



# Incidents Reporting System and Mobile Application

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## **Abstract**

Incident Report Systems are used to gather information from users and report incidents to the responsible institutes or owners. This would happen from filling forms, verbal complaints and digital submissions to the relative party. The main objective in reporting an incident is to prevent similar occurrences in the future and identify reasons for the incident. Any unplanned event or near miss occurrences are considered as an incident and the responsible person or organization is called as incident owner.

The aim of this project is develop a web based incident management system and Android application to report incidents or occurrences immediately to relevant organizations. The system is connected to MySQL database with an Android application. Get data and post data methods are used for communicating with database and Android application. The Android application is posting data to the web application and receives data posting accordingly to the database tables. The dashboard is indicating all incidents which are categorized by incident types to identify.

This system has been designed according to the standard web based model. The system was developed as a set of components to make it easy to design, understand and implement. The system has been developed using PHP, MySQL, Apache and Android development kit. The system has been implemented to work in the Microsoft Windows operating system environment.

Testing codes had been used to validate system correctness and system functionalities according to the plan. The obtained results are clearly indicating the success of the project and its usefulness when it comes to real users.



## Declaration

The thesis is my original work and has not been submitted previously for a degree at this or any other university/institute.

To the best of my knowledge it does not contain any material published or written by another person, except as acknowledged in the text.

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Date:

This is to certify that this thesis is based on the work of

Mr. W. A Pathum Sameera

under my supervision. The thesis has been prepared according to the format stipulated and is of acceptable standard.

Certified by:

Supervisor Name: Mr. K.P.M.K. Silva

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Signature:

Date:





## Acknowledgment

I wish to express my sincere gratitude to all those who helped me in successfully completing my study on “Incident Reporting System (Web / Mobile)”.

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## List of Abbreviations

|     |   |                             |
|-----|---|-----------------------------|
| SQL | - | Structured Query Language   |
| DB  | - | Database                    |
| SMS | - | Short Message Service       |
| PHP | - | PHP: Hypertext Preprocessor |
| IRS | - | Incident Reporting System   |
| AP  | - | Android Application         |



# Introduction

## 1.1 Incident Reporting

An incident report is a tool that documents any event that may or may not have caused injuries to a person or damage to a outside asset. It is used to capture injuries and accidents, near misses, property and equipment damage, health and safety issues, security breaches and workplace misconduct.

An incident report can be used in the investigation and analysis of an event. It includes the root cause and corrective actions to eliminate the risks involved and prevent similar future occurrences. Incident reports can also be used as safety documents which indicate potential risks and uncontrolled hazards found in the workplace.

An incident report can be used by:

- ◆ an authority to create a report of an incident;
- ◆ an employee to report an incident he/ she has witnessed;
- ◆ A member of the organization to raise awareness about an incident that has occurred in the workplace.

Incident reporting is the process of documenting all workplace injuries, near misses and accidents. An incident report should be completed at the time an incident occurs no matter how minor an injury is.

There are number of incidents happen every time every second in the world. Some are important to be attention and some are not worthy to attend. The important events should reach to appropriate organization or people immediately before harm to people's life and living environment. The central organization can manipulate the incidents with related divisions or team to rectify reported events. People can expect acceptable solutions for the incidents as per rectify issues by responsible organization.

## 1.2 Motivation

In the present world most of people holds a smart phone while moving to a place. Most of times people experienced incidents which are important and must be reported to

someone to get attention immediately. However users haven't option inform it to relate people as there isn't exist a proper and quick method to use.

In this incident reporting system people can report incidents using an android mobile app to centralized web system. Captured photos can be uploaded with a brief description, location, incident type, contacts, date & time to the system. The web system received all submission done by mobile users and system automatically informs responsible organization immediately or to the district office by an email. District officers may follow up the incident until it rectify.

## **1.3 Incident Investigation Procedure**

An incident investigation shall begin immediately after securing the scene. If the area is quarantined, the investigation shall not commence until release of the quarantine. Documents associated with the incident should be attached to incident file. The Investigation Team shall produce an Investigation report including corrective and preventive actions.

The following information will provide guidance when conducting an investigation:

### **1. Build an investigation team.**

- ◆ Perform investigation team for organization.
- ◆ The size of the team may vary based on the type of incident.
- ◆ Must include at least one employee of supervisor responsibility.

### **2. Assemble an investigation kit.**

- ◆ This kit may include a camera, paper/pens, reporting forms and any information such as notes on investigation.

### **3. Secure the accident scene.**

- ◆ Assess the situation to prevent additional accidents from occurring based on hazards.
- ◆ Attend to any immediate medical emergencies.
- ◆ Preserve any evidence at the scene. Do not enter an accident scene until it has been cleared for safety.

### **1.3.1 Doing the investigation:**

- ◆ Identifying and collect evidence - This must be done quickly.
- ◆ Identifying contributing factors - Can include procedure violations or employee knowledge.
- ◆ Photographing the accident scene - Take pictures necessary to reconstruct the scene. Take close and long range.
- ◆ Sketching the accident scene - Will provide information that a photo will not.
- ◆ Writing notes - Notes should be written as soon as possible while information is fresh.
  - Notes, emails, communications should be initiated as soon as possible by personnel involved in the incident
  - Consider who, what, when, where, how and why.
  
- ◆ Interviewing affected parties or witnesses - Prepare interview questions. Ask questions but let the witness describe their observations. Take notes during the interview. Get facts of expense of the damages or legal issues.

### **1.3.2 Responsibilities**

All personnel are responsible for:

- ◆ Notifying through mobile application of all incidents immediately.
- ◆ Participating in generating the initial notification.
- ◆ Participating in incident investigations as needed.
- ◆ Participating in generating the investigation report.
- ◆ Completing corrective and preventive actions as assigned.
- ◆ Assigning personnel to the incident investigation team.
- ◆ Defining and recommending corrective and preventive actions.

### **1.3.3 Determining root cause**

Review all evidence of all information collected. To determine the root cause, must identify contributing factors (symptoms). Analyze all findings and scenarios together with the gathered information to put in order occurrences to understand where the start of incident happened.

### **1.3.4 Determining Corrective Actions**

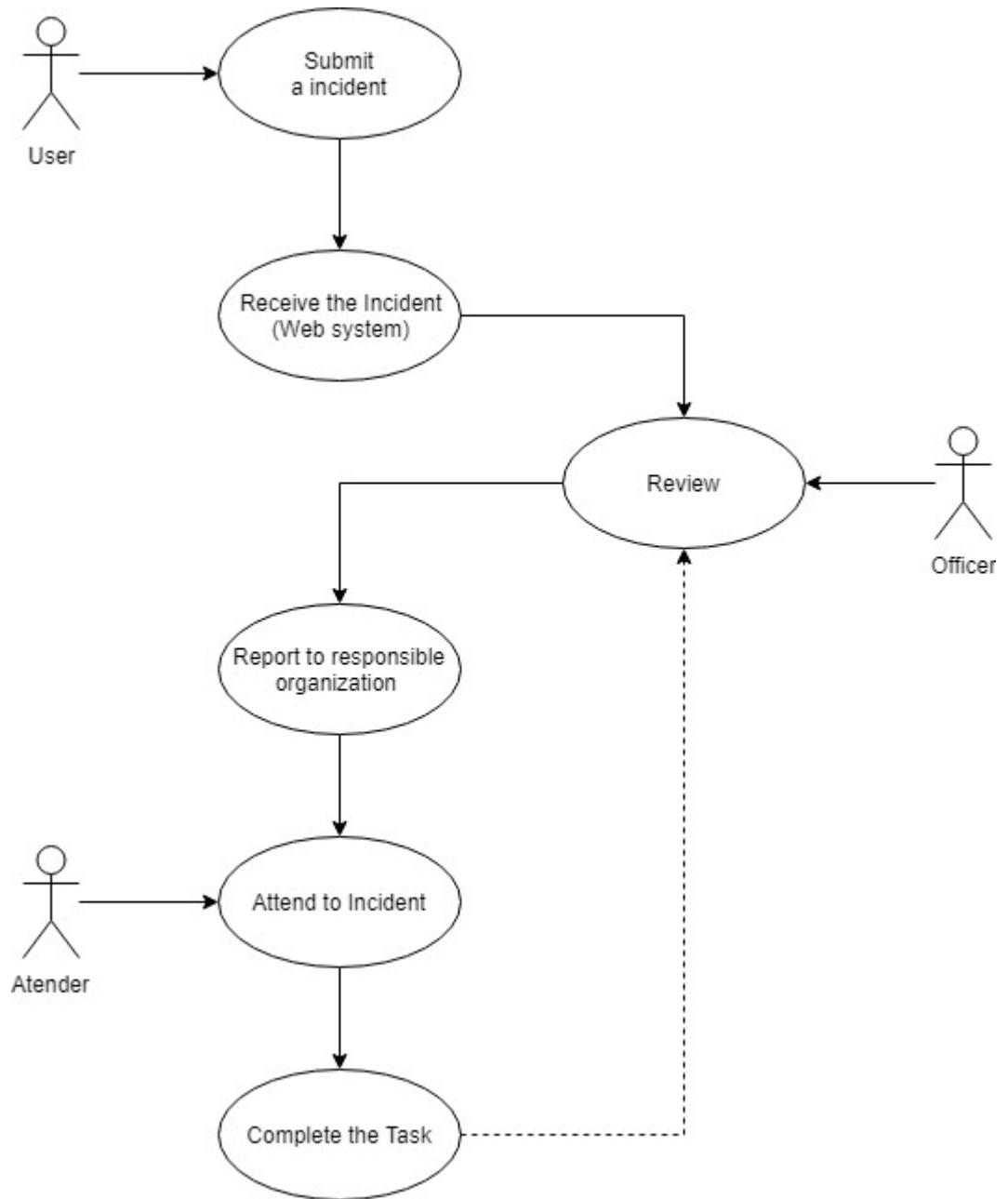
A corrective action is dealing with the event after the incident happened. Corrective action should be considered after determined the root cause of the incident in order to take appropriate corrective action to prevent the problem's recurrence.

### **1.3.5 Communicating**

To effectively communicate the findings of the investigation, a final report must be completed. The Company will communicate investigation reports through a safety meeting.

### **1.3.6 Approval & Closure**

An Incident Report is ready for approval and closure when the investigation is completed, the root cause has been identified and corrective actions have been implemented. The Facility Manager is responsible for final closure of the incident record.



**Figure 1.1 How system works**



## 1.4 Incident types

Here are four types of incidents can report to the system:

1. Sentinel events – Unexpected occurrences that resulted in serious physical or psychological injury or death (e.g. vehicle accidents, natural disasters, slips, trips and falls, disease outbreak, etc.)
2. Near misses – these are situations where the people involved had no injuries but could have been potentially harmed by the risks detected.
3. Adverse events – related to medicine, vaccines and medical devices. These events occur when an act of commission or omission harmed a patient rather than from the existing disease or condition.
4. No harm events – these are incidents that need to be communicated across an organization to raise awareness of any harm that may happen.

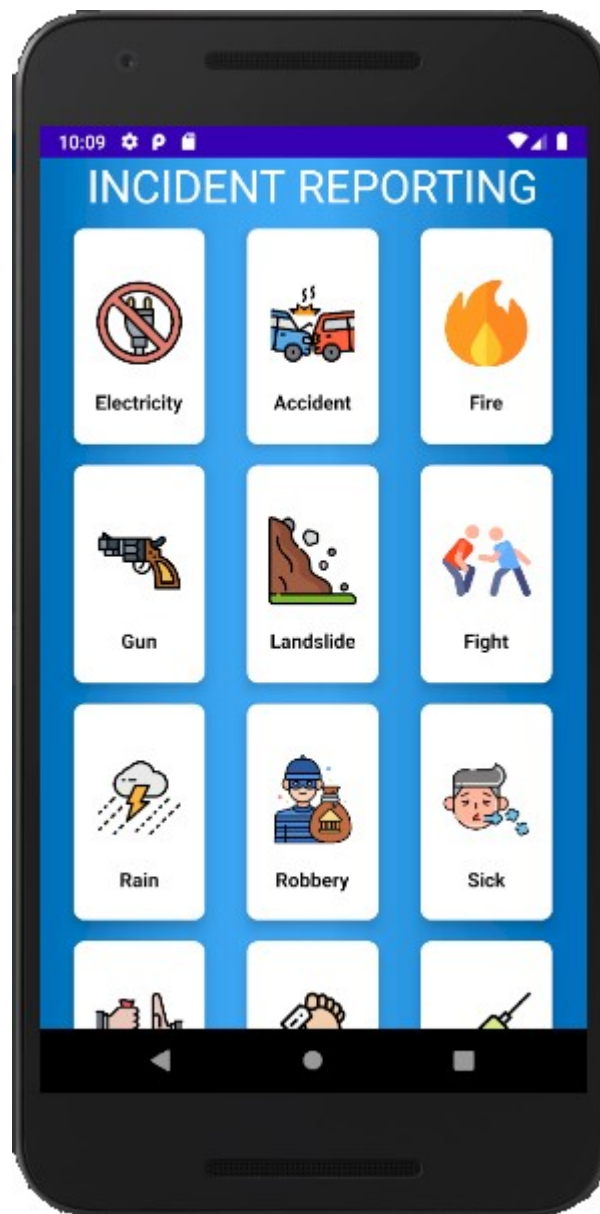


Figure 1.2 Screen of mobile application

## 1.5 Project Objective(s)

The primary objective of incident reporting system is improved the communication and visibility of an incident. The standardized methods and procedures are useful for efficient response to reporting incidents and ongoing cases. The service provided to users enhances the satisfaction and improve the quality of manage reporting incidents.

1. Report incidents immediately to responsible organization

After prompt an incident by a user, system automatically route incident to responsible organization identifying nature of incident by the incident type.

2. Keep a witness about the incident

The reported incidents are listing in web system and system authorized logins can refer all the submission and take appropriate actions.

