

**NANYANG  
TECHNOLOGICAL  
UNIVERSITY**

**COLLEGE OF ENGINEERING  
SCHOOL OF COMPUTER SCIENCE & ENGINEERING**

**CZ3003: Software System Analysis & Design**

**Academic Year 2016/17**

# **Project Documentation**

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# **1. Introduction**

## **1.1. Product Description**

### **1.1.1. Purpose**

The purpose of this document is to describe the requirements specification for C.R.U.X, the Crisis Management System (CMS), a system where it allows collaboration between government agencies and notifying the public in time of emergency.

### **1.1.2. Scope of the System**

C.R.U.X serves as a platform to allow collaboration between government agencies in times of occurrence of crises (Fire/Flood). It not only allows crisis handling by providing immediate responses and assistance to resolve the crisis, it also shows the transition from an incident to a crisis when an incident had gone beyond the required safety measures (Refer to Policy Definition), and the transition when a crisis transiting to an incident whenever a crisis is no longer in the alert zone levels (Refer to Policy Definition). When an incident is being reported by a member of public, call center operators will lodge the incident's information into C.R.U.X and monitor if it goes beyond the safety alert level. Given the case when it had surpassed the alert level, assets will be dispatched from relevant agencies to deal with the crisis. In the midst of the resolving the crisis, key decision makers will be able to observe the status changes, and notify the PMO via email as well as the public via social media channels (Twitter, Facebook, or SMS).

### **1.1.3. Users and Stakeholders**

Users of C.R.U.X includes the government agencies, call center operators, key decision makers and ministers. Government agencies include the Singapore Police Force (SPF) and Singapore Civil Defence Force (SCDF). Key decision makers include Prime Minister's Office. As for the members of public, they will be indirectly using the system as they will receive notifications as a form of safety awareness whenever there is occurrence of crises, to aid them in making better decision with the situations they are facing.

#### **1.1.4. Assumptions**

- Assumptions are made such that relevant assets must be dispatched whenever incidents had surpassed the safety alert levels, becoming a crisis.
- The Prime Minister's office shall receive a status report summarizing key indicators and trends every 30 minutes.
- C.R.U.X is always available 24/7 in times of crisis, meaning to say appropriate actions will also be executed even in the non-office hours.
- Users of C.R.U.X should be well-trained in using the system.

### **1.2. Product Features**

The product features describe the interactions between the users and the system that performs the necessary activities to map the user inputs to the desired outputs. It documents what the system must be able to perform.

#### **1.3.1. Incident Management**

C.R.U.X allows call operators to log an incident when a crisis happens and subsequently monitor the situation. Call operators are allowed to create an incident using the system and the system will send a notification to commanders of related government agencies informing them of the current situation. If the crisis is determined to be over, call operators can choose to delete incident and at the same time archive the case for future reference.

#### **1.3.2. Display Incident Status**

Once an incident has been created, users are able to view the situation of the crisis. These included the number of casualties, area and infrastructure affected. It must be updated in real time.

#### **1.3.3. Communications**

C.R.U.X has an in-built communication platform that comes in the form of a chat room to further facilitate different government agency in sharing their resource and plans to tackle the crisis.

#### **1.3.4. Assets Tracking**

C.R.U.X will also provide the numbers and location of the manpower and personnel deployed to handle the crisis from different government agencies. This would allow commanders to make more informed decisions on their next move on deploying their units.

#### **1.3.5. Update Live Information**

C.R.U.X allows different government bodies to share their information and then post notification to the public through social media update such as Twitter and Facebook as a single entity. Also, SMS will be sent out to the members of public. This allows information feeds to be publish frequently so that public will be better notified on the current situation crisis.

### **1.3. User Classes and Characteristics**

C.R.U.X is meant to offer a platform for collaboration between various government agencies. The system has to be time-critical and its user must be well equipped with knowledge and technical skills on how to handle the system. The users are divided into three categories, mainly the staffs, key appointment holders of Prime Minister Office (PMOs) and lastly the call center operators.

#### **1.3.1. Staffs**

Staffs are mainly classified into three group, normal staff, head of staff and public relations (PR) manager. All staffs are able to view and monitor incidents using the system. Only head of staff is able to delete incident. Only PR managers are able to update social media such as Facebook page. Staff are required to handle the troubleshooting and management of the system.

#### **1.3.2. Appointment holder of Prime Minister Office (PMO)**

Appointment holders of PMO are basically cabinet ministers and key decision makers. These users do not have to know how the technical aspect of the system. They mainly monitor the situation of the crisis using the real-time map and also make decisions based on the current crisis level.

#### **1.3.3. Call Centre Operators**

Call Centre operators are users who create incident using the system. They must be trained to use the system in an efficient manner.

#### **1.3.4. Government Agencies**

Government Agencies include National Environment Agencies (NEA), Singapore Police Force (SPF), Singapore Armed forces (SAF) and also Singapore Civil Defense Force (SCDF).

Each agency is required to update their assets in the event they are sent to handle an incident or a crisis.

#### **1.3.5. Public**

Public are considered passive users as they do not directly interact with C.R.U.X. They will just receive updates through social media platform such as Facebook, Twitter or through SMS.

### **1.3. Design and Implementation Constraints**

During a crisis, every second counts. C.R.U.X is a time critical system that must be available 100% of the time. It is a necessity to ensure constant reliability hence there must be not be any failure or downtime. As such we must take redundancy into account to improve reliability and quality assurance of the system. We must also take into account the interface implementation such that users are able to take the minimal steps to achieve their objectives. This in terms speed up the efficient of countermeasures to handle the crisis.

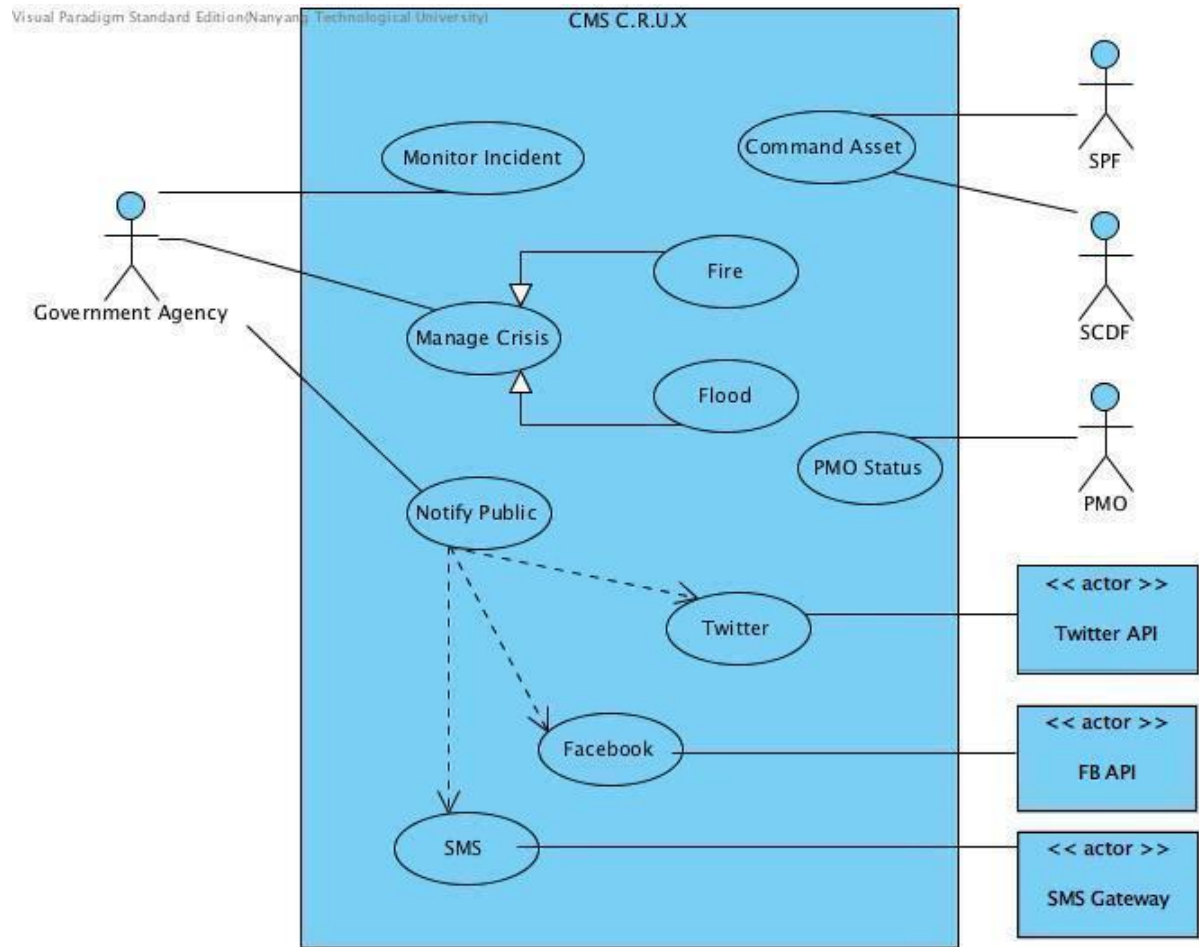
As is it hosted on a web server, security is also one our major concern. We must ensure that our website is not prone to malicious cyber-attacks.

C.R.U.X is developed on a Laravel framework, hence developers will have to be familiar with PHP and html programming language and familiar with their syntax.

