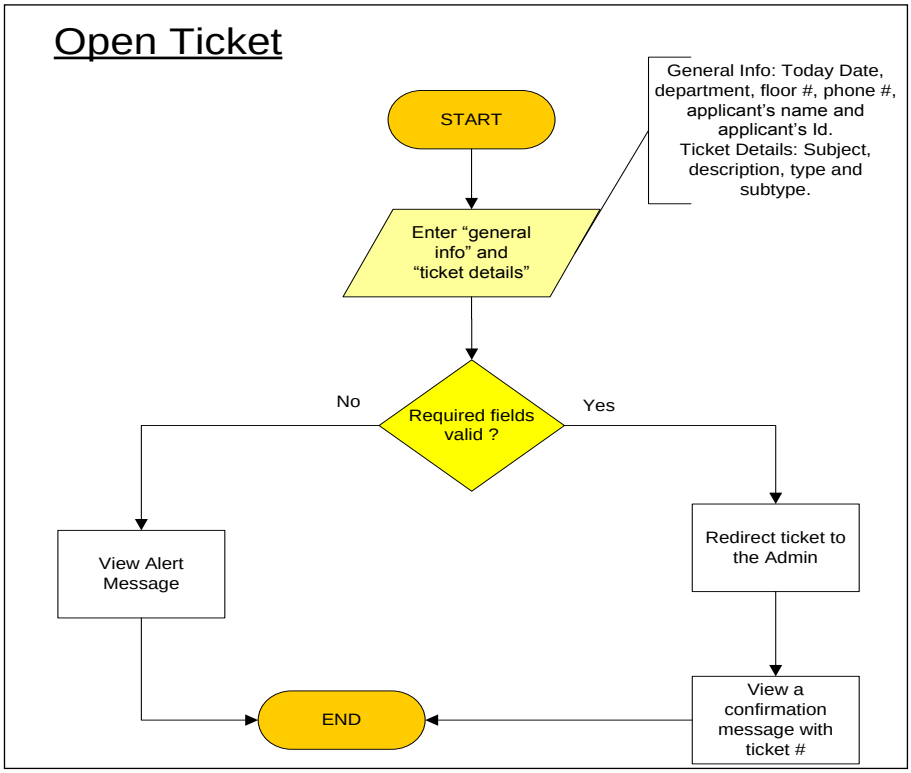

Figure 7. Open Ticket (DFD) Diagram for the application

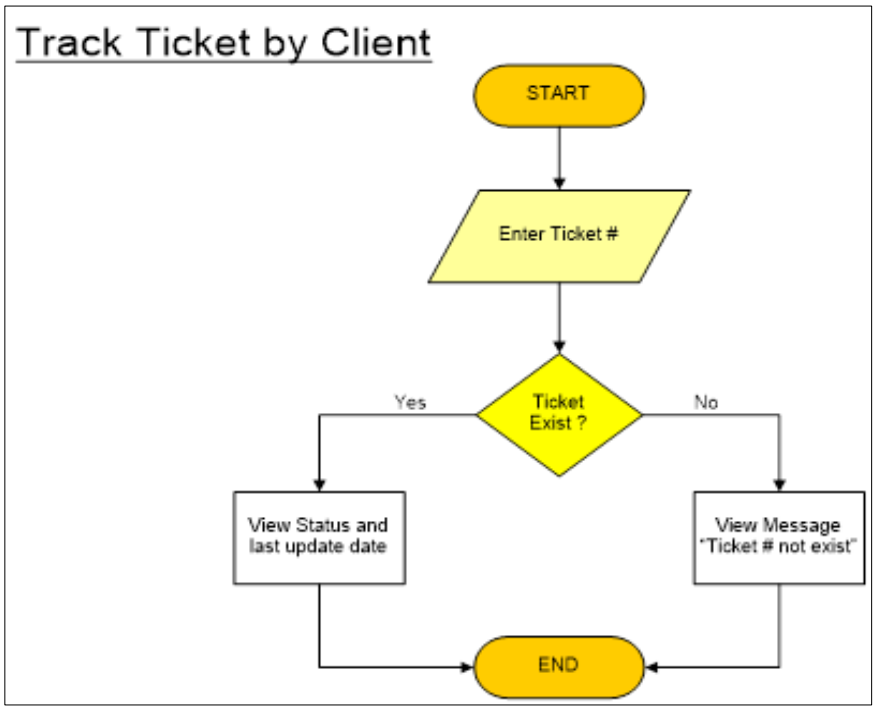

Figure 8. Track Ticket (DFD) Diagram for the application

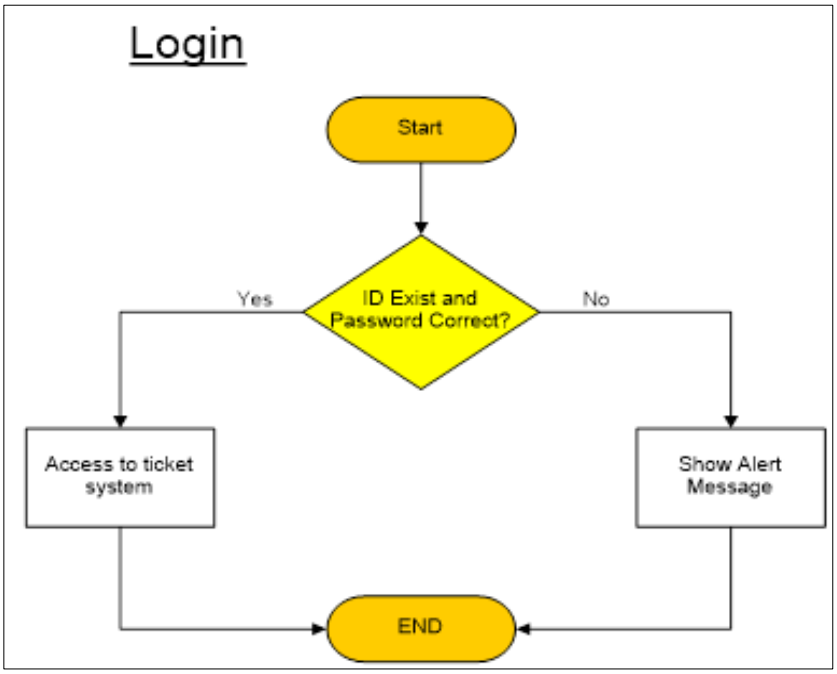

Figure 9. Login (DFD) Diagram for the application

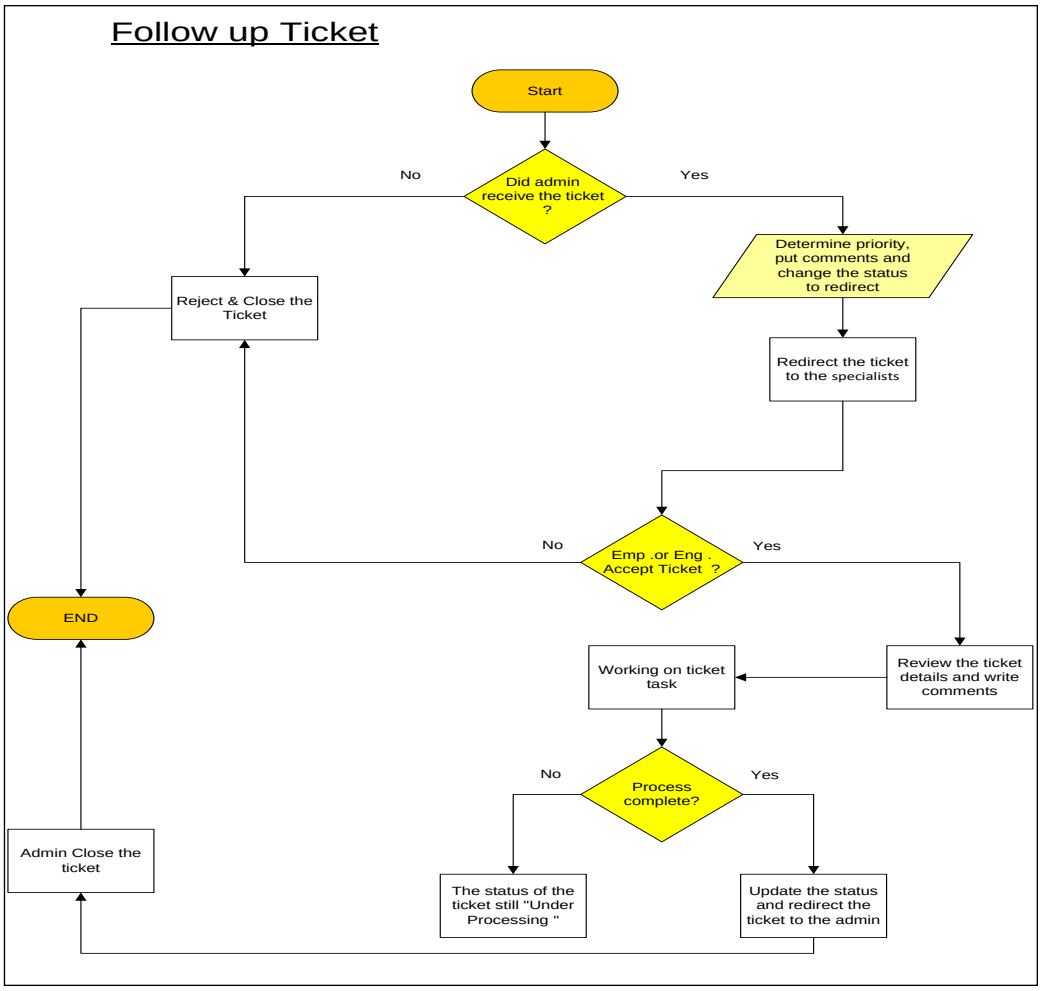

Figure 10. Track Ticket by Employee (DFD) Diagram for the application

6. Result and Discussion

The result of submitting a ticket by the client; it will inform him that the ticket was successfully sent. It shows the message “Thank you for using TICKET SYSTEM,” and ticket number so the client can track the ticket anytime and know the status of the ticket. The **Error! Reference source not found.**, shows the “track ticket step” view. It will show only the status of the ticket and the date of submitting it; the status is deferent between one ticket and another. If the admin changes the status or the employee, it will show the change. There is five different status of ticket: redirect, under processing, done, reject and close.

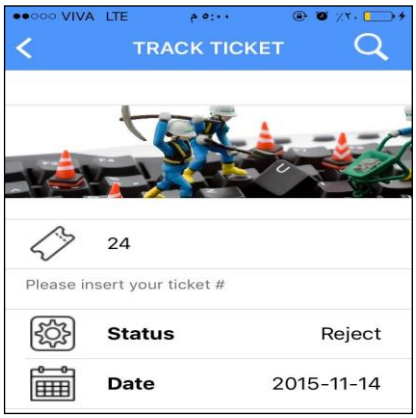

Figure 11. Second result in the application Track Ticket for Client