3. Analyze reported incidents for future decisions

Referring the occurrences reported, system users can analyze and capture the patterns of incidents are happens. The prevention actions can be managed with a proper analytical tool.

4. Minimize anti-social attempts

After report an anti-social event to the police, they can attend immediately to the incident and keep the peace in the area.

5. Early preparation and plan solutions for the events

Solutions can be setup early and ready for an occurrence happen in the future.  
(Eg: Illegal drug business)

6. Attend and rectify reported incidents

Reported incidents rectify by responsible organization before it gets worse or spreads.

7. Improve quality of service

Responsible organization cannot ignore reported issues and have to attend all Incidents. The same issue is submitting to relevant District officers who can follow up progress of the reported incidents.

8. Enhance people life style

With the reporting incidents and rectifying those in limited time period people can sustain the life style.

9. Stop avoiding from responsibility

Organization cannot derogate attending to the reported incidents. People are used

report incidents until it gets resolved.

#### 10. Confront when seen unjust situation

The easy way of reporting an incident encourages people to take the action against the situation.

## 1.6 Scope

This procedure applies to all Sri Lankan people who has a android mobile phone. While they are engage with an incident mobile user can directly report incident to web system and system inform responsible organizations instant by an email. The organization must react to the reported incident and rectify same immediately.

This project will consist of creating a web based and android mobile application to manage incidents which are happening over the country. Users can report the entire events trough mobile application to web system.

#### 1. Reports incidents from mobile application

All events can submit through the mobile application immediately to the web system. Mobile users required open mobile application and submit incident with a brief description.

#### 2. Attach a mobile images along with submission

Once captured a photo from mobile it can be sent along with the description of incident to the web system.

#### 3. Login to web system as individual users

User accounts are created for all users.

#### 4. View recent uploads from web system by authorized users

List all previous incidents submitted by mobile users.

#### 5. Coordinate with responsible organizations

Web users can respond to received events by informing relevant responsible organization.

## 6. Detailed summary report

Users reported incidents are listing in web system with all information.

## 7. Making better environment for the people

Help to people and environment to make a better place for living.

# Background

## 2.1 Analyzing of similar systems

In this chapter analyses other similar applications which are related to the kind of incident reporting system. Discuss its main features in order to get a general view of the current features, know what has been done, what these applications can do and how they relate to developed system.

Systems are developing added with variety of features to provide competitive service to the clients. Most of the times final outcome is invariable compared to the same category systems. The productivity, price, and offered unique features are beneficial to highlight among the business and clients.

## 2.2 Related Work/ Background Study

Incident reporting is important tool to any organization to manipulate the risk and prevent future occurrences. It's a right of people reporting to responsible person or authority when meet a situation which impact to people or an organization. In software industry varieties of solutions have been introduced with many features to choose suitable solution according to business module of the organization. A few software solutions are listed below which are developed with variety of functions to perform in different organizations.

### 2.2.1. Rapid Incident Reporting

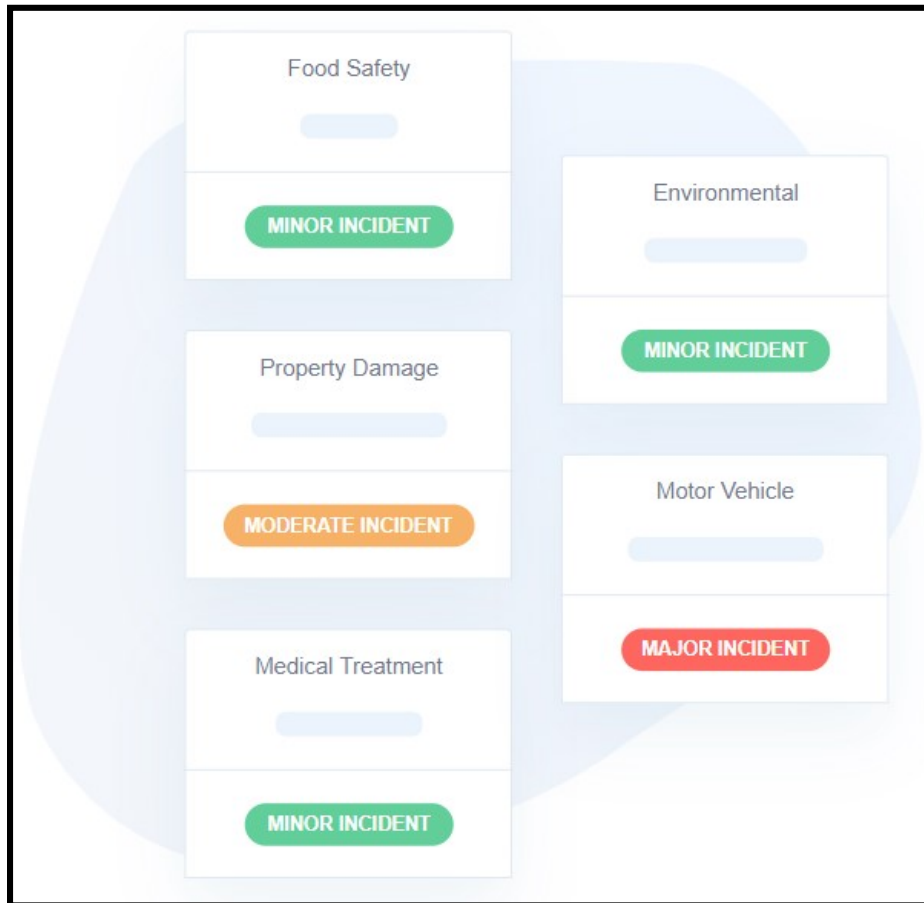
Rapid Incident Reporting provides an incident management solution to manage the entire incident lifecycle. From a solution to report a site incident, to investigation, corrective actions, response procedures, and statistics reporting, Rapid Incident Reporting handles it all with ease.

Link: <https://www.rapidglobal.com/products/rapid-incident-reporting/>

Following features are available in the Rapid Incidents Reporting System.

- Motor Vehicle
- Foods Safety

- Property Damage
- Environmental



**Figure 2.1 Rapid Incident Reporting**

## **2.2.2. MetricStream Incident Management**

MetricStream Incident Management software module is a comprehensive solution that enables companies to establish and follow consistent procedures for issue capture, loss event tracking, task management, and status reporting.

Link: <https://www.capterra.com/p/107142/MetricStream-Incident-Management/>

Following features are available in the MetricStream Incident Management system.

- Injury Report
- Safety Observation
- Risk assessment
- Corrective action
- Environmental

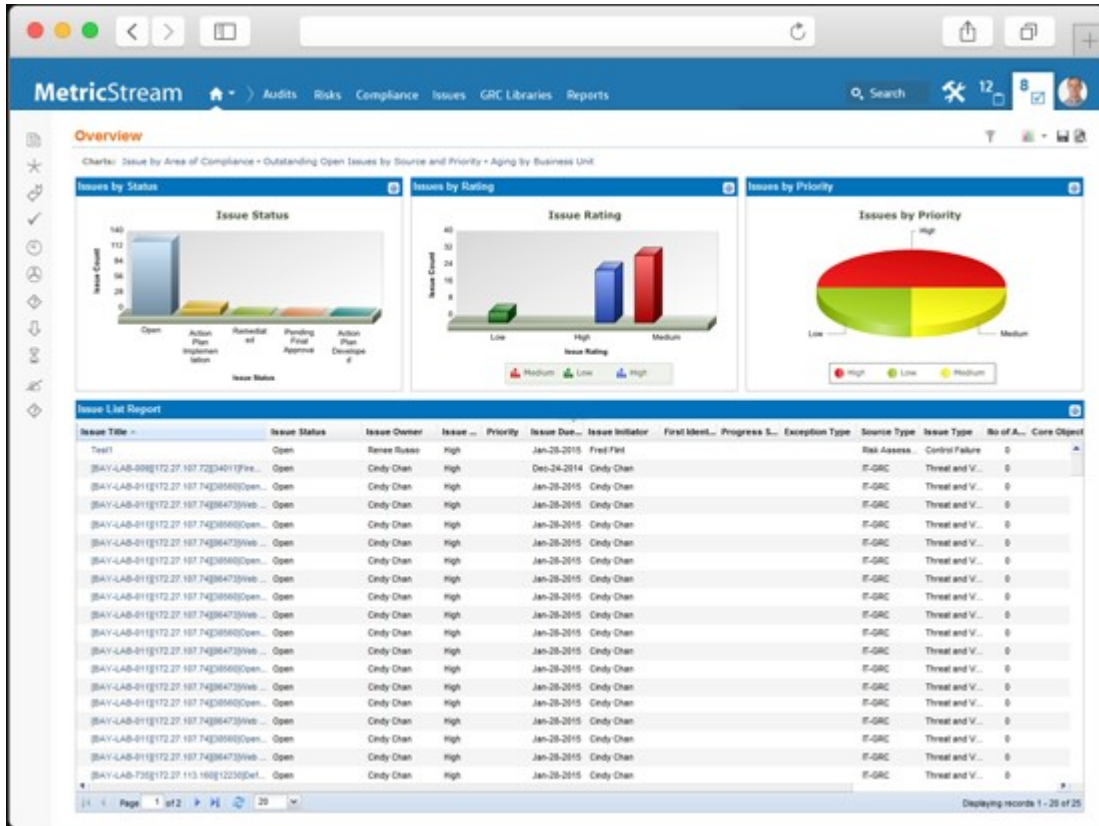


Figure 2.2 MetricStream Incident Management

### 2.2.3. Rave Mobile Safety

Rave Mobile Safety provides a suite of powerful data and communication tools to save time and save lives. From tools that provide additional caller data for faster, more effective response, to tools that provide real-time situational awareness and can prevent incidents from further escalating.



System tools can help maximize the effectiveness of community, business and school incident management systems, enhance personal safety in healthcare facilities and on college campuses, and contribute towards the rapid dispatch of assistance to individuals in need of help.

Link: <https://www.ravemobilesafety.com/incident-management-system>

Following features are available in the ravemobilesafety Incident Management software.

- serious head injury
- serious eye injury
- serious burn
- spinal injury
- serious lacerations



**Figure 2.3 Rave Mobile Safety**

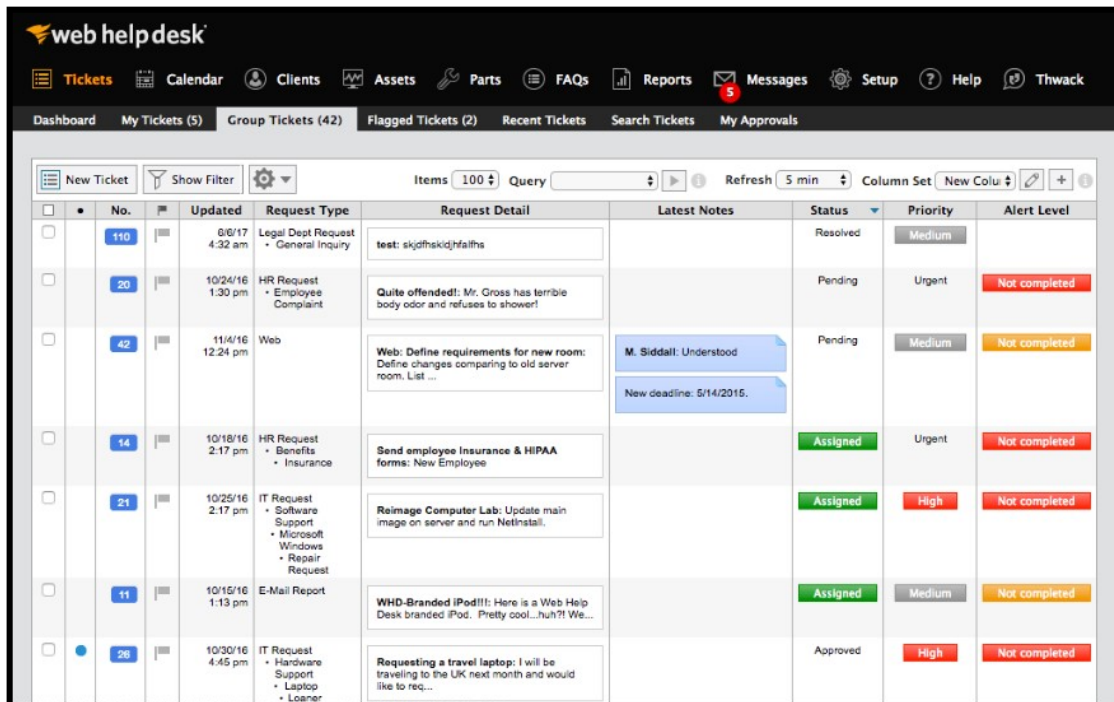
## **2.2.4. Web Help Desk**

Web help desk is allows set up parent-child relationship between incident and their associated problem tickets.

Link: <https://www.webhelpdesk.com/incident-management-software>

Following features are available in the Web help desk Incident Management software.