Furthermore, as Facebook and Twitter are external components, C.R.U.X does not have control over it.



## 2. Use Case Diagram



### 3. Use Case Description

#### 3.1 Monitor Incident

|                       |  |                    |             |
|-----------------------|--|--------------------|-------------|
| Use Case ID:          | C.R.U.X Crisis Management System   |                    |             |
| Use Case Name:        | Monitor Incident   |                    |             |
| Created By:           | Guo Jun  | Last Updated By:   | Guo Jun     |
| Date Created:         | 02 Sep 2016  | Date Last Updated: | 14 Sep 2016 |
| Actor:                | Government Agency (GA)   |                    |             |
| Description:          | The user will monitor all incidents regardless of the severity so long the incidents have not become crises.   |                    |             |
| Preconditions:        | The user must have accessed the CMS.   |                    |             |
| Postconditions:       | The user will be able to perform appropriate actions when an incident became a crisis.<br>The user will also make sure incidents that are transited from crises previously, are monitored.   |                    |             |
| Priority:             | High   |                    |             |
| Frequency of Use:     | Frequent   |                    |             |
| Flow of Events:       | <ol style="list-style-type: none"> <li>1. The system displays the entire list of all incidents and its respective details.</li> <li>2. The user decides if he/she wishes to view the incidents in categorization of flood and fire.</li> <li>3. The user views the list of all incidents via its own categorization.</li> <li>4. The user makes sure the flood incident has not go beyond water level of 1.25m tall.</li> <li>5. The user makes sure the water current speed of the flood incident has not surpassed 25m/s.</li> <li>6. The user makes sure the fire incident has not spread beyond 1 hectare wide of area.</li> <li>7. The user makes sure the fire incident smog level has not surpassed 150 pm2.5.</li> <li>8. The use case ends.</li> </ol>  |                    |             |
| Alternative Flows:    | <ol style="list-style-type: none"> <li>1. In the event if the flood incident has either "Flow of Events (4) or (5) violated".               <ol style="list-style-type: none"> <li>a. The incident remains as an incident.</li> </ol> </li> <li>2. In the event if the fire incident has either "Flow of Events (6) or (7) violated".               <ol style="list-style-type: none"> <li>a. The incident remains as an incident.</li> </ol> </li> <li>2. In the event if the flood incident has both "Flow of Events (4) and (5) violated".               <ol style="list-style-type: none"> <li>a. The incident transits to a crisis.</li> </ol> </li> <li>2. In the event if the fire incident has both "Flow of Events (6) and (7) violated".               <ol style="list-style-type: none"> <li>a. The incident transits to a crisis.</li> </ol> </li> </ol> |                    |             |
| Exceptions:           | -  |                    |             |
| Includes:             | -  |                    |             |
| Special Requirements: | -  |                    |             |
| Assumptions:          | -  |                    |             |
| Notes and Issues:     | -  |                    |             |

### 3.2 Command Asset

|                       |   |                    |             |
|-----------------------|---|--------------------|-------------|
| Use Case ID:          | C.R.U.X Crisis Management System  |                    |             |
| Use Case Name:        | Command Asset   |                    |             |
| Created By:           | Guo Jun   | Last Updated By:   | Guo Jun     |
| Date Created:         | 02 Sep 2016   | Date Last Updated: | 14 Sep 2016 |
| Actor:                | Singapore Police Forces (SPF)<br>Singapore Civil Defence Forces (SCDF)  |                    |             |
| Description:          | The user will dispatch relevant asset for different crisis.   |                    |             |
| Preconditions:        | The user must have accessed the CMS.  |                    |             |
| Postconditions:       | The user will be able to resolve the crisis fully or attempt to mitigate the seriousness of the crisis (transiting to incident).  |                    |             |
| Priority:             | High  |                    |             |
| Frequency of Use:     | Frequent  |                    |             |
| Flow of Events:       | <ol style="list-style-type: none"> <li>1. The system shows information of the crisis.</li> <li>2. The user determines what asset to be mobilized.</li> <li>3. The user will dispatch 10 lifesaver boat with capacity of 5 pax per boat for flood crisis.</li> <li>4. The user will dispatch 5 red rhinos and Station with Immediate First-aid Treatment (SWIFT) for fire crisis to mitigate the fire.</li> <li>5. The user will retreat the asset after resolving the crisis or successfully transiting the crisis to an incident (mitigating the seriousness of the crisis).</li> <li>6. The use case ends.</li> </ol> |                    |             |
| Alternative Flows:    | <ol style="list-style-type: none"> <li>1. In the event if it is a flood crisis. <ol style="list-style-type: none"> <li>a. "Flow of Events (3)" will be carried out.</li> </ol> </li> <li>2. In the event if it is a fire crisis. <ol style="list-style-type: none"> <li>a. "Flow of Events (4)" will be carried out.</li> </ol> </li> <li>2. In the event if it is no longer a crisis but an incident. <ol style="list-style-type: none"> <li>a. "Flow of Events (5)" will be carried out.</li> </ol> </li> <li>2. Use case resumes at "Flow of Events (1)".</li> </ol>   |                    |             |
| Exceptions:           | -   |                    |             |
| Includes:             | -   |                    |             |
| Special Requirements: | -   |                    |             |
| Assumptions:          | -   |                    |             |
| Notes and Issues:     | -   |                    |             |

### 3.3 PMO Status

|                       |  |                    |             |
|-----------------------|--|--------------------|-------------|
| Use Case ID:          | C.R.U.X Crisis Management System   |                    |             |
| Use Case Name:        | PMO Status   |                    |             |
| Created By:           | Guo Jun  | Last Updated By:   | Guo Jun     |
| Date Created:         | 02 Sep 2016  | Date Last Updated: | 14 Sep 2016 |
| Actor:                | Prime Minister's Office (PMO)  |                    |             |
| Description:          | The user will receive a status report of the crisis that is happening ongoing.   |                    |             |
| Preconditions:        | The user must have accessed the CMS.   |                    |             |
| Postconditions:       | The user will be able to make informed decisions upon situational crisis.  |                    |             |
| Priority:             | High   |                    |             |
| Frequency of Use:     | Frequent   |                    |             |
| Flow of Events:       | <ol style="list-style-type: none"> <li>1. The system shows notification of email received.</li> <li>2. The user receives a status report summarizing key indicators and trends over email every 30 minutes.</li> <li>3. The user visualizes the situational crisis through real-time status updates on a map of Singapore.</li> <li>4. The user proceeds with next action (e.g. requests for immediate assistance) to better resolve the crisis.</li> <li>5. The use case repeats from (1) until crisis is resolved or transited to an incident.</li> <li>6. The use case ends.</li> </ol> |                    |             |
| Alternative Flows:    | -  |                    |             |
| Exceptions:           | -  |                    |             |
| Includes:             | -  |                    |             |
| Special Requirements: | -  |                    |             |
| Assumptions:          | -  |                    |             |
| Notes and Issues:     | -  |                    |             |

### 3.4 Manage Crisis

|                    |  |                    |             |
|--------------------|--|--------------------|-------------|
| Use Case ID:       | C.R.U.X Crisis Management System   |                    |             |
| Use Case Name:     | Manage Crisis  |                    |             |
| Created By:        | Ka Hian  | Last Updated By:   | Ka Hian     |
| Date Created:      | 02 Sep 2016  | Date Last Updated: | 18 Sep 2016 |
| Actor:             | Government Agency  |                    |             |
| Description:       | Allows actor to manage “Incident” and “Crisis”.  |                    |             |
| Preconditions:     | <ul style="list-style-type: none"> <li>• The actor clicks on “View Incident”.</li> <li>• The account logged in belongs to “Government Agency”.</li> </ul>  |                    |             |
| Postconditions:    | <ul style="list-style-type: none"> <li>• The actor updated an “Incident”.</li> <li>• The actor deleted an “Incident”.</li> </ul>   |                    |             |
| Priority:          | High   |                    |             |
| Frequency of Use:  | Frequent   |                    |             |
| Flow of Events:    | <ol style="list-style-type: none"> <li>1. Actor click on “View Incident” on the “Main Page”.</li> <li>2. The web application display “View Incident” page. <ol style="list-style-type: none"> <li>a. The “View Incident” page consist of a list of “Incident” and “Crisis” with their date and summary information.</li> <li>b. A drop down list to filter the list between “Expired”, “Crisis”, “Incident”. (Default: “Incident”)</li> <li>c. A drop down list to filter the list between type of incident. (e.g Fire or Flood, Default: Both)</li> </ol> </li> <li>2. The actor clicks on one of the Incident. (eg. Incident #123)</li> <li>3. The web application displays the “Incident Details” page. <ol style="list-style-type: none"> <li>a. The “Incident Details” page consist of a “Update” button, a “Delete” button, a ”Make Announcement” button.</li> <li>b. The “Incident Details” page consist of details on incident. <ul style="list-style-type: none"> <li>Details Include: <ol style="list-style-type: none"> <li>i. Time and date of case and when it was last updated.</li> <li>i. Summary information of incident.</li> <li>i. Type of Incident (Fire or Flood)</li> <li>i. “Crisis” (Yes/No)</li> <li>i. Location of “Incident”</li> <li>i. History of “Incident” (e.g Team Dispatched records)</li> </ol> </li> </ul> </li> </ol> </li> <li>2. The actor clicks on “Update” button.</li> <li>3. The web application displays the “Update Incident” page.</li> <li>4. The actor input/edit “Incident” details on “Update Incident” page and click “Confirm” button. (e.g actor change an “Incident” to a “Crisis”)</li> <li>5. The web application verify information entered is valid.</li> <li>6. The web application display the updated “Incident Details” page.</li> </ol> |                    |             |
| Alternative Flows: | <p>AF-1) The actor select “Crisis” from drop down list on “View Incident” page.</p> <ol style="list-style-type: none"> <li>1. The web application will only show “Crisis” type incident in the list on “View Incident” page.</li> </ol> <p>AF-2) The actor select “Fire” from drop down list on “View Incident” page.</p> <ol style="list-style-type: none"> <li>1. The web application will only display “Fire” type incident on the list.</li> </ol>   |                    |             |