In figure [12], all employees will be able to see all the tickets that were sent to their department, excluding the Admin and the manager who can see all the departments’ ticket lists. Tickets in red are high priority tickets, so they will do an action and make the ticket request after they finish the close the ticket or they can reject it.

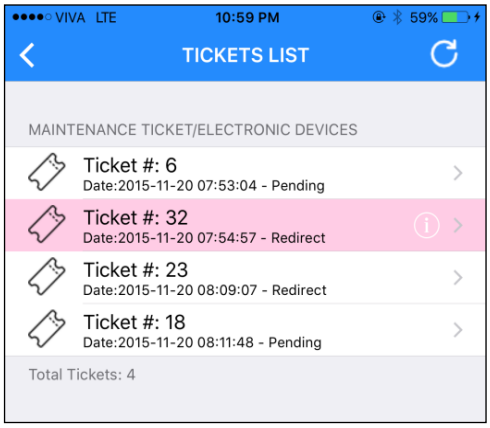

Figure 12. Third result in the application Track Ticket for employee

In **Error! Reference source not found.**, the ticket details will appear after choosing one of the tickets from the ticket list in **Error! Reference source not found.**. The admin or employee can change the status of the ticket. Only the admin can determine the priority of the ticket and redirect and close the ticket. On the other hand, the manager has only the ability to view all ticket in the system, but he cannot make any changes or update. After the fields updated, the employee or admin must press the "SUBMIT" button to update ticket status fields.

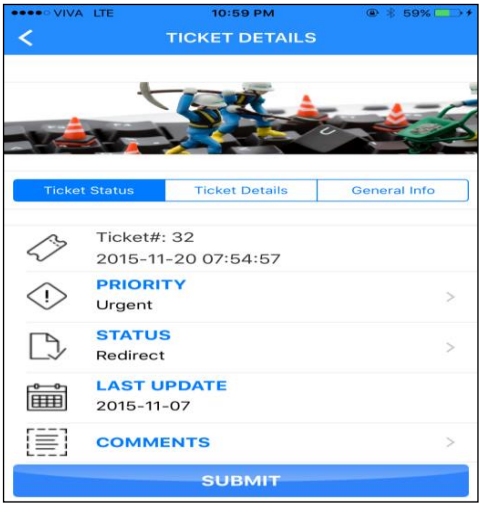

Figure 13. Ticket Details (fourth result) in the application

The admin and employee can write comments on this screen. It will show the client way the ticket was rejected or what did they do for the ticket, so it helps him without facing him. The ticket details view on the second tab. In this view, the employee can review all ticket details such as ticket number, subject, and description: the comment from the client that he sent it, type and subtype of the ticket. General info view is on the third tab. In this view, the employee can review all general information of the ticket such as ticket date, department, floor#, phone #, applicant's name and id.

7. Conclusion

In fact, smartphones through applications solved many problems with the routine work of institutions; it made procedures more manageable and accessible, it saved time, effort, and costs. For these reasons, the developers and programmers are working hard to develop an application that use modern technology and smartphones to create a new mechanism of communication between working teams without having to send e-mails, make calls, and wait for a reply. This system needs to be followed by professional team members as well. After developing the application and using it as a mimic organization, we concluded that communication speed became remarkable, the nature of the problem is clarified to the concerned department directly, and it is always at hand.

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