- Alert and report on service level agreement time lines and ticket status
- Intuitive reporting dashboards to monitor technician performance & track ticket status
- 3. Centralized Web-based interface provides single pane of glass for managing incident ticket



The screenshot displays the 'web help desk' interface. At the top, there is a navigation bar with icons for Tickets, Calendar, Clients, Assets, Parts, FAQs, Reports, Messages, Setup, Help, and Thwack. Below this is a sub-navigation bar with options like Dashboard, My Tickets (5), Group Tickets (42), Flagged Tickets (2), Recent Tickets, Search Tickets, and My Approvals. The main area shows a table of tickets with the following columns: No., Updated, Request Type, Request Detail, Latest Notes, Status, Priority, and Alert Level. The table contains several rows of ticket data, including a resolved ticket (No. 110) and several pending or assigned tickets with various request types like HR Request, Web, and IT Request.

| No. | Updated          | Request Type  | Request Detail  | Latest Notes                                       | Status   | Priority | Alert Level   |
|-----|------------------|---|---|--|----------|----------|---------------|
| 110 | 8/6/17 4:32 am   | Legal Dept Request<br>• General Inquiry                                     | test: skjofhskidjhfalths  |  | Resolved | Medium   |               |
| 20  | 10/24/16 1:30 pm | HR Request<br>• Employee Complaint  | Quite offended! Mr. Gross has terrible body odor and refuses to shower!                       |  | Pending  | Urgent   | Not completed |
| 42  | 11/4/16 12:24 pm | Web   | Web: Define requirements for new room: Define changes comparing to old server room. List ...  | M. Siddall: Understood<br>New deadline: 5/14/2015. | Pending  | Medium   | Not completed |
| 14  | 10/18/16 2:17 pm | HR Request<br>• Benefits<br>• Insurance                                     | Send employee Insurance & HIPAA forms: New Employee   |  | Assigned | Urgent   | Not completed |
| 21  | 10/25/16 2:17 pm | IT Request<br>• Software Support<br>• Microsoft Windows<br>• Repair Request | Reimage Computer Lab: Update main image on server and run Netinstall.                         |  | Assigned | High     | Not completed |
| 11  | 10/15/16 1:13 pm | E-Mail Report   | WHD-Branded iPod!!!: Here is a Web Help Desk branded iPod. Pretty cool...huh?! We...          |  | Assigned | Medium   | Not completed |
| 26  | 10/30/16 4:45 pm | IT Request<br>• Hardware Support<br>• Laptop<br>• Loaner                    | Requesting a travel laptop: I will be traveling to the UK next month and would like to rec... |  | Approved | High     | Not completed |

Figure 2.4 Web Help Desk

## 2.2.5. Convergence safety incident management

This system provides an intuitive guide for employees to immediately report any injury, illness, property damage, safety observation, or near-miss. The incident mobile app is providing report incidents in real time from the field.

Link: <https://www.convergencetraining.com/incident-management-software.aspx>

Following features are available in the Convergence safety incident management.

- Electrical Burn
- Chemical Burn
- Fracture
- Heatstroke
- Asbestosis

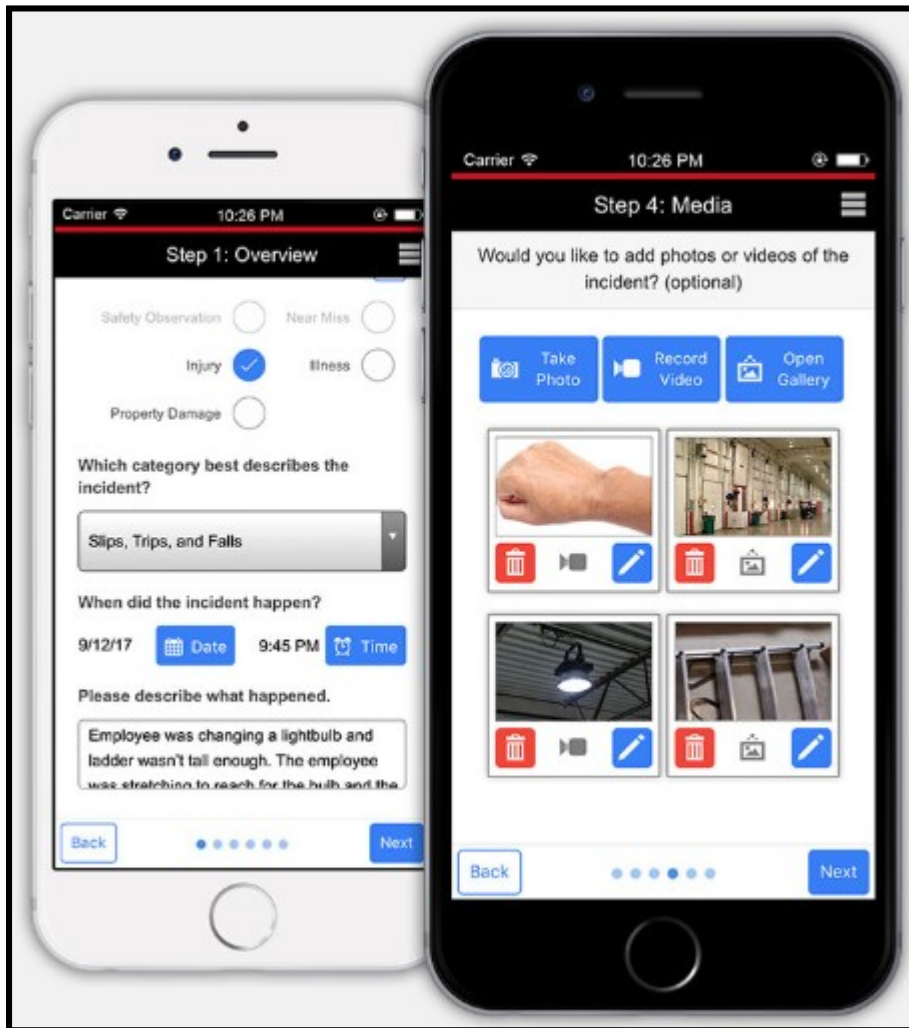


Figure 2.5 Convergence safety incident management

## 2.2.6. WCB Online Incident Reporting System

WCB employer incident reports contain confidential personal and medical information. Its associated data reside on a WCB-Manitoba web server. Only employers who have signed up with the WCB and have received a unique User ID have access to Online Incident Reporting.

Link:

[https://www.wcb.mb.ca/sites/default/files/resources/4732\\_WCB\\_Online\\_Incident\\_Reporting\\_Guide\\_Web.pdf](https://www.wcb.mb.ca/sites/default/files/resources/4732_WCB_Online_Incident_Reporting_Guide_Web.pdf)

System mainly focus injuries occurred to employees at workplace.



The screenshot shows the login interface for the WCB Online Incident Reporting System. At the top left, the WCB logo is displayed with the text "WCB Workers Compensation Board of Manitoba". Below the logo, there are navigation links for "Home", "Privacy Statement", and "Security Statement". The main content area contains the instruction "Please enter your user id and password:". Below this, there are two input fields: "User ID" and "Password". To the right of the "Password" field is a "Change Password" link. Below the input fields, there is a "Login" button and a "Forgot Your Password?" link.

Figure 2.6 WCB Online Incident Reporting System

# Methodology

## 3.1 Introduction

This chapter describes the technical implementation of the system. It will consist about the technical background of the system and tools were used to develop the system. Finally this chapter will elaborate the structure and architecture of the system. Also describes how data collection process happens, data sources, information representation and participants of the system. Further, solution will be delivered using methods and diagrams as object oriented modeling.

## 3.2 Problem Definition

A lot of incidents are not communicated to responsible authority even that can be solved with a minimum attempt. The main reason is there no use of flexible media by both parties to inform and neglect the responsible and duty by deliberately.

The dilatoriness will impact to all lives in the society by broadly or part of the region. It may affect to health, violence and life style of the people.

## 3.3 Solution

The goal is this project provides a software solution to users to report incidents accuracy and fast. The mobile application will help to communicate with relevant authorities by the specific incidents types in the area. The following incident types can be reported from mobile to relevant authorities' immediately.

- Fire
- Robbery
- Accident
- Fight
- Dengue
- Shooting

- Violence
- Dead Person
- Animal Attack
- Broken Road
- Flood
- Illegal Activity
- No Electricity
- Broken Water Pipe
- Lost items
- Garbage Pilled

### **3.3.1 Reporting Incidents**

Following information obtain while reporting an incident from a mobile application.

- Incident Type
- Message
- Location
- Name
- Contact

### **3.4 Scenario Analyst**

Use cases are demonstrate different ways of user interactions with the system and summary details of the system. Specialized symbols and connectors are use for represent use case activity. That gives get a idea of scope of the system, goals and scenarios in system interact with people, organization or external systems.

## **3.5 System Design**

Design is the step after defining attributes and the procedures and their relationships. Design gives general overview of how data objects, components and overall architecture should be implemented. So it starts with data abstraction then adds procedures to them to design components then shows overall software architecture.

### **3.5.1 Activity Diagram**

UML activity diagram shows the flow of the processing in the each module of the system where it's mainly show how the flow of the activation for each scenario will work and how the decisions are made in each activity.

Figure 3.1 show the activity diagram for User Registration.

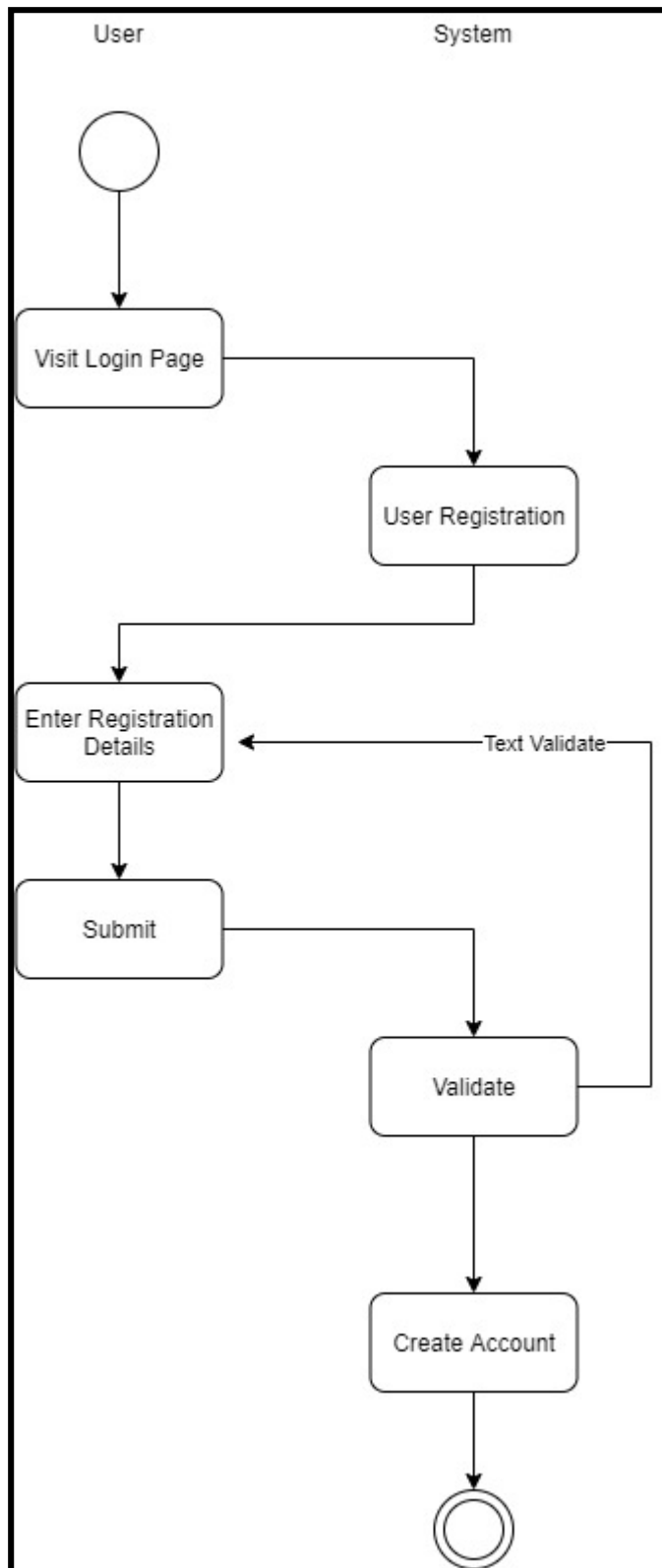


Figure 3.1 User registration activity diagram



### 3.5.2 Database Diagram

UML class diagram shows the flow of each module of the system where it's mainly show how the flow of incident records and email activity scenario.

Figure 3.2 show the DB diagram of system

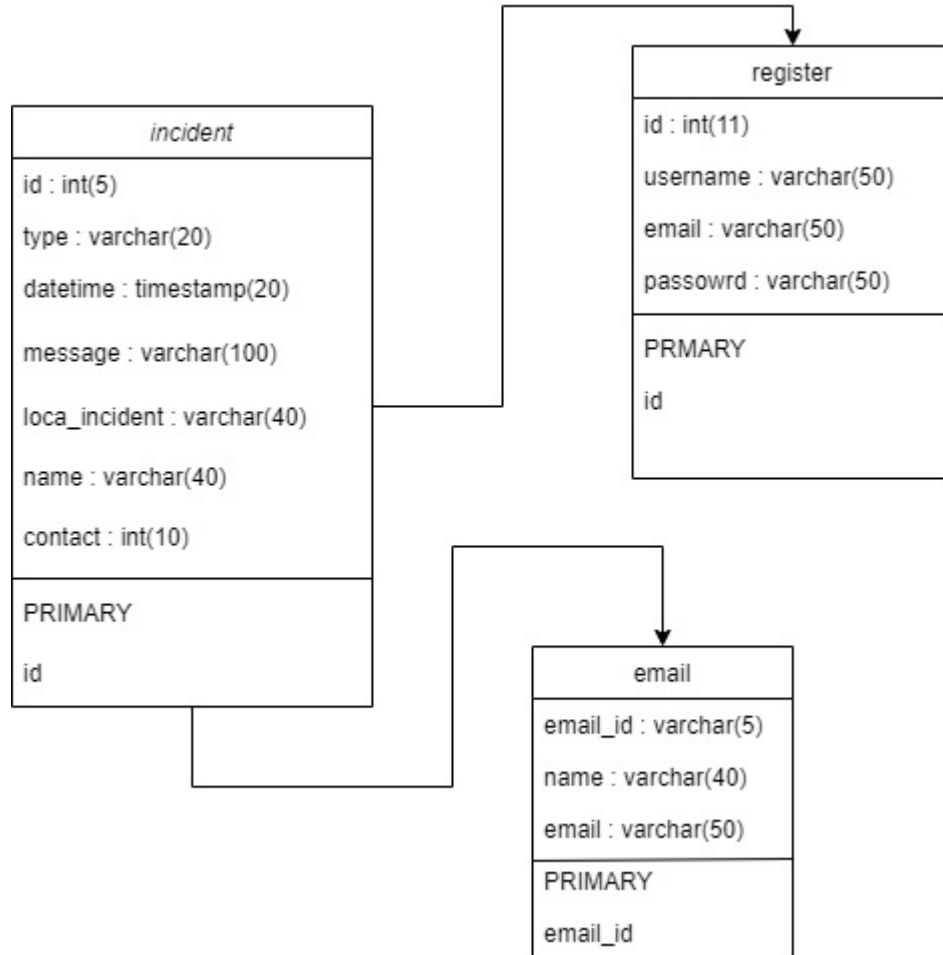


Figure 3.2 Database diagram

### 3.6 Data Collection

The study is carried out basis on incident reporting through the mobile application. The main source provide different kind of incident types to the system which process received data and

inform relevant responsible organization with an email. Responsible organization information can be gathered from government officers with contact details and those information can be added to system for incident routine purpose.