|                       |   |
|-----------------------|---|
|                       | <p>AF-3) The actor select “Delete” button on “Incident Details” page.</p> <ol style="list-style-type: none"> <li>1. The web application will prompt user for confirmation of incident deletion, “Do you wish to delete this Incident?”</li> <li>2. The actor clicks on “Yes”.</li> <li>3. The web application deletes the incident and display the updated “View Incident” page.</li> </ol> |
| Exceptions:           | <p>EX-1) Information entered in “Update Incident” page is invalid.</p> <ol style="list-style-type: none"> <li>1. The web application shows an error message stating that the information entered is invalid.</li> <li>2. The web application prompts the actor to re-enter the required field(s).</li> </ol>  |
| Includes:             | -   |
| Special Requirements: | -   |
| Assumptions:          | -   |
| Notes and Issues:     | -   |

### 3.5 Notify Public

|                       |  |                    |             |
|-----------------------|--|--------------------|-------------|
| Use Case ID:          | C.R.U.X Crisis Management System   |                    |             |
| Use Case Name:        | Notify Public  |                    |             |
| Created By:           | Ka Hian  | Last Updated By:   | Ka Hian     |
| Date Created:         | 02 Sep 2016  | Date Last Updated: | 18 Sep 2016 |
| Actor:                | Government Agency  |                    |             |
| Description:          | Allows actor to notify the public via the web application.   |                    |             |
| Preconditions:        | <ul style="list-style-type: none"> <li>• The actor clicks on “View Incident”.</li> <li>• The account logged in belongs to “Government Agency”.</li> </ul>  |                    |             |
| Postconditions:       | <ul style="list-style-type: none"> <li>• The actor made an announcement to the public.</li> </ul>  |                    |             |
| Priority:             | Normal   |                    |             |
| Frequency of Use:     | Frequent   |                    |             |
| Flow of Events:       | <ol style="list-style-type: none"> <li>1. The actor clicks on “Make Announcement” on the “Incident Detail” page.</li> <li>2. The web application displays the “Make Announcement” page. <ol style="list-style-type: none"> <li>a. The “Make Announcement” page consists of a “Announcement” textbox, a “send” button.</li> <li>b. The “Make Announcement” page consists of checkboxes: <ol style="list-style-type: none"> <li>i. Twitter</li> <li>i. Facebook</li> <li>i. SMS</li> </ol> </li> </ol> </li> <li>2. The actor enters the announcement to be made in the textbox.</li> <li>3. The actor will select where to make announcement by checking the checkboxes. (e.g Actor select Twitter checkbox)</li> <li>4. The actor selects the send button.</li> <li>5. The web application send the announcement based on the selected checkboxes.</li> <li>6. The web application displays the “Incident Detail” page.</li> </ol> |                    |             |
| Alternative Flows:    | -  |                    |             |
| Exceptions:           | -  |                    |             |
| Includes:             | -  |                    |             |
| Special Requirements: | S-1: For the SMS notification, only users subscribed to the system will receive the announcement   |                    |             |
| Assumptions:          | -  |                    |             |
| Notes and Issues:     | -  |                    |             |

## **4. User Documentation**

### **4.1 Assumptions and Dependencies**

- Assumptions are made such that relevant assets must be dispatched whenever incidents had surpassed the safety alert levels, becoming a crisis.
- The Prime Minister's office shall receive a status report summarizing key indicators and trends every 30 minutes.
- C.R.U.X is always available 24/7 in times of crisis, meaning to say appropriate actions will also be executed even in the non-office hours.
- Users of C.R.U.X should be well-trained in using the system.
- Twitter and Facebook API must be online to post incident and crisis information.
- SMS API gateway must be available to send to the members of public.
- Crisis may or may not be caused by an incident. Given the fact that if an incident is transiting to a crisis, it surpassed a safety alert level. Otherwise, it occurs as a crisis right from the start.

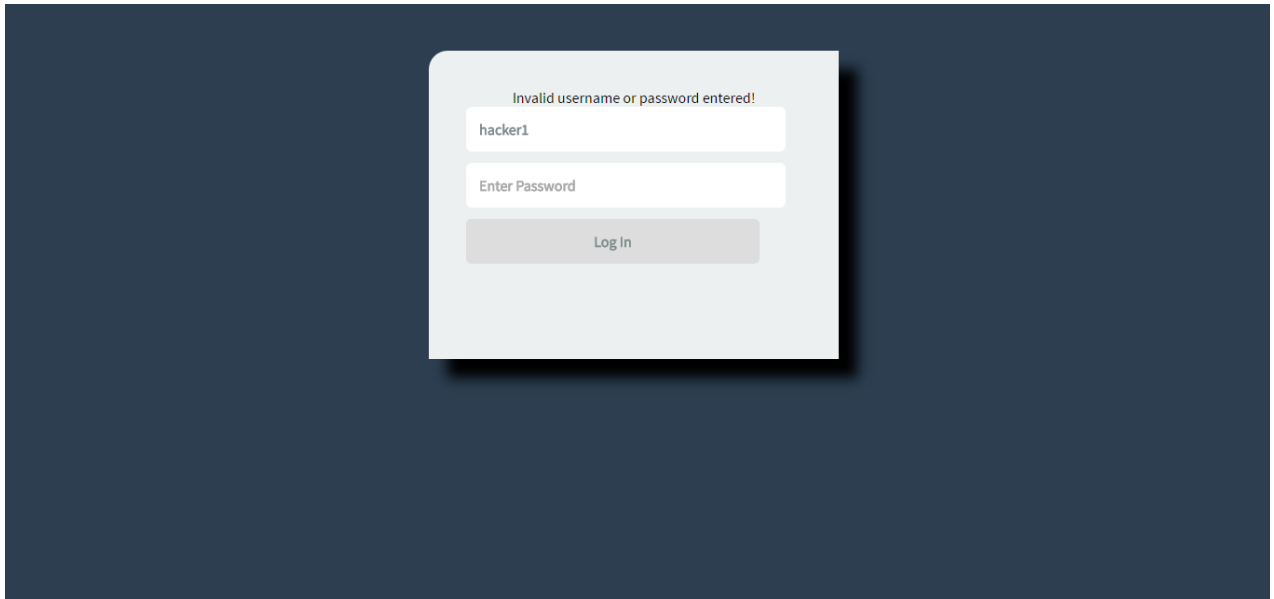
### **4.2 External Interface Requirements**

#### **4.2.1 User Interfaces**

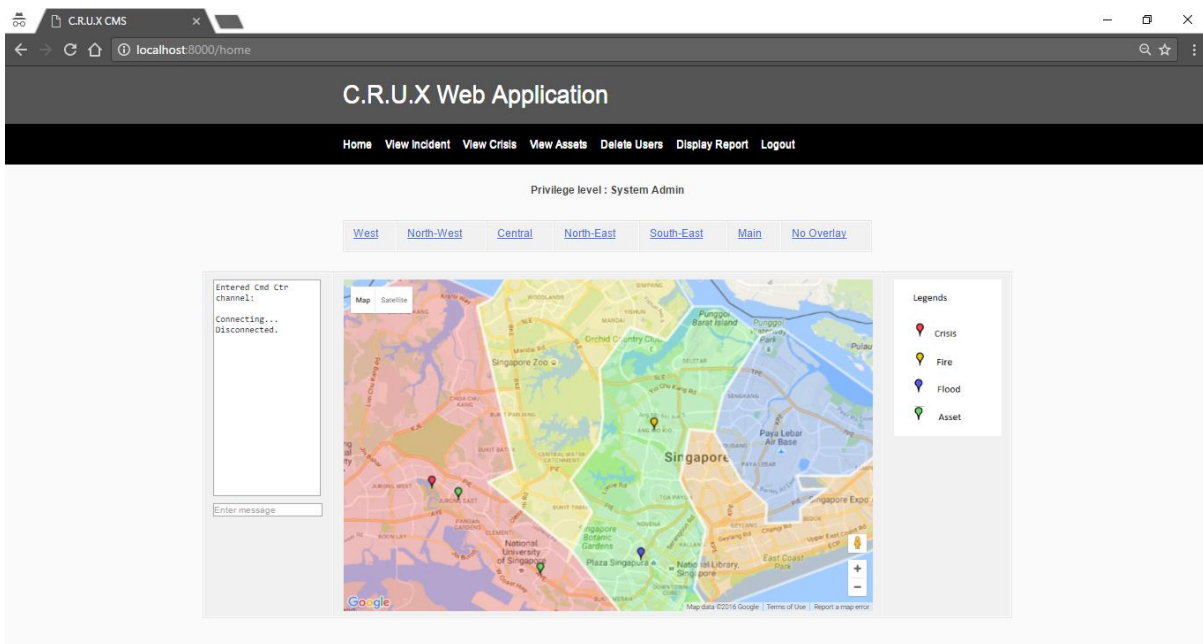
C.R.U.X is a web application that conform to W3C standards. As C.R.U.X is an application for private use, all users will be trained for day-to-day usage of their respective scope. C.R.U.X is also a time-critical application; hence user interface must be as concise as possible.



#### 4.2.1.1 Login Page (Invalid request)



#### 4.2.1.2 Home page (Dashboard for different users may vary)



In the home page, user is able to view the Singapore map with markers that indicate incidents, crisis and assets deployed around Singapore. Commanders are also able to chat among each other using the chat provided at the left side of the page.

### 4.2.1.3 Log Incident

Create new incident

Privilege level : Operator

New Incident

Case ID :

Incident Name :

Operator Name :

Incident Location :

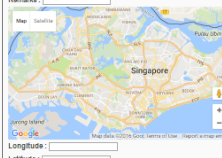
Incident Timing :

Incident Description :

Alert Level :

Choose category for the incident:

Remarks :

Map : 

Longtitude :

Latitude :

Call operator is able to log incident into the system when he receive a call or informed by the public.

### 4.1.1.4 Edit Incident

C.R.U.X Web Application

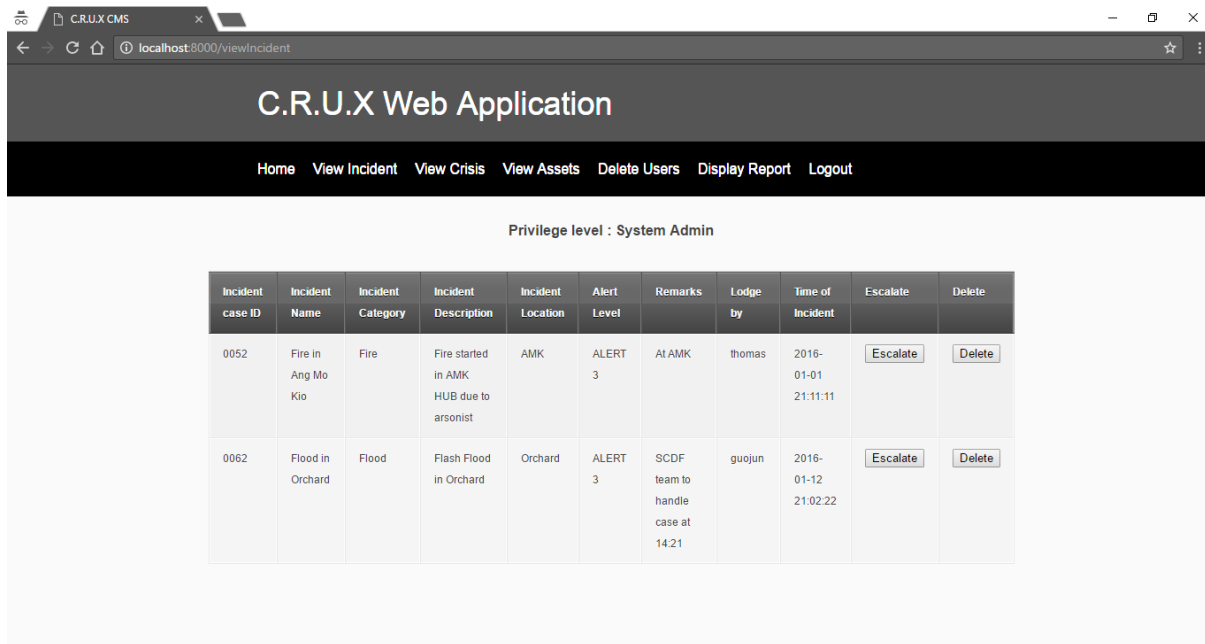
Home Log Incident Edit Incident Display Report View Map Logout

Privilege level : Operator

| Incident case ID | Incident Name      | Time of Incident    | Edit                                  |
|------------------|--------------------|---------------------|---------------------------------------|
| 0052             | Fire in Ang Mo Kio | 2016-01-01 21:11:11 | <input type="button" value="Update"/> |
| 0062             | Flood in Orchard   | 2016-01-12 21:02:22 | <input type="button" value="Update"/> |

At any point of time where an incident needs to be updated, operator is able to update inside through this page.

### 4.2.1.5 View Incident



C.R.U.X Web Application

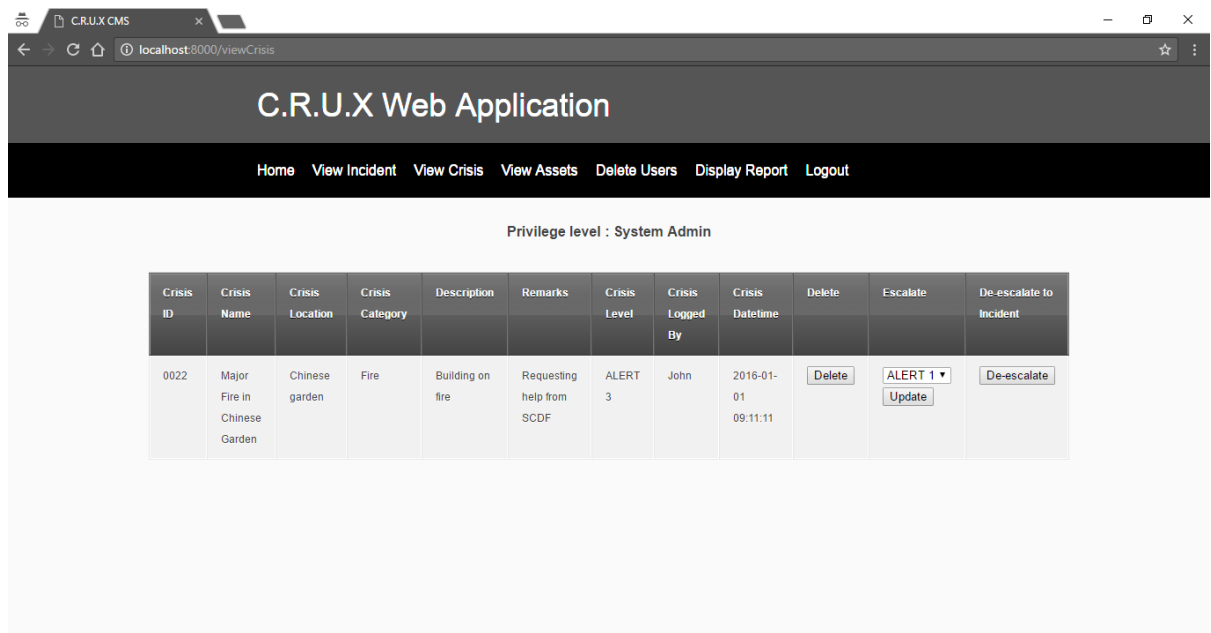
Home View Incident View Crisis View Assets Delete Users Display Report Logout

Privilege level : System Admin

| Incident case ID | Incident Name      | Incident Category | Incident Description                    | Incident Location | Alert Level | Remarks                           | Lodge by | Time of Incident    | Escalate                  | Delete                  |
|------------------|--------------------|-------------------|---|-------------------|-------------|-----------------------------------|----------|---------------------|---------------------------|-------------------------|
| 0052             | Fire in Ang Mo Kio | Fire              | Fire started in AMK HUB due to arsonist | AMK               | ALERT 3     | At AMK                            | thomas   | 2016-01-01 21:11:11 | <button>Escalate</button> | <button>Delete</button> |
| 0062             | Flood in Orchard   | Flood             | Flash Flood in Orchard                  | Orchard           | ALERT 3     | SCDF team to handle case at 14:21 | guojun   | 2016-01-12 21:02:22 | <button>Escalate</button> | <button>Delete</button> |

System admin is able to escalate incident to crisis at the view incident page if an incident becomes too serious. He can also remove the incident from the system if he deem it is too minor according to the policy.

### 4.2.1.6 View Crisis



C.R.U.X Web Application

Home View Incident View Crisis View Assets Delete Users Display Report Logout

Privilege level : System Admin

| Crisis ID | Crisis Name                  | Crisis Location | Crisis Category | Description      | Remarks                   | Crisis Level | Crisis Logged By | Crisis Datetime     | Delete                  | Escalate  | De-escalate to Incident      |
|-----------|------------------------------|-----------------|-----------------|------------------|---------------------------|--------------|------------------|---------------------|-------------------------|---|------------------------------|
| 0022      | Major Fire in Chinese Garden | Chinese garden  | Fire            | Building on fire | Requesting help from SCDF | ALERT 3      | John             | 2016-01-01 09:11:11 | <button>Delete</button> | <button>ALERT 1 ▼</button><br><button>Update</button> | <button>De-escalate</button> |

If the System admin choose to escalate an incident to a crisis, it will be shown on the crisis page. System admin is able to de-escalate the crisis to an incident anytime depending on what is stated in the policy.