### 3.7 Data Present

Data shows in the system when AP triggers incidents to web system. Dashboard indicate brief information and the users can list all incident types by referring sub pages. When AP trigger a data to the 'incident' table dashboard is update immediately.

User management information can view from User profile page and users can be edited or deleted and adding by that page.

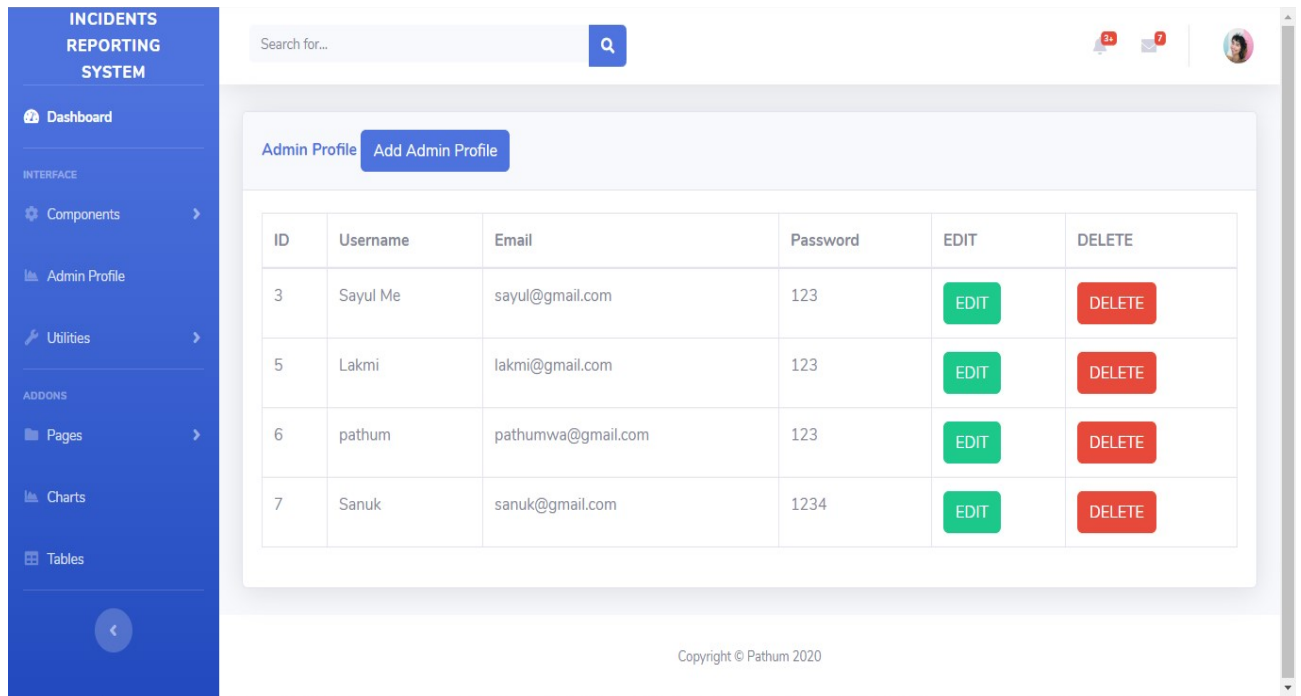


Figure 3.3 User Management screen

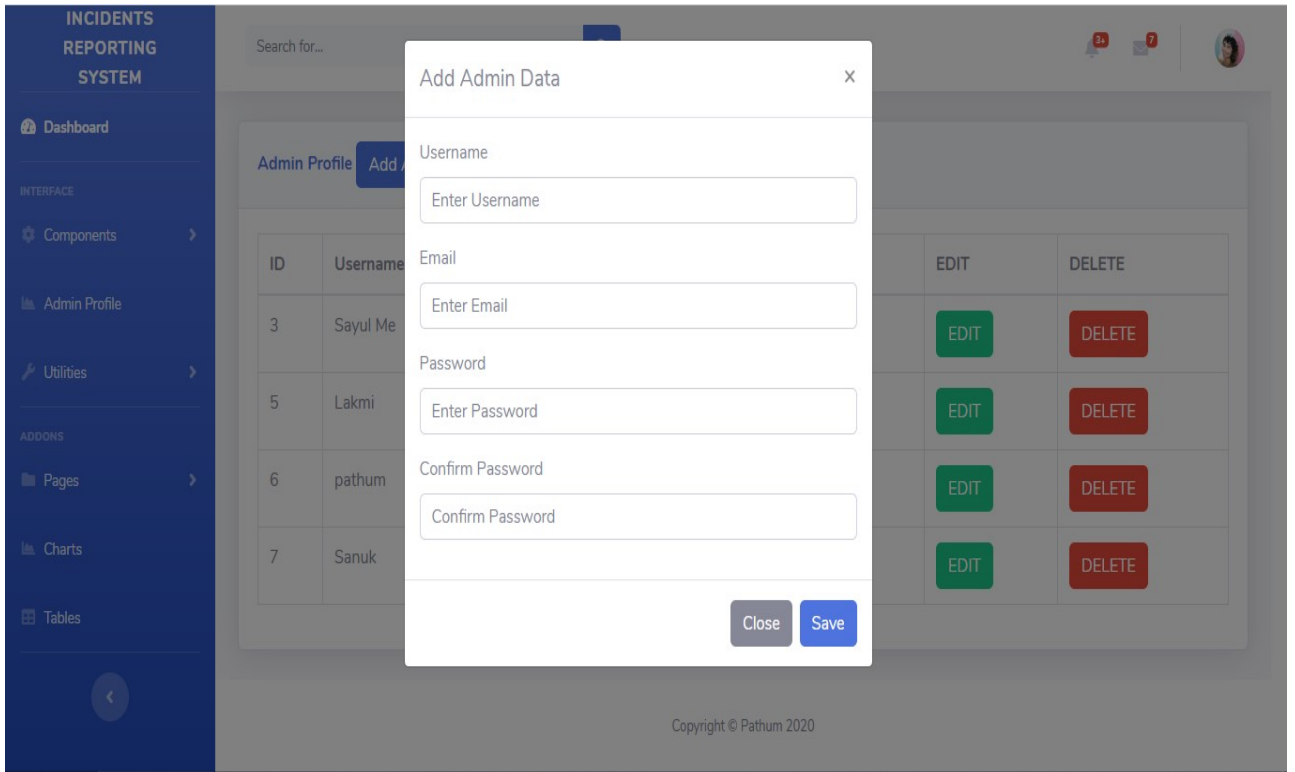


Figure 3.4 A user adding screen

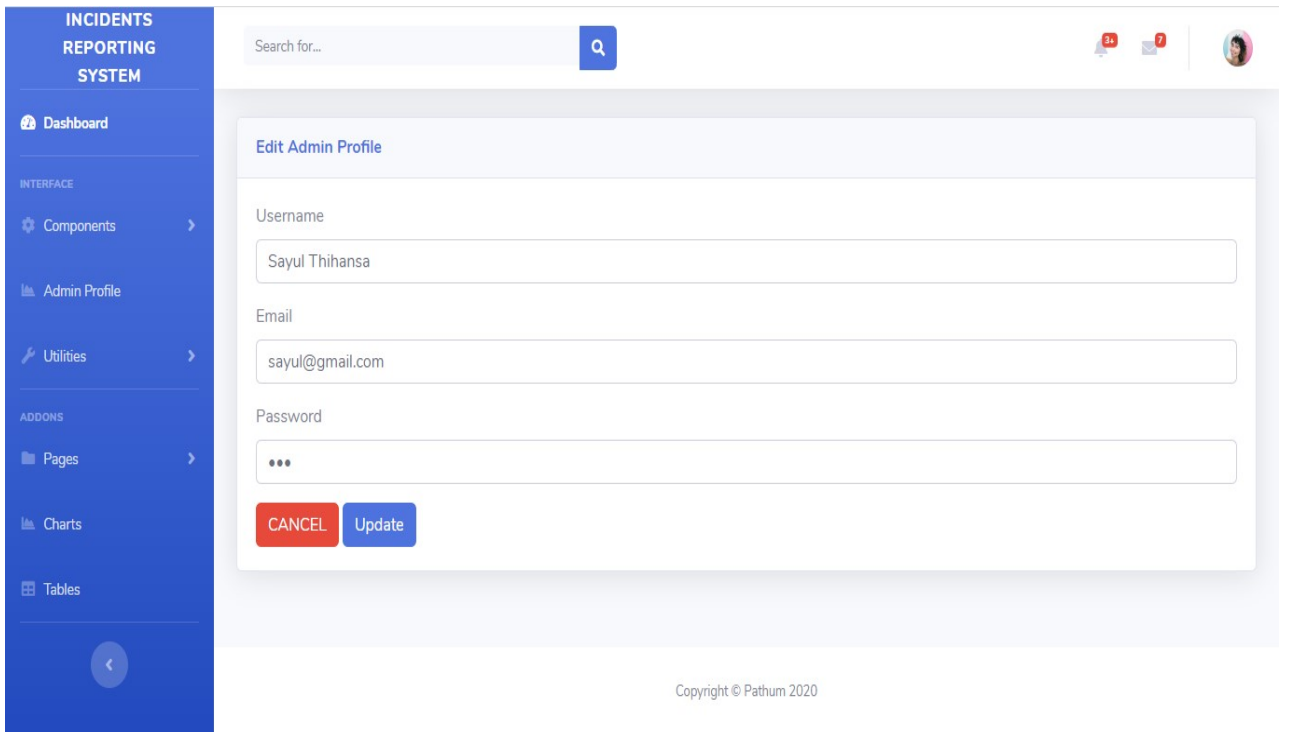


Figure 3.5 Modify user details screen

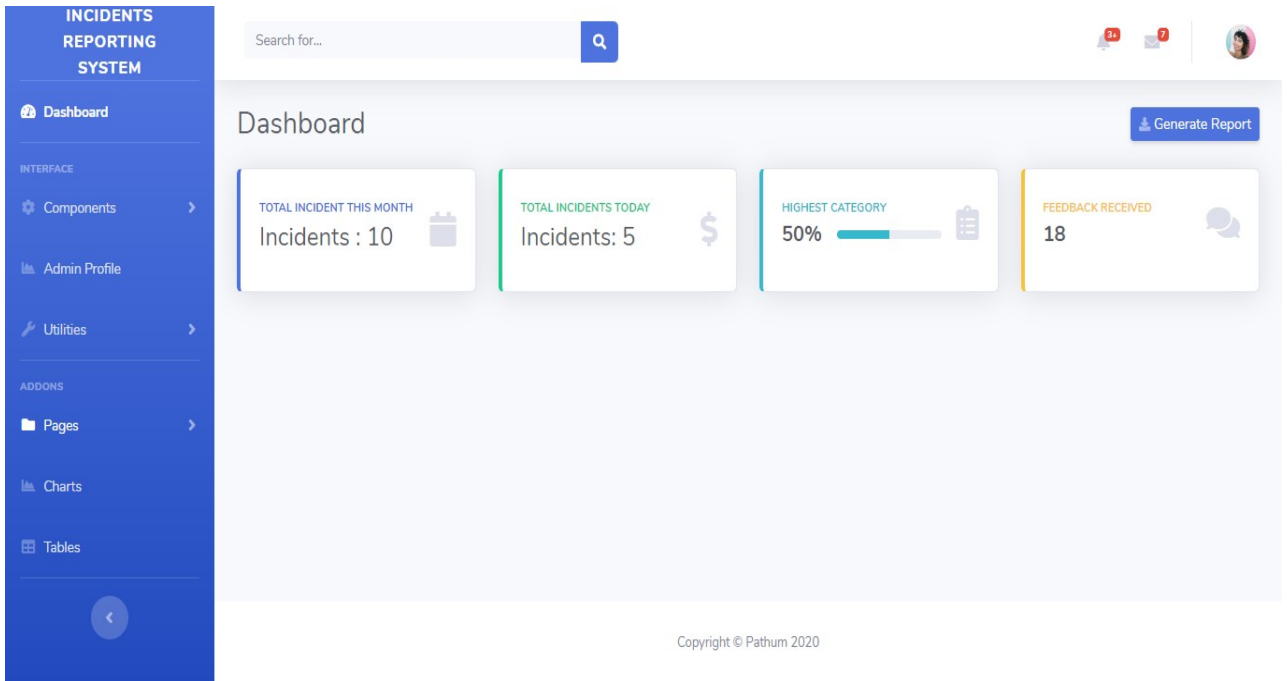


Figure 3.6 Dashboard

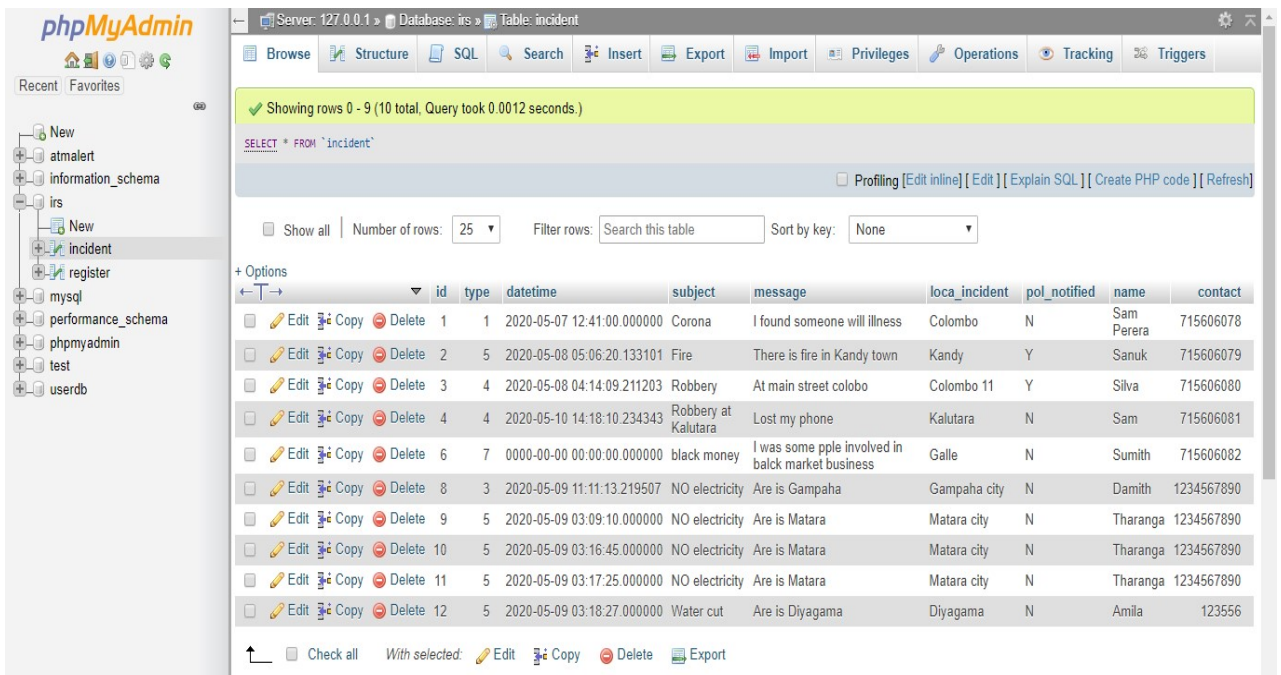


Figure 3.7 MySQL DB table structure screen

# Evaluation

## 4.1 Introduction

In this chapter focus system effectiveness based on developed application performance. The system function is verify from test cases and including what they are, how they are use, what information is included and how organized. Evaluation allows demonstrate program's success or progress.

## 4.2 Test Process

Before system goes to clients' programmers must check system functionality to find out every little bug. Black box and white box testing are main methods for judge software behavior and performance. But there are other methods also available for measure system performance. Follow are advantages and disadvantages of these two methods.

### 4.2.1 White box testing

White box testing is testing of software by internal codes and infrastructure. When system gets errors programmer go deeply and find out issue of the code. White box testing also called glass testing or open box testing. These are advantages of white box testing.

#### 4.2.1.1 Advantages of White box testing

1. Helps to optimize system
2. As tester has knowledge of the source code, it easy to find out which type of data can help in testing the application effectively
3. Extra lines of code can be removed which bring hidden system usage.

### **4.2.1.2 Disadvantages of White box testing**

1. The costs are increased when skilled tester perform the task.
2. Difficult to maintain white-box testing, as it requires specialized tools (analyzers debugging tools)
3. Sometimes it is impossible to look into every code lines to find out

### **4.2.2 Black box testing**

The technique of testing without having knowledge of application is called black-box testing. The tester may system architecture and does not have access to the source code. The tester will interact with the system's user interface by providing inputs and examining outputs without knowing how and where the inputs are work.

#### **4.2.2.1 Advantages of Black box testing**

1. Well suited and efficient for large code segments.
2. Code access is not required.
3. Testers can test the application with no knowledge of implementation, programming language, or operating systems.

#### **4.2.2.2 Disadvantages of Black box testing**

1. Limited area test since only a selected number of test scenarios are actually performed.
2. The test cases are difficult to design
3. Tester only has limited knowledge about an application

## **4.3 Testing Levels**

There are generally four levels of tests. During implementation of proposed solution, system test different type of testing levels to ensure that system is working without any issues.

### **4.3.1 Unit testing**

Unit testing aims to verify each part of the software and then perform tests to demonstrate that each individual component is correct according to requirements. This type of testing is performed at the earliest stages of the development process, and in many cases. It is executed by the developers themselves before handing the software over to the testing team.

### **4.3.2 Integration testing**

Integration testing aims to test different parts of the system in order to assess if they work correctly. By testing the units in groups, any faults in the way they interact together can be identified.

### **4.3.3 System testing**

All the components of the software are tested as a whole in order to ensure that the overall product meets the requirements specified in previously. System testing is a very important step as the software is almost ready to deliver and it can be tested in an environment which is very close to that which the user will experience once it is deployed.

## 4.4 Evaluate results using test cases

| ID  | Test Case             | Steps   | Expected Results  | Actual Result                     | Status |
|-----|-----------------------|---|---|-----------------------------------|--------|
| 1.0 | Login                 |   |   |                                   |        |
|     | Login to System       | Enter valid username and valid password             | User able see dashboard and data entries                | Success                           | Passed |
|     |                       | Enter invalid username and invalid password         | Warning message should appear in Login screen           | Warning message appeared          | Passed |
|     |                       | Enter invalid username and valid password           | Warning message should appear in Login screen           | Warning message appeared          | Passed |
|     |                       | Enter valid username and invalid password           | Warning message should appear in Login screen           | Warning message appeared          | Passed |
| 2.0 | Register              |   |   |                                   |        |
|     | New user registration | Enter valid information to the form                 | New account added page redirected user information page | New account added page redirected | Passed |
|     |                       | User not fill password column                       | Warning message should appear                           | Warning message appeared          | Passed |
|     |                       | User enter different password on confirmation field | Warning message should appear                           | Warning message appeared          | Passed |
|     |                       | Enter invalid email address to the form             | Warning message should appear                           | Warning message appeared          | Passed |

|     |           |  |  |  |  |
|-----|-----------|--|--|--|--|
| 3.0 | Dashboard |  |  |  |  |
|-----|-----------|--|--|--|--|



|     |                    |  |  |                             |        |
|-----|--------------------|--|--|-----------------------------|--------|
|     | View Dashboard     | Login and check all reported incidents | User see all incidents in dashboard                          | Dashboard appeared          | Passed |
|     |                    | Monthly total incidents                | User see total number of incidents occurred in current month | Actual values are displayed | Passed |
|     |                    | Current day incidents                  | User see total number of incidents occurred in today         | Actual values are displayed | Passed |
|     |                    | Highest category for current month     | User see incident category occurred in current month         | Actual values are displayed | Passed |