### 4.2.1.7 View Assets

C.R.U.X Web Application

Home View Incident View Crisis View Assets Delete Users Display Report Logout

Privilege level : System Admin

| Assets ID | Assets Name    | Assets Description                           | Assets Type | Assets Deployment Location | Assets Status          | Assets Department | Remarks |
|-----------|----------------|--|-------------|----------------------------|------------------------|-------------------|---------|
| 004999    | Water Pump Veh | Water pump vechicle to drain water in drains | Vehicle     | Jurong                     | On the move to Orchard | NEA               | None    |

Assets will also be displayed in a page as shown above. This will allow commanders to easily keep track of assets deployed in the field for different incidents or crisis.

### 4.2.1.8 Add Assets (SCDF/NEA/SPF/SAF)

C.R.U.X Web Application

Home View Incident View Crisis View Assets Add Assets Logout

Privilege level : NEA Liaison

Add Asset

New Asset

Asset ID :

Asset Name :

Asset Type :

Asset Location :

Asset Description :

Asset Status :

Asset Department : SCDF

Asset metadata

Asset Remarks :

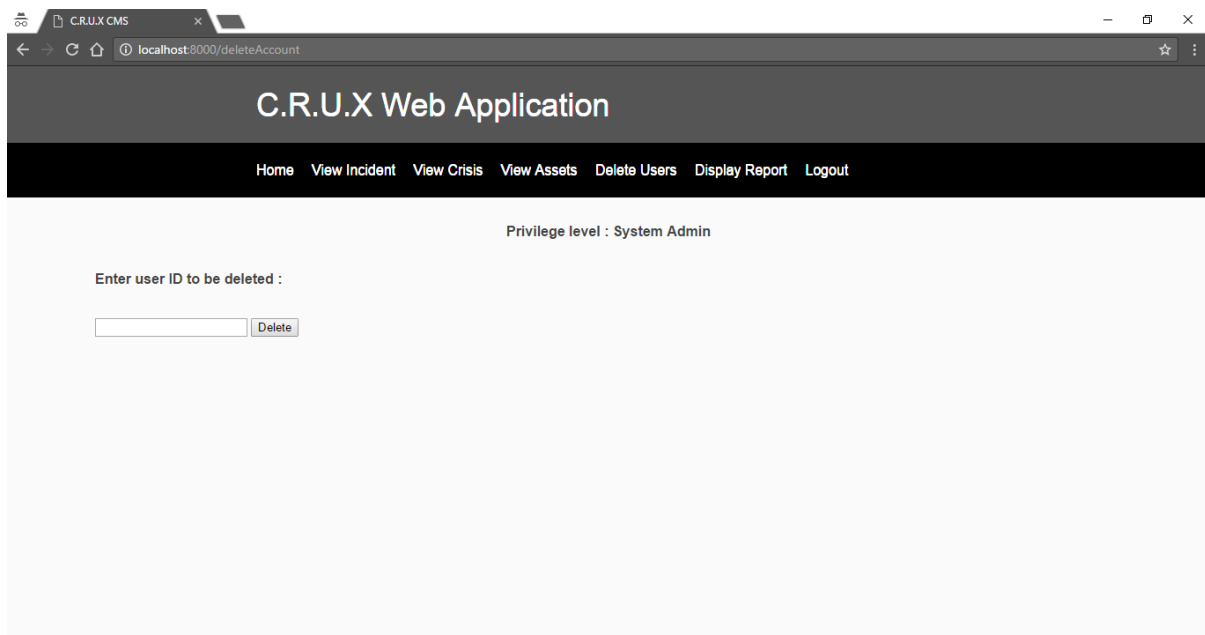
Map

Longitude :

Latitude :

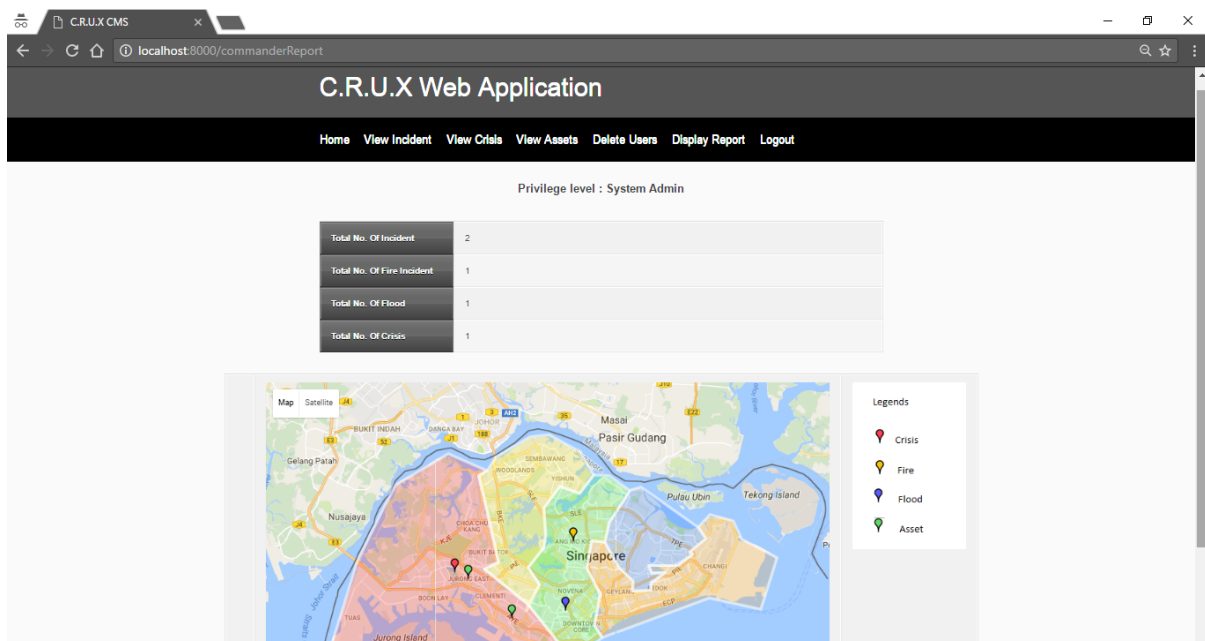
Create

#### 4.2.1.9 Delete Users



System Admin is also able to remove users from the system if the account is not in use anymore.

#### 4.2.1.10 Display Report



There will also be a report page where user is able to view the total number of incident/crisis happening currently.

#### 4.2.1.11 Notify Public

C.R.U.X Web Application

Home Notify Public Logout

Privilege level : Commander

Enter facebook post :

Enter Twitter post :

Enter SMS notification :

Public Liaison is able to notify public through twitter, Facebook or SMS through this page.

#### 4.2.1.12 Email PMO

C.R.U.X CMS

localhost:8000/viewEmail

C.R.U.X Web Application

Home Logout

Privilege level : Email Manager

Create Email

New Email

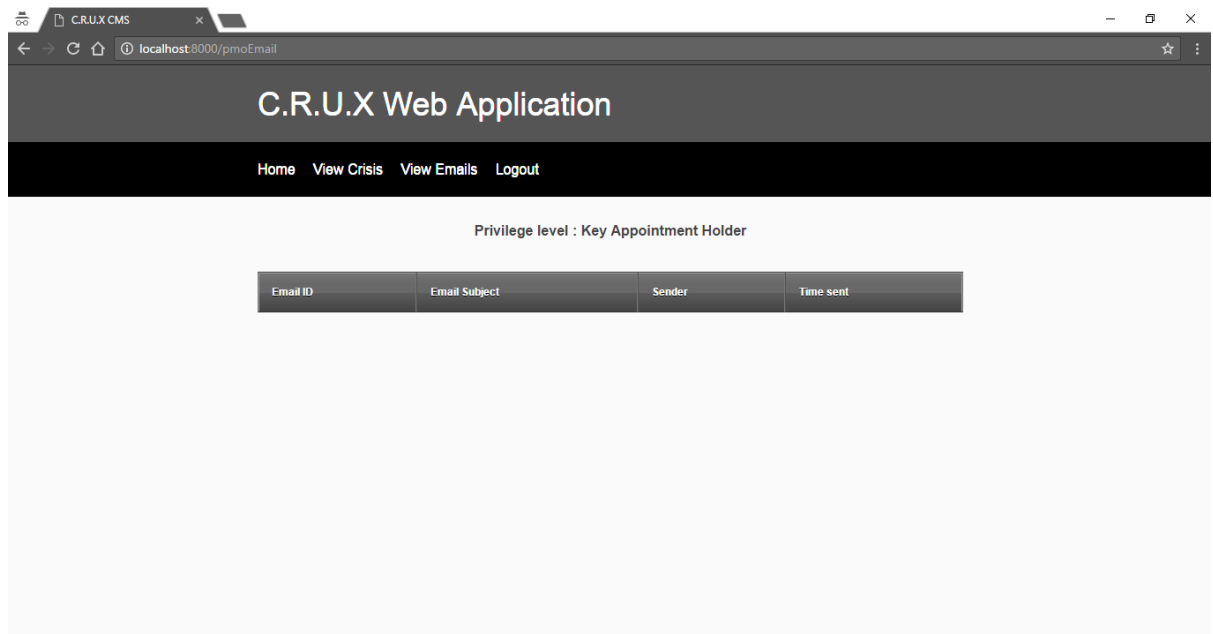
Subject :

Operator Name :

Message :

As PMO will need to review on incident and crisis periodically, an email will be crafted by the email manager and send to the key appointment holders to facilitate their decision making.

#### 4.1.1.13 View Email



In this page, Key appointment holders will be able to view email reports sent giving them additional information about the incident and crisis.

#### 4.2.1.18 Users Scope

| Role           | View Home | Lodge Incident | View Incident | Delete Incident | Update Incident | Escalate Incident | View Crisis | Delete Crisis | View Map | Send Email | View Email | Add Assets | Delete Assets |
|----------------|-----------|----------------|---------------|-----------------|-----------------|-------------------|-------------|---------------|----------|------------|------------|------------|---------------|
| Scope          |           |                |               |                 |                 |                   |             |               |          |            |            |            |               |
| System Admin   | ✓         |                | ✓             | ✓               |                 | ✓                 | ✓           | ✓             | ✓        |            |            |            |               |
| Call Operator  | ✓         | ✓              | ✓             |                 | ✓               |                   |             |               |          |            |            |            |               |
| PMO            | ✓         |                |               |                 |                 |                   | ✓           |               | ✓        |            | ✓          |            |               |
| SAF Commander  | ✓         |                | ✓             |                 |                 |                   | ✓           |               | ✓        |            |            | ✓          | ✓             |
| NEA Liaison    | ✓         |                | ✓             |                 |                 |                   | ✓           |               | ✓        |            |            | ✓          | ✓             |
| SCDF Commander | ✓         |                | ✓             |                 |                 |                   | ✓           |               | ✓        |            |            | ✓          | ✓             |
| SPF Commander  | ✓         |                | ✓             |                 |                 |                   | ✓           |               | ✓        |            |            | ✓          | ✓             |
| Email Liaison  | ✓         |                | ✓             |                 |                 |                   |             |               |          | ✓          |            |            |               |
| Public Liaison | ✓         |                | ✓             |                 |                 |                   |             |               |          |            |            |            |               |

**Figure 4.** Please note that figure does not show every possible operations or functions, but just the major ones.



#### **4.2.2 Hardware Interfaces**

Users are highly recommended to have:

- Keyboard
- Mouse
- Monitor
- Desktop Computer
- At least a 56k modem for stable internet access

#### **4.3.1. Software Interfaces**

##### Operating System

A functional operating system that has internet connection is required for C.R.U.X. However, a Window or Linux system is preferred.

##### Database

The system will be using **MySQL 5.7**, an open-source relational database management system mainly for managing incidents, crisis, assets information, as well as user accounts.

##### Web browser

The system will be able to run on any web browser such as Firefox, Google Chrome and Internet Explorer.

#### **4.3.2. Communication Interfaces**

The CMS shall use the HTTP protocol for communication over the internet and for the intranet communication will be through TCP/IP protocol suite.

The system will communicate with other APIs:

- Google Map API
- Weather API
- Twitter API
- Email API
- SMS API

## **5. System Features**

### **5.1 Functional Requirements**

#### ***5.1.1 Creating new Incident***

- 5.1.1.1 The user must input the Category of Incident.
- 5.1.1.2 The user must input the Description of Incident.
- 5.1.1.3 The user must input the Causes and Effects by the incident.
- 5.1.1.4 The user must input whom the incident is Lodged by.
- 5.1.1.5 The System must verify that all the input is between 1 to 500 characters.
- 5.1.1.6 The System shall create a new incident in the database when the user has submitted the input.

#### ***5.1.2 Uploading of Social Media Update***

- 5.1.2.1 The public relation team must be able to input information to upload.
- 5.1.2.2 The information field must be between 1 to 1000 characters.
- 5.1.2.3 The public relation team must be able select 1 picture to upload.
- 5.1.2.4 The public relation team must be able select which social media associated with the CMS to publish the information to.
- 5.1.2.5 The system must verify that 1 or more social media has been selected for publishing.
- 5.1.2.6 The system must publish the information inputted to the selected social media.
- 5.1.2.7 If the SMS social media is selected, the system must send a SMS to all the public members that had subscribed via SMS.

#### ***5.1.3 Login***

- 5.1.3.1 The system shall prompt the user to key in his/her username and password.
- 5.1.3.2 The user must enter the username and password.
- 5.1.3.3 The user must select on the “Login” button.
- 5.1.3.4 In the event if the user has key in an empty field for username and/or password:
- 5.1.3.5 The system shall display error message: “Invalid username/password entered! Please try again.”
- 5.1.3.6 The system must validate the username and password entered.

#### **5.1.4 *Deleting Incident***

- 5.1.4.1 The user must select on the “Incident” tab.
- 5.1.4.2 The system must be list the option for the user to delete incident.
- 5.1.4.3 The user shall select on “Delete Incident” button he/she wish to delete.
- 5.1.4.3 The system must prompt the user for re-confirmation
- 5.1.4.4 The user shall select either “Yes”/” No/Archive” to confirm his/her decision.
- 5.1.4.5 System must validate the decision and act according to it.

#### **5.1.5. *Archive Incident***

- 5.1.5.1 The user must select on the “Incident” tab.
- 5.1.5.2 The system must list the option for the user to delete incident.
- 5.1.5.3 The user shall select on “Delete Incident” button on the incident that he/she wish to delete.
- 5.1.5.4 The system must prompt the user for re-confirmation
- 5.1.5.5 The user shall select either “Yes”/” No/Archive” to confirm his/her decision.
- 5.1.5.6 System must validate the decision to archive and store incident into database.

#### **5.1.6 *Dispatch Information via Email***

- 5.1.6.1 The system must have the email address of the Prime Minister’s Office, Cabinet Ministers and Government agency key decision makers.
- 5.1.6.2 The system must automatically create a latest status report summarizing key indicators and trend after creation of an incident.
- 5.1.6.3 The system must be able to send out email automatically after the status report is created.

#### **5.1.7. *View Weather***

- 5.1.7.1 The system must display the weather forecast.
- 5.1.7.2 The system must display the temperature in degree Celsius (°C) in the range of 10°C to 50°C up to one decimal place of accuracy.
- 5.1.7.3 The system must display 3 days’ weather forecast outlook.

#### **5.1.8 *Track Asset***

5.1.8.1 The system must display assets using marker on the map.

5.1.8.2 The system must provide real time updates on the assets.

5.1.8.3 The government agency must be able to select which asset to display on the map.

### **5.2 Software Requirements**

The system will be hosted as a web application and it will be a private application only catered for selected users. The system must be

- Compatible with chrome v48 and above
- Internet explorer v11 and above
- Firefox v44 and above

### **5.3 User Interface Requirements**

- User interface must be consistent throughout different pages and browsers.
- Logout button must always be available in the sidebar
- Color Theme and layout of user interface must not use more than 4 colors.
- User must be able to navigate to different pages according to his scope using the sidebar
- Error message must be displayed
- Confirmation message must be displayed

## **6. Other Non-Functional Requirements**

### **6.1 Performance Requirements**

6.1.1 SMS notification sent must reach receiver within 5seconds.

6.1.2 Map update must not take more than 5seconds.

6.1.3 Users must be able to log in at all time.

- 6.1.4 Create, update, delete and read operation must not exceed 3seconds.
- 6.1.5 Assets must be displayed on the map less than 3second once it has updated its status and location.
- 6.1.6 Commander must be able to escalate incident to crisis at any given time.
- 6.1.7. Email sent to PMO must not take more than 3second to be receive.

## **6.2 Security Requirements**

- 6.2.1 Email sent to PMO must be encrypted at all time.
- 6.2.2 C.R.U.X must not reveal any information about its users.
- 6.2.3 Each user is given a unique user identification number.
- 6.2.4 Accounts are created by system admin hence user is not able to create account from the web application page itself for security purposes.
- 6.2.5 All data transmission between channels have to be encrypted.
- 6.2.6 Each user is only able to access page within their scope

## **6.3 Extensibility Requirements**

- 6.3.1 New component must be easily integrated into the system; development process must not take more than 3 days.
- 6.3.2 System must be able to support new database.
- 6.3.3 System must be able to support new users.
- 6.3.4 Removal of one component must not affect any other modules, hence ensuring loose coupling

## **6.4 Software Quality Attributes**

### **6.4.1 Availability and Reliability**

Availability is the measure of quality of a software to keep function in spite of problems. Since the 'problems' can be of many types, different technologies work in tandem to achieve availability for the overall system.

As C.R.U.X is a life critical system, we aim to

- Allow users to log on to the system anytime of the day (24/7/) uptime
- Allow a minimum of 10 users to use the system concurrently
- Have a stable system with a success rate of 99% uptime rate ( high availability)

### 6.4.2 Flexibility

Flexibility is the ability to adapt when external changes occur.

Flexibility is important to C.R.U.X because

- The system must be able to support new changes in crisis category(e.g. terrorism, disaster outbreak)
- The system must be able to support any new additions to supporting government agencies (e.g volunteer corps)
- The system must be able to support new functions if needed (e.g conference call, online chat)

### 6.4.3 Reusability

Reusability is when the component inside a software system can be reused in the development of other software systems.

### 6.4.4 Maintainability

Maintainability is the ability of a software to adapt to changes, improve over time, and correct any bugs and be proactively fixed through preventive maintenance.

To ensure, maintainability C.R.U.X,

- Source codes for the different components of C.R.U.X must be organized in folders which the same functionality
- Codes must be written in a clear and concise syntax which allows for novice users to change/maintain the codes.
- The system must be automated testing, so that a new changes can be debugged and solved in a short time.

### 6.4.5 Portability

C.R.U.X must be able to function consistently on multiply browser platform such as safari, google chrome and internet explorer.