|     |                    | Feedback received                      | User see how many feedback received for reported incidents   | Actual values are displayed | Passed |
|     |                    | Recent updated list                    | Latest updated incident will display first                   | Actual values are displayed | Passed |
| 4.0 | Mobile Application |  |  |                             |        |
|     |                    | Open Android application               | User see all incidents types in mobile application           | Primary screen appeared     | Passed |
|     |                    | Select an incident                     | User see all incident information request screen             | Actual values are displayed | Passed |
|     |                    | Submit an incident                     | User see "Incident Submitted" message                        | Actual values are displayed | Passed |
|     |                    | Connection not available               | User see "Host unreachable" message                          | Actual values are displayed | Passed |

| 5.0 | Email activity |   |  |                       |        |
|-----|----------------|---|--|-----------------------|--------|
|     |                | New incident report                       | A email triggered to responsible authority | A new email triggered | Passed |
|     |                | New location added                        | Email sent to specified email address      | A new email triggered | Passed |
|     |                | Included two emails for a single location | Emails sent to specified email addresses   | A new email triggered | Passed |
|     |                | Email address not included for a location | Email not triggered                        | Email not received    | Passed |

## 4.5 User Evaluation

Android application testing is completed by actual users. Tasks are submitting different kind of incidents with different mobile devices and all submitted items were updated in web system successfully. Users were satisfied with options and features given by the application. Android version 4.4 (Kitkat) and below version are not tested due to mobile phones are not available with this versions.

# Conclusion

## 5.1 Introduction

This chapter contains conclusion of the implemented system and its future enhancements. Apart from above this chapter describe about initial goals, achievements and strength of the system. This system helps users to minimize the occurrences of incidents which are bringing unnecessary problems to users and the planet.

## 5.2 Results of respect to the objectives

Main objective of the project is report incidents to responsible authority to find out the root cause of incident and take corrective action against it and prevent similar future occurrences. The system is perfectly matched with expecting outcome of the users and system is benefit for the people. The service of system spread to all kind of region, community and people. The better service will make better future of all kind of live on earth.

## 5.3 Strengths and limitation

The system provides stable and accurate information to the responsible authority to start investigates the incident. System output and expectations handling are implemented to improve the system reliability. The system is limited to the functionality and it takes more time to implement with more suggestions.

## 5.4 Technical limitation

The system has following technical limitation while serving to the users. Some may can rectify with new innovations and some limitation exists due to non technology matters come to the situation.

- ❖ Network connectivity  
The mobile connectivity is limited to some areas of Sri Lanka and application will not serve without a proper connectivity with a service provider.
  
- ❖ Technology usage of people

people might not use technology due to fear and making mistakes while using the digital technology. Most of elder people still favor to go through traditional system and they believe that technology is still not developed to serve better to social.

- ❖ System functionality

  - System bugs and security threats impact to functionality of a system.

  - Technology is updating every second and system must update accordingly to perform with full functional to provide a better service.

## 5.5 Future works

The following features can be added to enhance the performance of system in the future. The new modules will more efficient and users will receive feedback to what they have reported.

- ❖ SMS notifications – Client gets register with a mobile number in android application will receive feedback notification when completed reported incident by responsible organization.
- ❖ Avoid multiple incident reporting – A single user can report incidents multiple times now. This mistake can be stopped by some methods implement to the system.
  1. Only registered users allow reporting incidents by android application. Guest users only can view that registered users reported incidents.
  2. Location and incident type detects while reporting and suggest to user if previously received same type of incidents whiting a day or a period by other users.
- ❖ Allow reopen incident while it closed – Some incidents may reoccur due to unavoidable circumstances. In such case users allow to reopen a previous reported incident to indicate responsible organization.
- ❖ Google map use to verify exact location – The correct location can add to system by using Google map and relevant organization can track the place and attend to correct location.
- ❖ Dashboard in Android application – Users can get brief idea that how many incidents were reported and which category was highest in specific period etc.

- ❖ IOS application – This project is mainly focused to develop Android application. There are many user hold Apple I phones they can involve to this after develop IOS base mobile applications.

# Bibliography

[1] Youtube.com, “Failed to load AppCompatActivity”, 2019, [Online] Available:

<https://www.youtube.com/watch?v=FpuH1Z8Rzfg> [Accessed 20-June-2019]

[2] android-examples.com, “view is not constrained Android Studio”, 2019, [Online] Available:

<https://www.android-examples.com/view-not-constrained-android-studio-error-solution-tutorial/> [Accessed 21-June-2019]

[3] Youtube.com, “view is not constrained android studio”, 2019, [Online] Available:

<https://www.youtube.com/watch?v=nkLA4VQN6Bc> [Accessed 20-June-2019]

[4] geeksforgeeks.org, “What is Black box testing and white box testing”, 2020, [Online]

Available:

<https://www.geeksforgeeks.org/differences-between-black-box-testing-vs-white-box-testing/> [Accessed 31-Jan-2020]

[5] softwaretestingfundamentals.com, “Different between what is Black box testing and white box testing”, 2020 [Online] Available:

<http://softwaretestingfundamentals.com/differences-between-black-box-testing-and-white-box-testing/> [Accessed 21-Feb-2020]

# Appendix

## Appendix A – System Documentation

User documentation is provides guidelines of installation process to organization. Systems administrator must install database server in a specified server with requested minimum server hardware configurations.

Organization should provide a server created in the VM environment to install deployment and a client PC is required for login to system. In order to installation following requirements should available in server.

### Server

Follow the server requirements of hardware and software configurations.

| Hardware    | Recommended Minimum Requirements                   |
|-------------|--|
| Processor   | Intel Xeon 3.5GHz CPU                              |
| Memory      | 16 GB RAM  |
| Hard Disk   | 1TB HDD  |
| Display     | 1024x768 resolution or higher. 32bit color display |
| LAN Adapter | 100Mbps Virtual Network                            |

**Table 1.1: Minimum requirements – Server hardware**

| Software         | Recommended Minimum Requirements       |
|------------------|--|
| Operating System | Windows Server 2016 or later           |
| Database         | Microsoft SQL Server Management Studio |
| PHP              | PHP 7.2. 30                            |
| Web server       | IIS 8.0                                |

**Table 1.2: Minimum requirements – Server software**

## Client

Follow the client PC requirements of hardware and software configurations.

| Hardware    | Recommended Minimum Requirements                   |
|-------------|--|
| Processor   | Intel core i3 3.0GHz or above                      |
| Memory      | 4 GB RAM   |
| Hard Disk   | 100 GB HDD   |
| Display     | 1024x768 resolution or higher. 32bit color display |
| LAN Adapter | 100Mbps Ethernet card                              |

**Table 1.3: Minimum requirements – Client hardware**

| Software         | Recommended Minimum Requirements |
|------------------|----------------------------------|
| Operating System | Windows Server 7 or above        |
| Browsers         | Google Chrome v73.0 or above     |
| PDF reader       | Acrobat Reader 10.0 or above     |

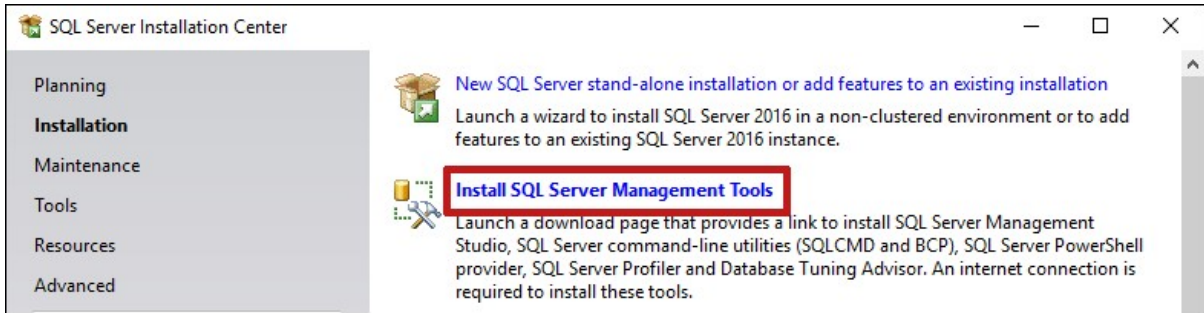
**Table 1.4: Minimum requirements – Client software**

## Appendix B - Install SQL Server Management Tools

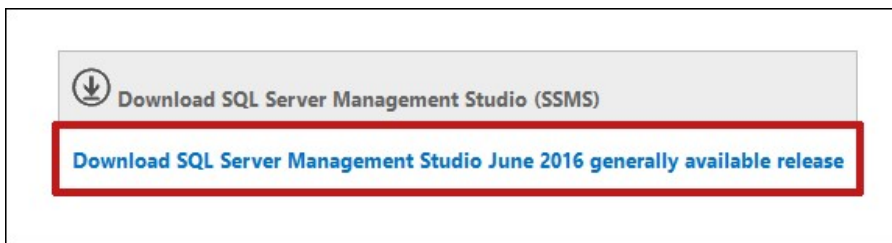
Follow the steps below to set up your database with MS SQL Server Management Studio.

1. In the SQL Server Installation Center window and select **Install SQL Server Management Tools**.



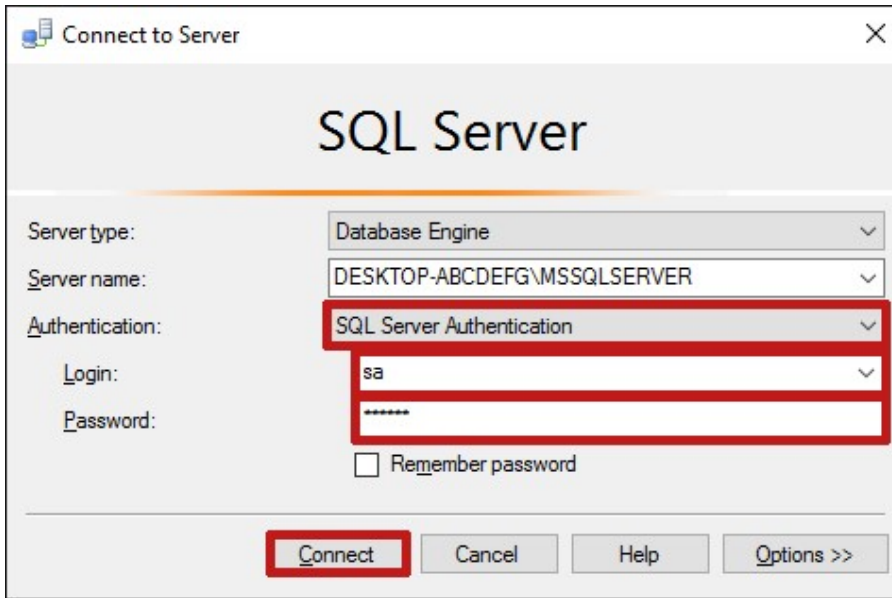


2. The browser will launch and take to the *Download SQL Server Management Studio* web page. Select the **Download SQL Server Management Studio** link.

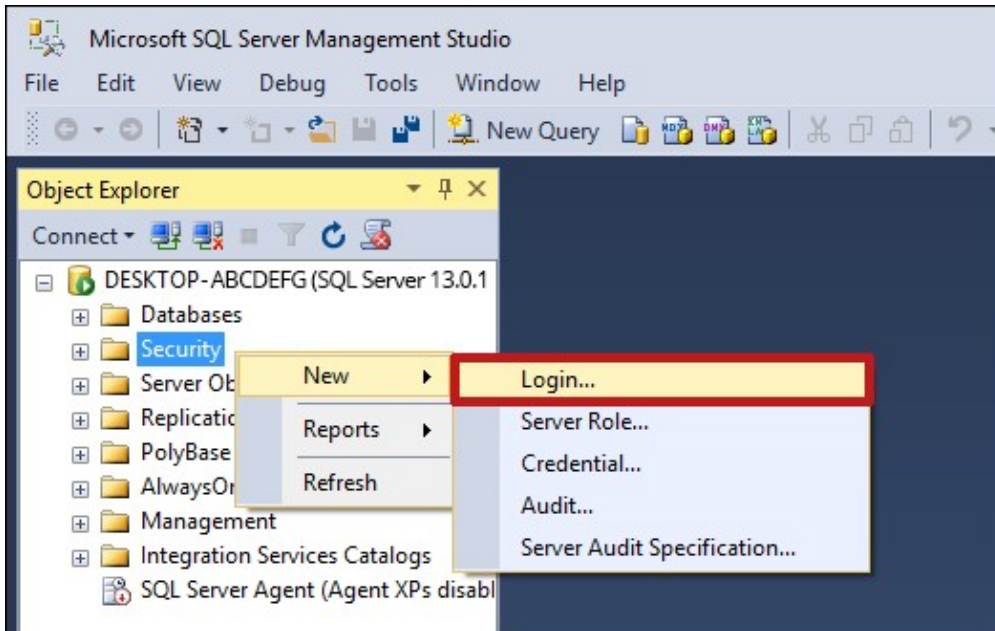


3. Select **Install** and Wait for the installation to complete, and then select **Close** to close the window.

4. Open *Management Studio* and enter credentials.



5. In the *Object Explorer* bar to the left, right-click on *Security*; select **New**; then select **Login**.



6. In the *Login* enter a new login name. Select **SQL Server authentication**, and then enter and confirm a password for the user.

## 7. Uncheck Enforce password policy.

Login - New

Select a page

- General
- Server Roles
- User Mapping
- Securables
- Status

Script Help

Login name: ITManager Search...

Windows authentication

SQL Server authentication

Password: .....

Confirm password: .....

Specify old password

Old password:

Enforce password policy

Enforce password expiration

User must change password at next login

Mapped to certificate

Mapped to asymmetric key

Map to Credential Add

Mapped Credentials

| Credential | Provider |
|------------|----------|
|------------|----------|

Remove

Default database: master

Default language: <default>

OK Cancel

Connection

Server: DESKTOP-QSVAJ5H\MSSQLSER

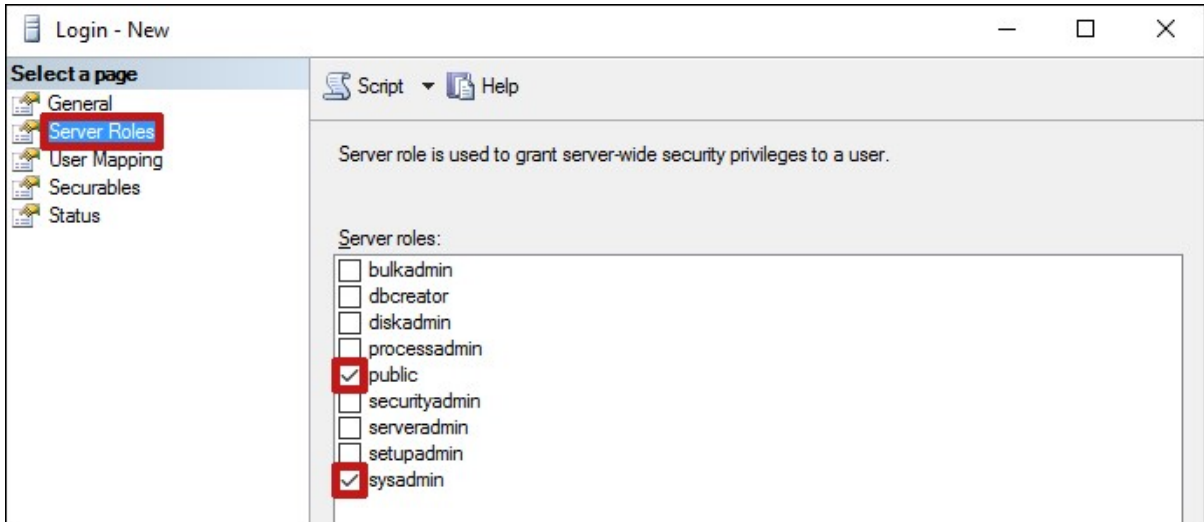
Connection: sa

[View connection properties](#)

Progress

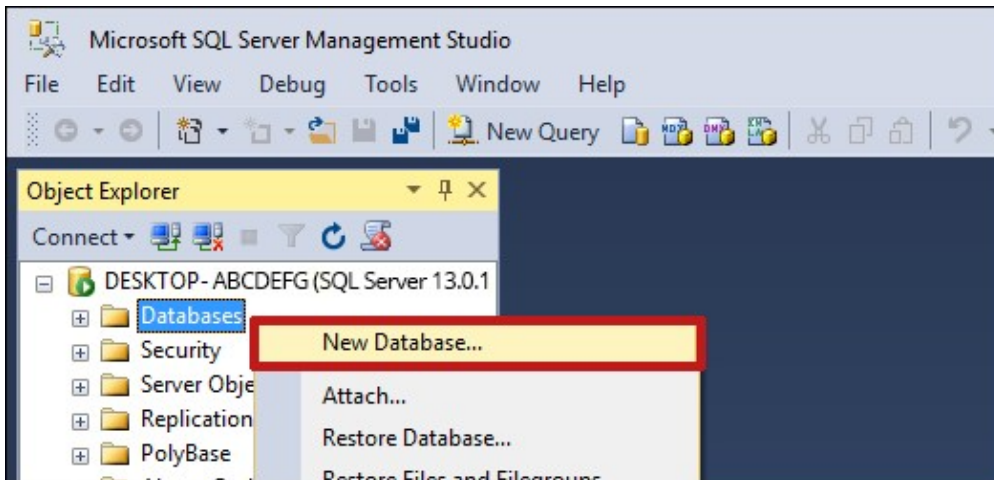
Ready

8. Select the **Server Roles** tab and choose the permissions.

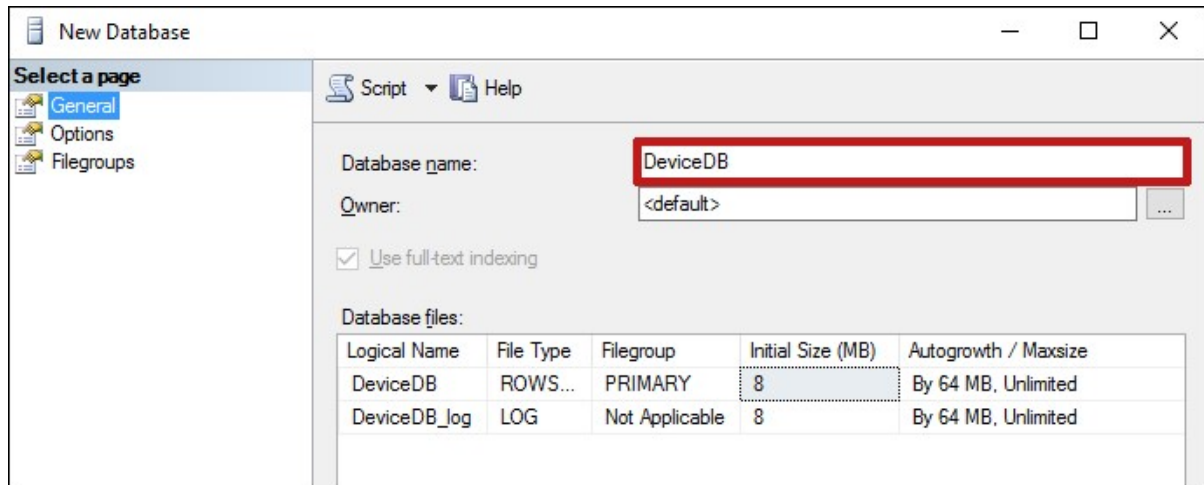


9. Then select **OK** at the bottom of the screen.

10. Right-click on *Databases*, and select **New Database** from the menu.



11. In the *New Database* window, enter a name for the database. Then select **OK** at the bottom of the screen.



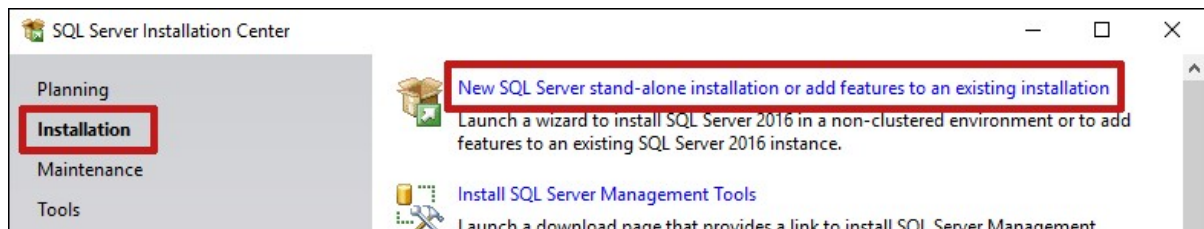
12. Restore DB backup and configures connectivity.