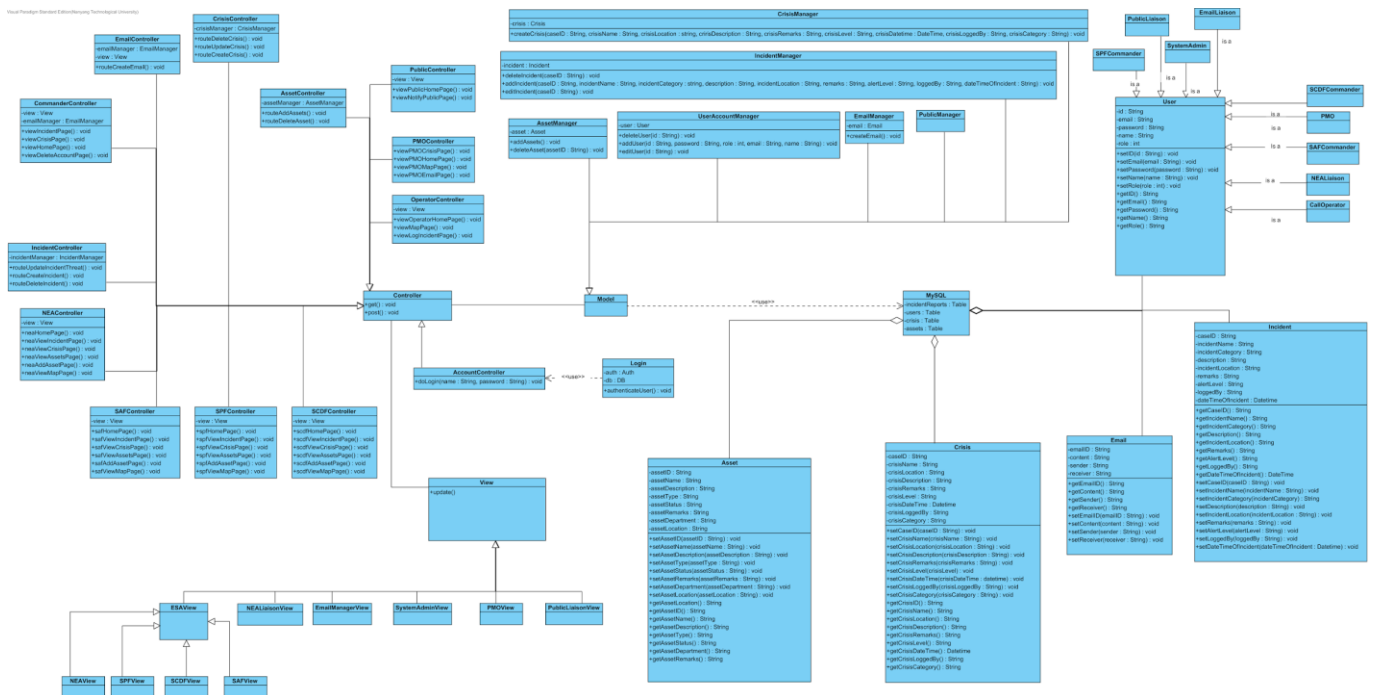
## 7. Appendix A: Glossary

| Name                             | Terms  |
|----------------------------------|--|
| Government Agencies (GA)         | Refers to the government sectors involved in the crisis. For example, Ministry of Health, Ministry of Education, etc               |
| Emergency Service Agencies (ESA) | Refers to the different emergency units that are involved in the incident  |
| Category of Incident             | Refers to the different types of incident that has happened <ul style="list-style-type: none"><li>• Fire</li><li>• Flood</li></ul> |
| Head of Staff (HoS)              | Refers to the person in-charge of the whole incident and who has the authority to delete or amend the crisis                       |
| Archive Incident                 | Archive Incident for future record purpose   |
| Email Liaison                    | Officer in charge to send email to PMO periodically  |
| SAF Commander                    | Officer in charge to handle assets and situation from SAF side   |
| SCDF Commander                   | Officer in charge to handle assets and situation from SCDF side  |
| SPF Commander                    | Officer in charge to handle assets and situation from SPF side   |

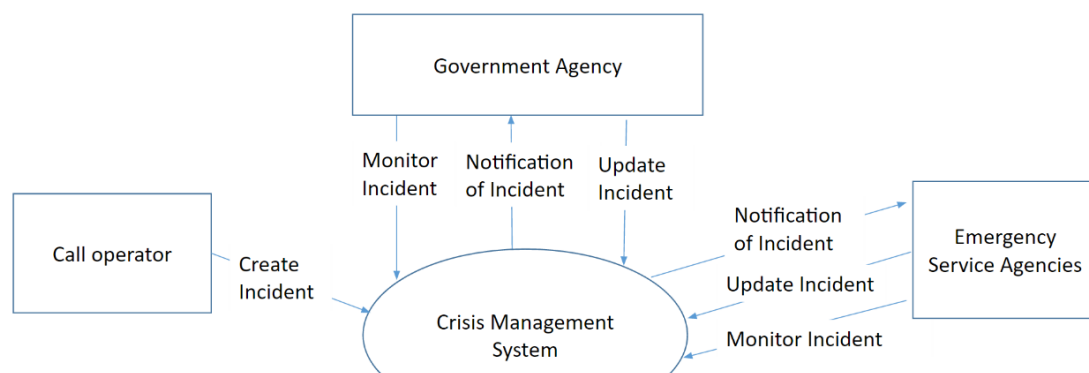
|                            |   |
|----------------------------|---|
| NEA Liaison                | Officer in charge of handling assets and situation from the NEA side  |
| Email API                  | Refers to application programming interface that helps dispatch the email to the people associate to the incident   |
| Weather API                | Refers to application programming interface that helps the users view the current weather condition                 |
| Login                      | Refers to the login CMS before viewing /using features provided by the system.                                      |
| Update Crisis              | Refers to updating of the incident so that the system will be in synchronization with the latest news received.     |
| Delete Crisis              | Refers to the choice of crisis to be deleted, the existing Crisis regardless the reasons.                           |
| Archived Crisis            | Refers to the choice of crisis to be archived from existing incident instead of deleting the crisis                 |
| Create Crisis              | Refers to the creation of a new incident in the CMS.  |
| Dispatch information       | Refers to the dispatchment of information by the user to the people/ministries involved in the crisis               |
| Monitor incident           | Refers to main page of the CMS showing a list of incident logged by ESA and other sources                           |
| Track asset                | Refers to the accessing of the amount of asset activated/used for a particular incident                             |
| View Weather               | Refers to monitoring of the current weather situation through weather API   |
| View Incident/Crisis       | Refers to the viewing summary of the incident/ crisis   |
| Upload Social Media Update | Refers to the different platforms (Twitter,SMS) which the PR Team chooses to dispatch the information to the public |

## 8. Appendix B: Analysis Models

## 8.1 Class Diagram

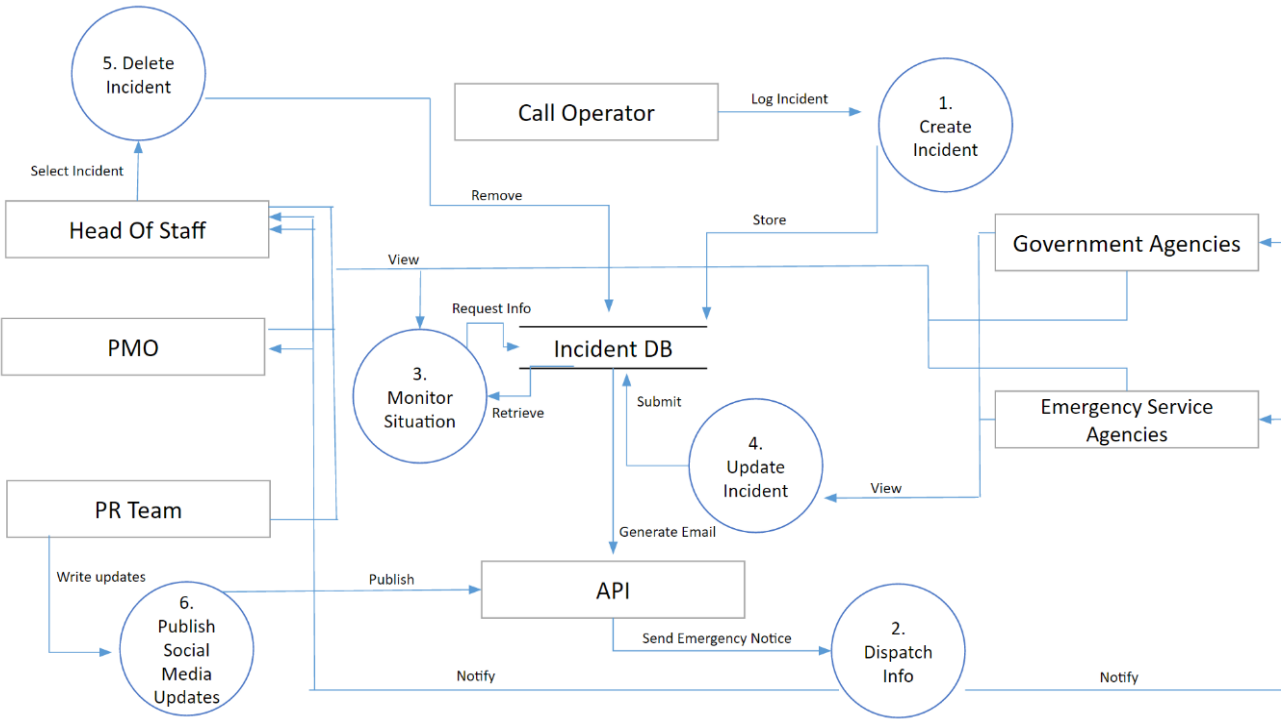


## 8.2 Context Diagram

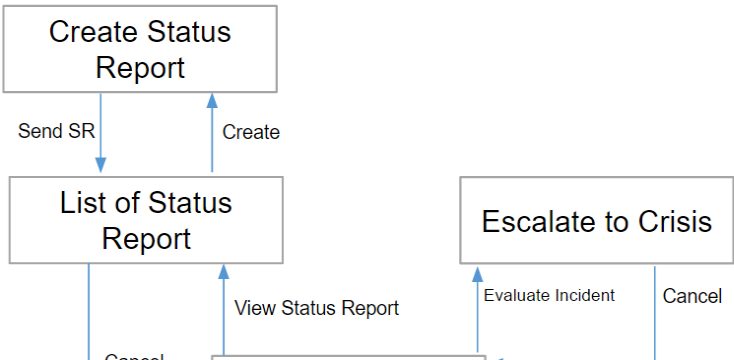




8.3 Data Flow Diagram

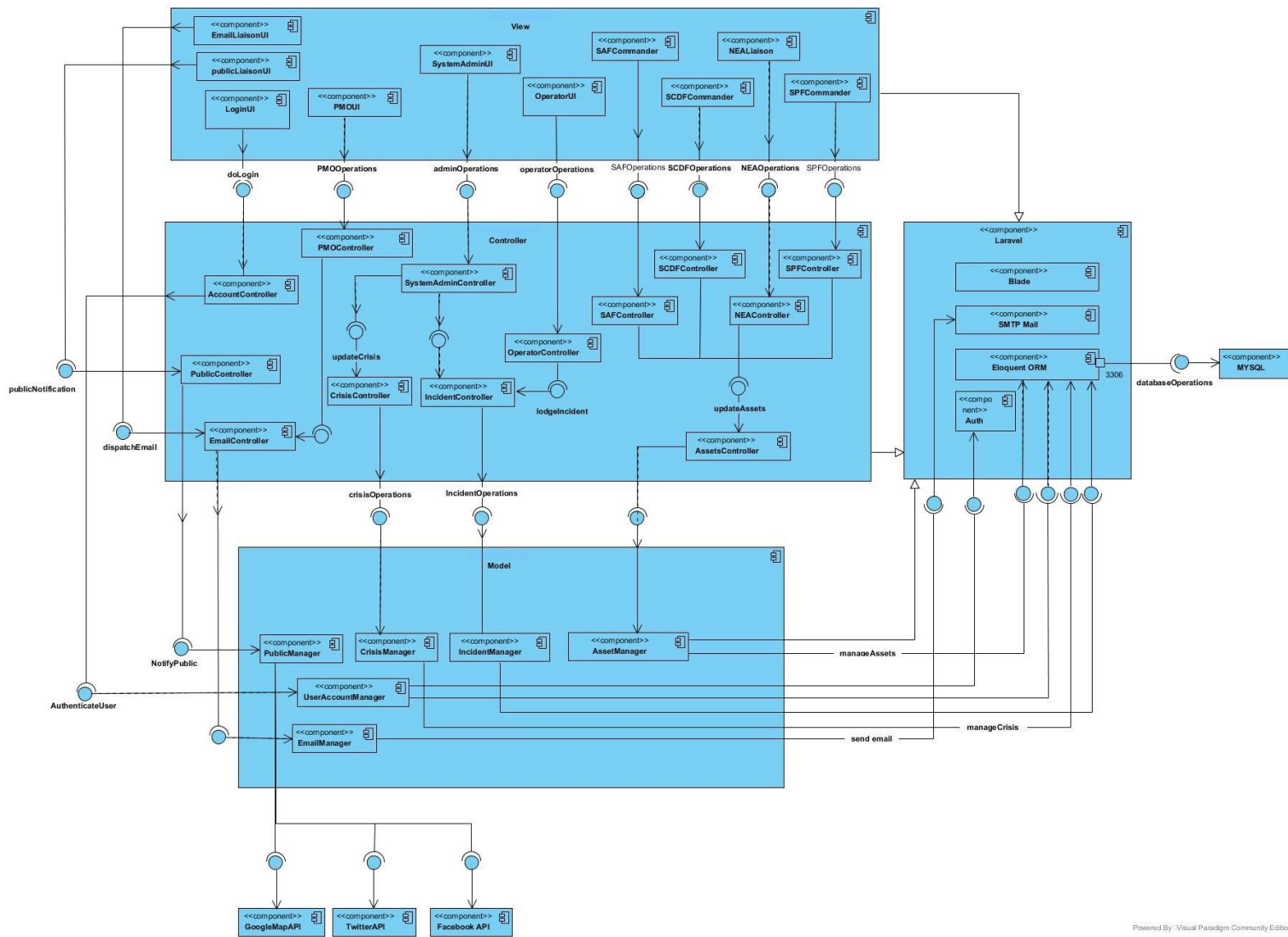


8.4 Dialog Map



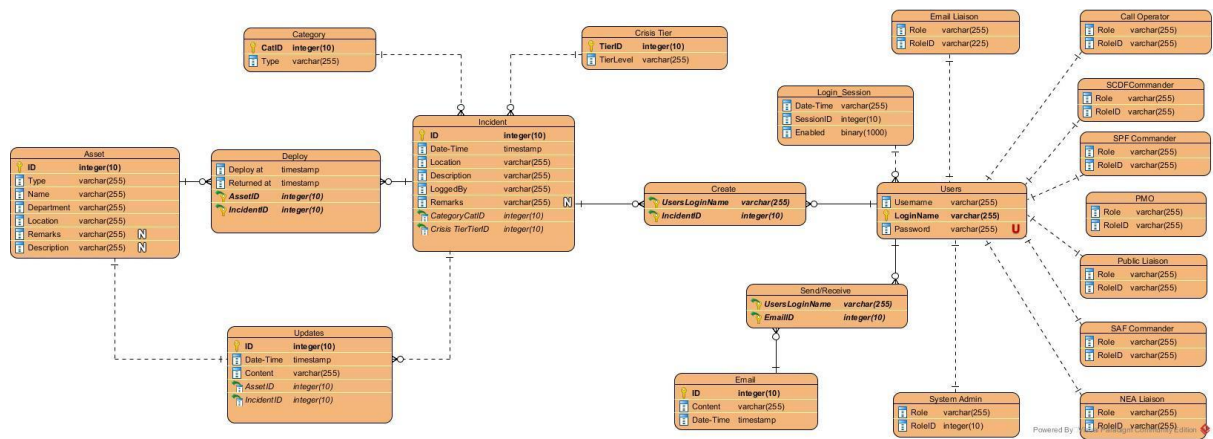


## 8.5 Architecture Diagram



Powered By Visual Paradigm Community Edition

## 8.6 Entity -Relational(ER) Diagram



## 9. Appendix C: Policy Definition

This appendix will define the various THREATCON level on the situation of natural disaster crisis. THREATCON is a measure of action and readiness to be carried out in a given situation. These actions will be used by various emergencies task forces such as Singapore Civil Defence Force, Singapore Police Force, Singapore Armed Forces and Public Utility Board.

Situation A - Occurrence of flash flood.

Situation B - Major fire outbreak.

### **THREATCON 1**

THREATCON 1 will be declared if either one of the situation are stated below occurred at any time.

Situation A - Heavy downpour of continuous rain for 6 hour and water level is 0.5m tall.

Situation B - Fire outbreak and SCDF is trying to control for 2 hour.

Key decision makers will carry out if THREATCON 1 is activated:

Situation A - Notify public to remain indoor until rain subside.

Situation B - SCDF to activate Fire Fighting Force Bravo (3x red rhino) to on high alert and standby.

### **THREATCON 2**

THREATCON 2 will be declared if either one of the situation are stated below occurred at any time.

Situation A - Reports of water level above 1.25m tall.

Situation B - Fire spread to 1 hectare wide.

Key decision makers will carry out if THREATCON 2 is activated:

Situation A - SPF to activate Contingency Plan Alpha of closure of roads in affected area and display of flash flood warning at LED signboards using EMAS to inform motorists. Dispatch SPF Alpha team to aid public that are stranded outdoor due to flood.

Situation B - Notify public to avoid incident area and SAF to deploy Alpha team to provide immediate first aid alert.

### **THREATCON 3**

THREATCON 3 will be declared if either one of the situation are stated below occurred at any time.

Situation A - water current running at speed of 25m/s

Situation B - Smog level reached above 150 PM2.5

Key decision makers will carry out if THREATCON 3 is activated:

Situation A - SCDF deploy Alpha Team to aid PUB in pumping flood water out of any flooded area and Bravo Team (10x5 pax Lifesaver Boat) to assist stranded civilians. SAF to deploy immediate first aid station.

Situation B - SCDF deploy Charlie Team (10x Red Rhino) and SAF to deploy fire fighting helicopter to mitigate further spread of fire. SPF to deploy alpha team and issue N95 masks to civilians within 2km of incident area.