13. Plan DB backup procedure and disaster recovery plan to ensure system continues.

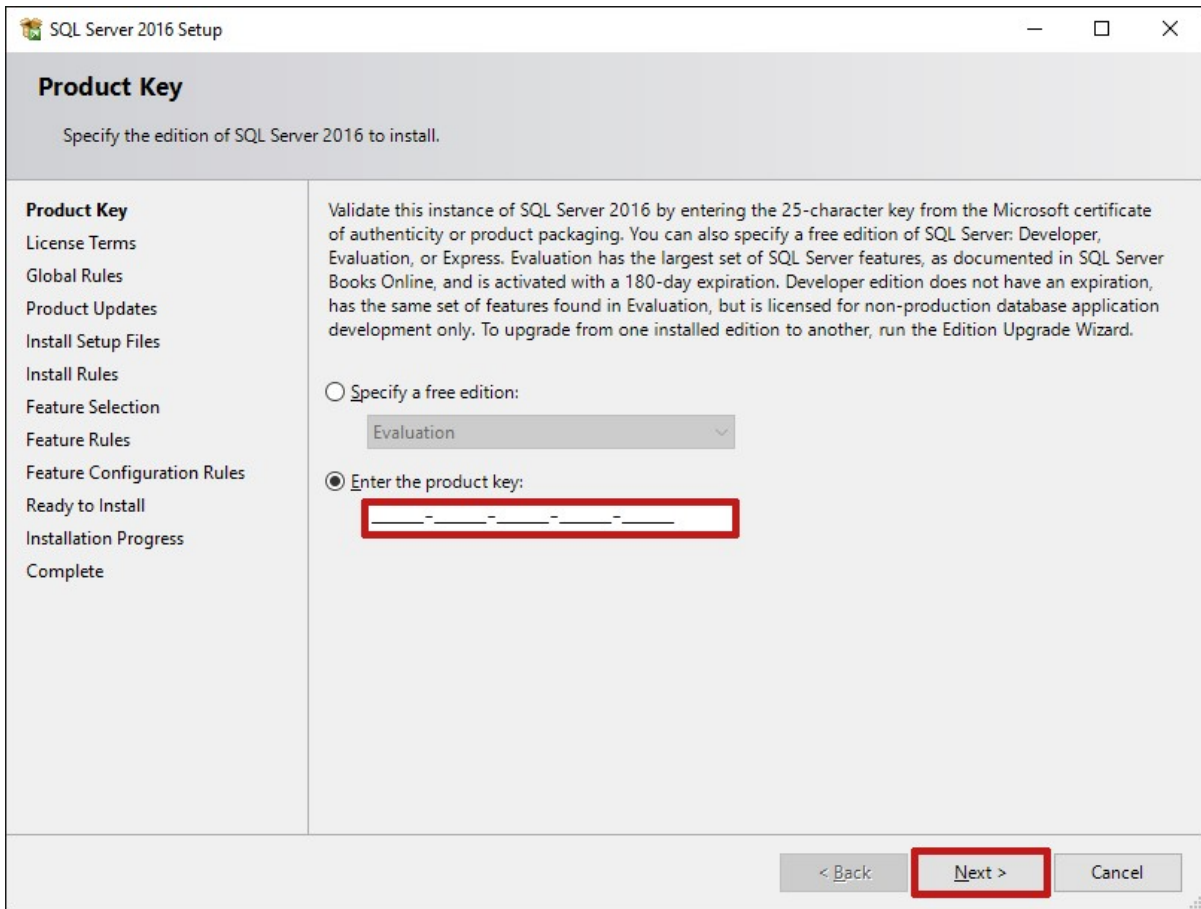
## Appendix C – SQL server installation

The installation is available Microsoft.com website. Organization should be purchased license version of software before installation start. Follow the steps below to install MS SQL Server.

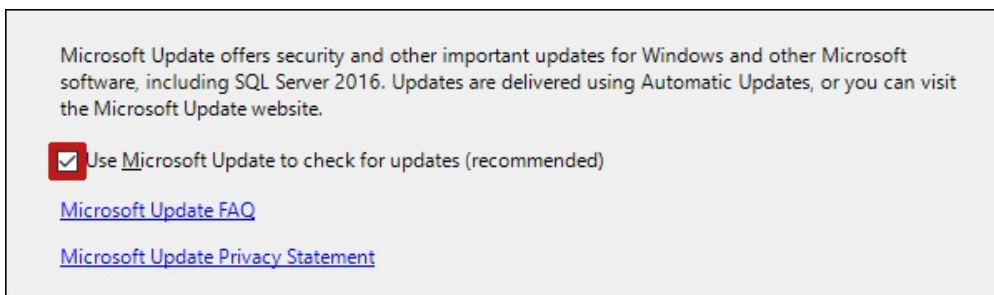
1. In the SQL Server Installation Center window, select **Installation** and then select **New SQL Server stand-alone installation or add features to an existing installation**.



2. Enter product key on the *Product Key* page. Then select **next**.



3. In the *License Terms* window, accept the license terms and then select **Next**.








4. In the *Install Rules* window, correct any rules with a *Failed* status. Then select **Next**.

Operation completed. Passed: 4. Failed 0. Warning 1. Skipped 0.

Hide details << Re-run

[View detailed report](#)

| Rule  | Status                  |
|---|-------------------------|
|  Fusion Active Template Library (ATL)                | <a href="#">Passed</a>  |
|  Consistency validation for SQL Server registry keys | <a href="#">Passed</a>  |
|  Computer domain controller                          | <a href="#">Passed</a>  |
|  Microsoft .NET Application Security                 | <a href="#">Passed</a>  |
|  Windows Firewall                                    | <a href="#">Warning</a> |

5. In the *Feature Selection* window, select **Database Engine Services**. Then select **Next**.

Features: Feature description:

Database Engine Services

- SQL Server Replication
- R Services (In-Database)
- Full-Text and Semantic Extractions for Sea
- Data Quality Services
- PolyBase Query Service for External Data
- Analysis Services
- Reporting Services - Native

Shared Features

- R Server (Standalone)
- Reporting Services - SharePoint
- Reporting Services Add-in for SharePoint Proc

Select All Unselect All

Instance root directory:  ...

Shared feature directory:  ...

Shared feature directory (x86):  ...

The configuration and operation of each instance feature of a SQL Server instance is isolated from other SQL Server instances. SQL Server instances can operate side-by-side on

Prerequisites for selected features:

Already installed:

- Windows PowerShell 3.0 or higher
- Microsoft Visual Studio 2010 Redistributable

Disk Space Requirements

Drive C: 1058 MB required, 247784 MB available

6. In the *Instance Configuration* window, you may leave **Default Instance** selected. Then select **Next**.

Default instance

Named instance:

Instance ID:

SQL Server directory: C:\Program Files\Microsoft SQL Server\MSSQL13.MSSQLSERVER

Installed instances:

| Instance Name | Instance ID | Features | Edition | Version |
|---------------|-------------|----------|---------|---------|
|---------------|-------------|----------|---------|---------|

7. Leave the defaults in the *Server Configuration* window, and select **Next**.

Service Accounts Collation

Microsoft recommends that you use a separate account for each SQL Server service.

| Service                    | Account Name             | Password | Startup Type                               |
|----------------------------|--------------------------|----------|--|
| SQL Server Agent           | NT Service\SQLAgent\$... |          | Manual <input type="button" value="v"/>    |
| SQL Server Database Engine | NT Service\MSSQL\$MSS... |          | Automatic <input type="button" value="v"/> |
| SQL Server Browser         | NT AUTHORITY\LOCAL...    |          | Automatic <input type="button" value="v"/> |

Grant Perform Volume Maintenance Task privilege to SQL Server Database Engine Service

This privilege enables instant file initialization by avoiding zeroing of data pages. This may lead to information disclosure by allowing deleted content to be accessed.

[Click here for details](#)



8. Follow these steps in the *Server Configuration* tab:

a. In *Authentication Mode*, select **Mixed Mode**. Enter and confirm a password for the system administrator (“sa”) account. Then select **Next**.

Server Configuration | Data Directories | TempDB | FILESTREAM

Specify the authentication mode and administrators for the Database Engine.

Authentication Mode

Windows authentication mode

Mixed Mode (SQL Server authentication and Windows authentication)

Specify the password for the SQL Server system administrator (sa) account.

Enter password: [Masked]

Confirm password: [Masked]

Specify SQL Server administrators

DESKTOP-ABCDEF\Current User (Current User)

SQL Server administrators have unrestricted access to the Database Engine.

Add Current User | Add... | Remove

9. In the *Ready to Install* window, select **Install**.

10. When the *Complete* window appears, select **Close** and restart server.

## Appendix D – Android Studio Installation

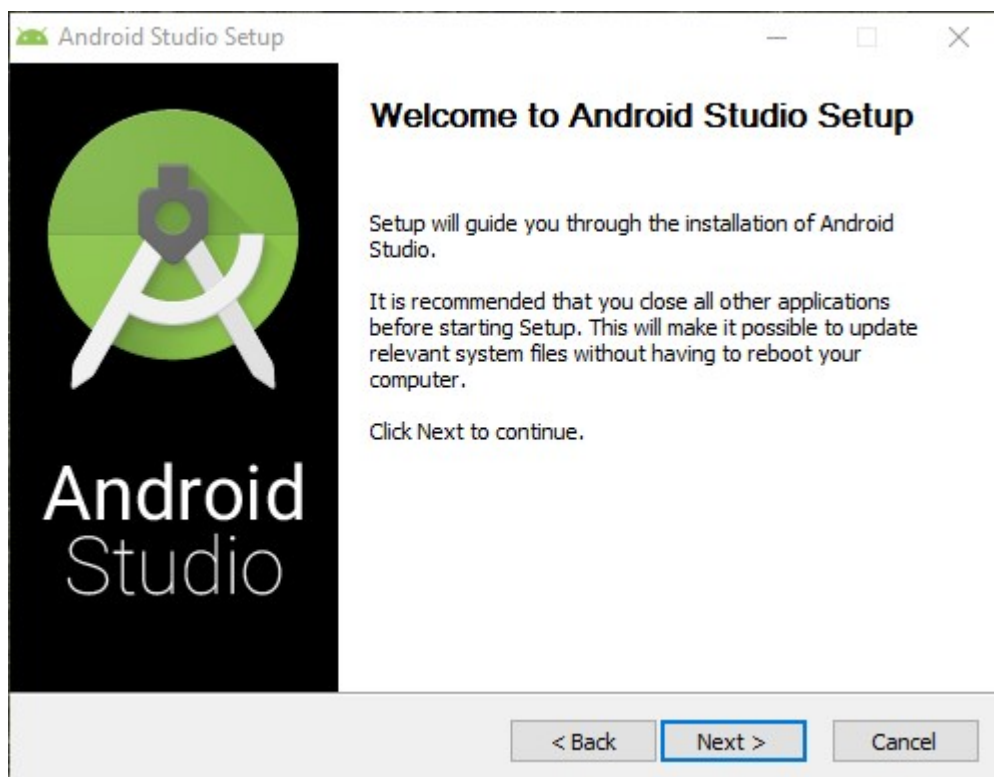
### 1. Download Android Studio

Go to [developer.android.com](http://developer.android.com) homepage and search for downloads. Choose appropriate platform either for windows, mac or linux. Following are the pre requirements for windows operating system.

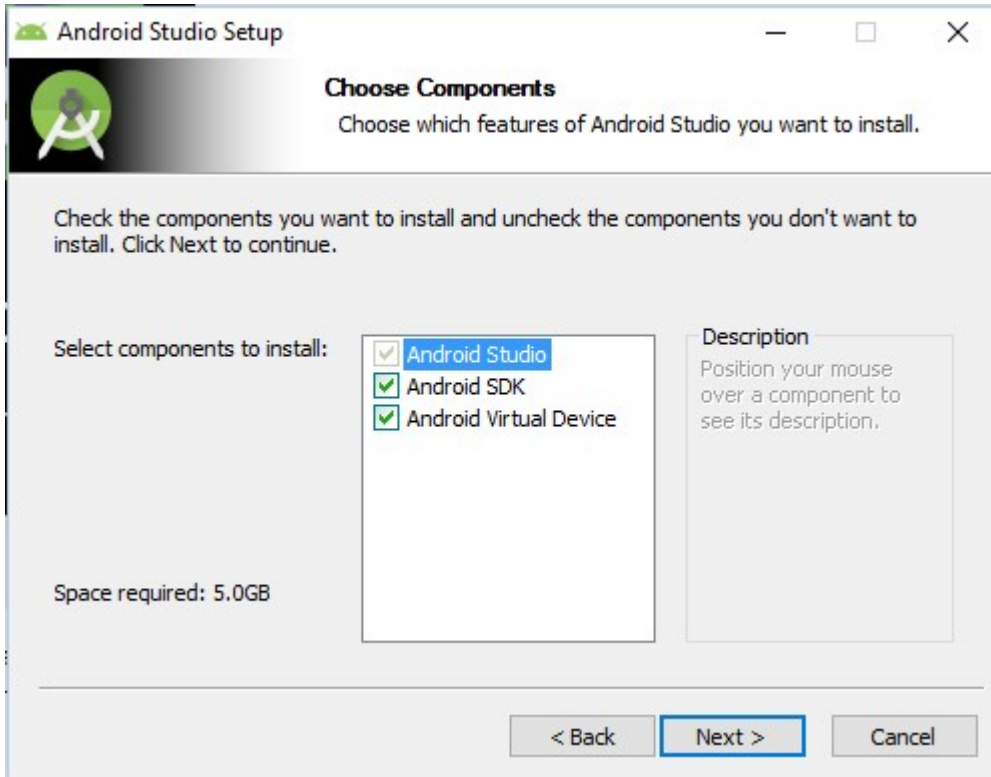
#### Pre-requirements

- Microsoft windows 7/8/10 (32 or 64 bits)
- Minimum 3GB RAM (recommended 8GB)
- 2GB disk space
- 1280 x 800 minimum screen resolution size
- Intel processor for accelerated emulator
- Android SDK

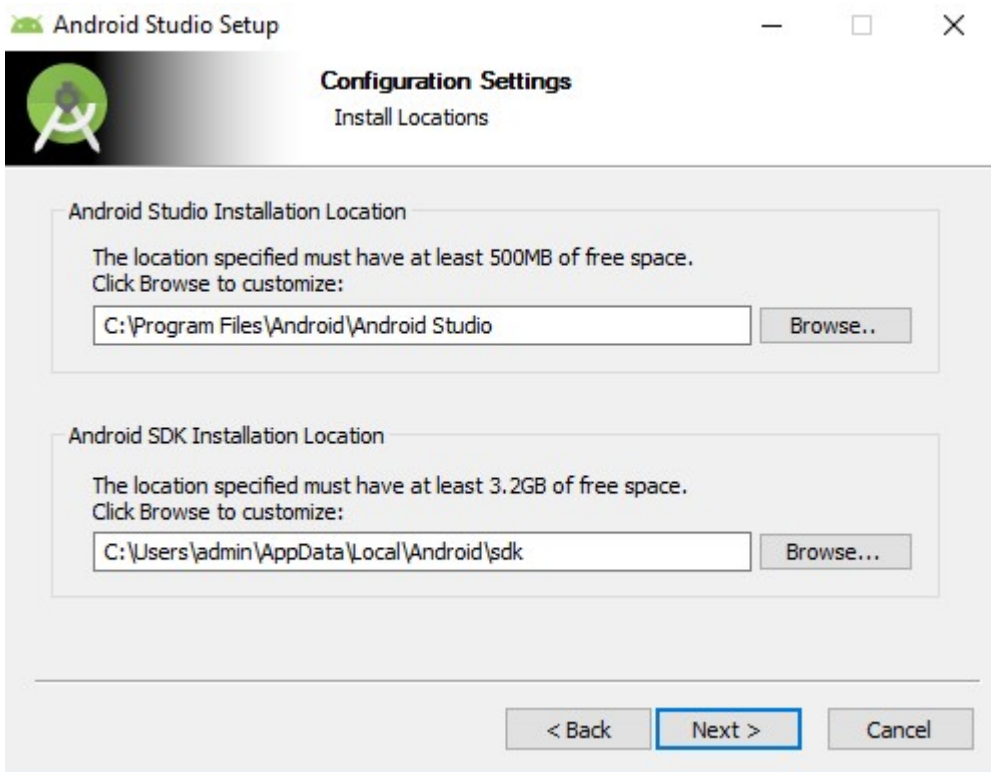
### 2. Run .exe file



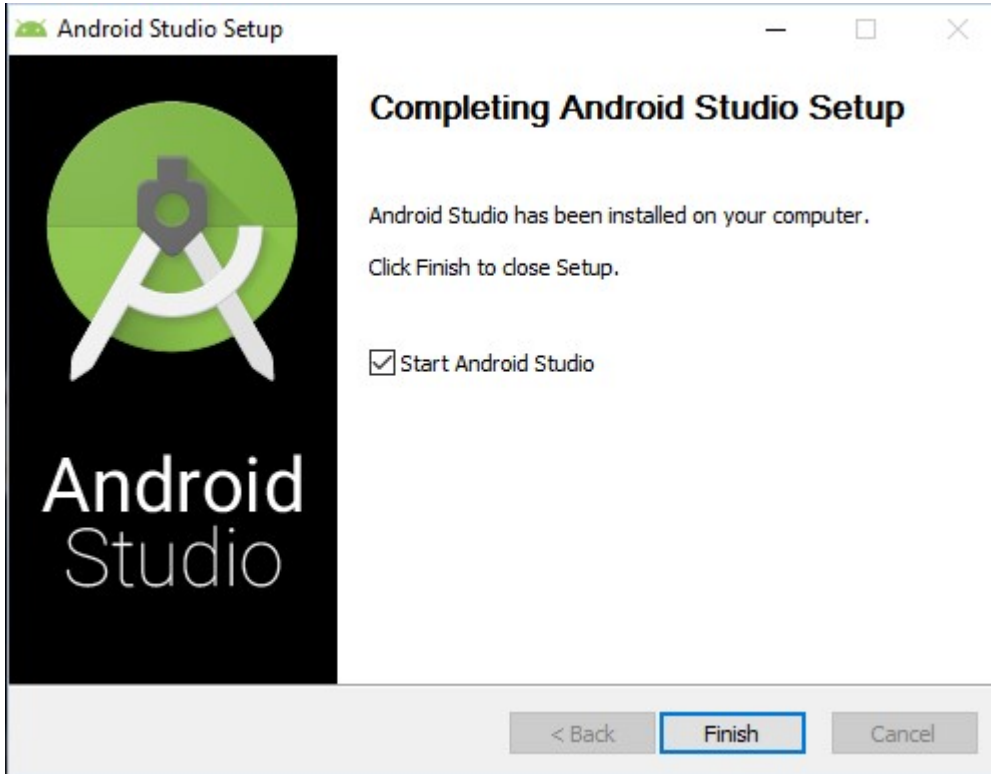
3. Click next and select Android SDK checked if you don't have it already. Better is to leave the default settings.



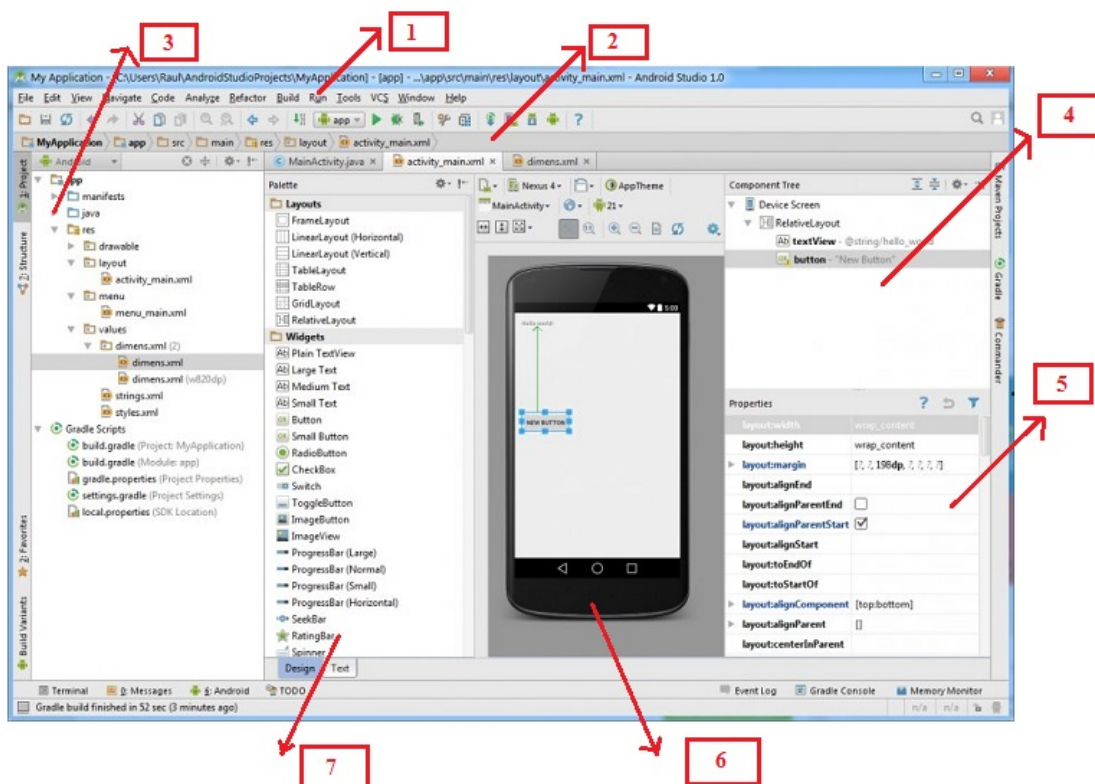
4. Set location of installation.



5. Hit **Next** button. It will start installation. Once it's done following window will appear.



6. Android Studio User Interface



## Appendix E - Major code fragments

Below are sample code fragments of the login page.

```
<?php
session_start();
include('includes/header.php');
?>

<div class="container">

  <!-- Outer Row -->
  <div class="row justify-content-center">

    <div class="col-xl-6 col-lg-6 col-md-6">

      <div class="card o-hidden border-0 shadow-lg my-5">
        <div class="card-body p-0">
          <!-- Nested Row within Card Body -->
          <div class="row">
            <!-- <div class="col-lg-6 d-none d-lg-block bg-login-image"></div> -->
            <div class="col-lg-12">
              <div class="p-5">
                <div class="text-center">
                  <h1 class="h4 text-gray-900 mb-4">Welcome Back!</h1>

                <?php

                  if(isset($_SESSION['status']) && $_SESSION['status'] !='')
                    {
```

```
        echo '<h2 class="bg-danger text-white">
'.$_SESSION['status'].' </h2>';
        unset($_SESSION['status']);
    }
    ?>
</div>
<form class="user" action="code.php" method="POST">
    <div class="form-group">
        <input type="email" name="email" class="form-control
form-control-user" placeholder="Enter Email Address...">
    </div>
    <div class="form-group">
        <input type="password" name="password"
class="form-control form-control-user" placeholder="Password">
    </div>
    <button type="submit" name="login_btn" class="btn
btn-primary btn-user btn-block"> Login </button>
    <hr>
</form>
</div>
</div>
</div>
</div>
</div>
</div>
</div>
```

```
<?php
include('includes/scripts.php');
?>
```

Below are sample code fragments of index.php

```
<?php
include('includes/header.php');
include('includes/navbar.php');
include('security.php');
include('database/dbconfig.php');
?>
```

```
<!-- Begin Page Content -->
```

```
<div class="container-fluid">
```

```
    <!-- Page Heading -->
```

```
    <div class="d-sm-flex align-items-center justify-content-between mb-4">
```

```
        <h1 class="h3 mb-0 text-gray-800">Dashboard</h1>
```

```
        <a href="#" class="d-none d-sm-inline-block btn btn-sm btn-primary
shadow-sm"><i
```

```
            class="fas fa-download fa-sm text-white-50"></i> Generate Report</a>
```

```
    </div>
```

```
<!-- Content Row -->
```

```
<div class="row">
```



```

<!-- Earnings (Monthly) Card Example -->
<div class="col-xl-3 col-md-6 mb-4">
  <div class="card border-left-primary shadow h-100 py-2">
    <div class="card-body">
      <div class="row no-gutters align-items-center">
        <div class="col mr-2">
          <div class="text-xs font-weight-bold text-primary text-uppercase
mb-1">Total Incident This Month</div>
          <div class="h5 mb-0 font-weight-bold text-gray-800">

            <?php
              $query = "SELECT id FROM incident ORDER BY id";
              $query_run = mysqli_query($connection, $query);
              $row = mysqli_num_rows($query_run);
              echo '<h4> Incidents : '.$row.'</h4>';
            ?>
          </div>
        </div>
        <div class="col-auto">
          <i class="fas fa-calendar fa-2x text-gray-300"></i>
        </div>
      </div>
    </div>
  </div>
</div>

```

```

<!-- Earnings (Monthly) Card Example -->
<div class="col-xl-3 col-md-6 mb-4">
  <div class="card border-left-success shadow h-100 py-2">

```

```

<div class="card-body">
  <div class="row no-gutters align-items-center">
    <div class="col mr-2">
      <div class="text-xs font-weight-bold text-success text-uppercase
mb-1">Total Incidents Today</div>
      <div class="h5 mb-0 font-weight-bold text-gray-800">

        <?php

          $query = "SELECT id FROM incident WHERE datetime >=
CURDATE() AND datetime < CURDATE() + INTERVAL 1 DAY";

          $query_run = mysqli_query($connection, $query);

          $row = mysqli_num_rows($query_run);

          echo '<h4> Incidents: '.$row.'</h4>';

        ?>

      </div>
    </div>
    <div class="col-auto">
      <i class="fas fa-dollar-sign fa-2x text-gray-300"></i>
    </div>
  </div>
</div>
</div>
</div>
</div>

```

```

<!-- Earnings (Monthly) Card Example -->

```

```

<div class="col-xl-3 col-md-6 mb-4">

```

```

<div class="card border-left-info shadow h-100 py-2">
  <div class="card-body">
    <div class="row no-gutters align-items-center">
      <div class="col mr-2">
        <div class="text-xs font-weight-bold text-info text-uppercase
mb-1">Highest Category</div>
        <div class="row no-gutters align-items-center">
          <div class="col-auto">
            <div class="h5 mb-0 mr-3 font-weight-bold
text-gray-800">50%</div>
            </div>
          <div class="col">
            <div class="progress progress-sm mr-2">
              <div class="progress-bar bg-info" role="progressbar"
style="width: 50%" aria-valuenow="50"
aria-valuemin="0" aria-valuemax="100"></div>
            </div>
          </div>
        </div>
      </div>
      <div class="col-auto">
        <i class="fas fa-clipboard-list fa-2x text-gray-300"></i>
      </div>
    </div>
  </div>
</div>

```

```

<!-- Pending Requests Card Example -->

```

```

<div class="col-xl-3 col-md-6 mb-4">

```

```
<div class="card border-left-warning shadow h-100 py-2">
  <div class="card-body">
    <div class="row no-gutters align-items-center">
      <div class="col mr-2">
        <div class="text-xs font-weight-bold text-warning text-uppercase
mb-1">Feedback Received</div>
        <div class="h5 mb-0 font-weight-bold text-gray-800">18</div>
      </div>
      <div class="col-auto">
        <i class="fas fa-comments fa-2x text-gray-300"></i>
      </div>
    </div>
  </div>
</div>
</div>
</div>
</div>
</div>
</div>
</div>
```

```
<!-- Content Row -->
```

```
<?php
include('includes/scripts.php');
include('includes/footer.php');
?>
```