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"I pledge my honor that I have abided by the Stevens Honor System"

<u>The functionality of overall project</u>

The main function of the whole system is to assist users to obtain information about crime rate of the place that they are going by utilizing the technology of smart phone. As we know, nowadays, almost all phones are capable of having mobile application installed in their phone, depending of the type of mobile platform that they are using. All Apple product users would have iOS as their mobile platform while for other smart phones users; they are various kind of mobile application available, such as Android, Windows, and others. These mobile platforms have their own mobile application market available for users. Many various kinds of mobile applications are available in these apps market. Besides opening new opportunity of income for mobile application developer, mobile applications are very useful and convenience for smart phone users.

Nowadays, we can see in newspaper about rate of crime act that happens every day. Government and police department has put a lot of effort in order to prevent crime from happen. It is not every time and everywhere the police can be to take care of everyone. Citizens need to take early precaution to prevent them from being victims of any crime action. In order to help

this, we came out with an idea by utilizing the technology of mobile application to help reducing crime rate. We are going to develop a mobile application for users to get information about crime rate of the place that they are going, probably a new place that they are not familiar with, and to be extra careful if the place that they go has quite high rate of crime happened.

For our project, we will be utilizing the Android as our operating platform. Android is a software stack for mobile devices that includes an operating system, middleware and key applications. It is normally being used for mobile smartphones such as the Samsung Galaxy S2 or tablets such as Motorola Xoom. All applications are written using the Java language. Android's user interface is based on direct manipulation using touch inputs that loosely correspond to real-world actions, like swiping, tapping, pinching and reverse pinching to manipulate on-screen objects. The response to user input is designed to be immediate and provides a fluid touch interface, often using the vibration capabilities of the device to provide haptic feedback to the user.

For our project, to get information about crime rate, a type of server such as SAP NetWeaver Application Server must be set up to handle mobile request documents that are sent from mobile devices through the document service and server connector. The server connector communicates with SAP NetWeaver Application Server using the TCP port number assigned to SAP NetWeaver Application Server. When SAP NetWeaver Application Server receives requests from the document service, it stores them in a mobile document queue to be processed and stored in the database.

The server has the following tasks:

- It is responsible for the queuing and acknowledgment of synchronized data containers and for communicating with the back-end system.

- As part of data synchronization, it defines data packages for individual mobile devices (data allocation), determines the delta data to be sent to the device (delta data determination), manages conflict situations and provides a number of configuration and monitoring tools.

- It plays a major role in the deployment of applications on the mobile device.

- In the SAP NetWeaver Mobile Administrator, it provides functions for administering the mobile devices and the mobile components (JAVA).

The functionality of the components used in figures.

User / Mobile
Application
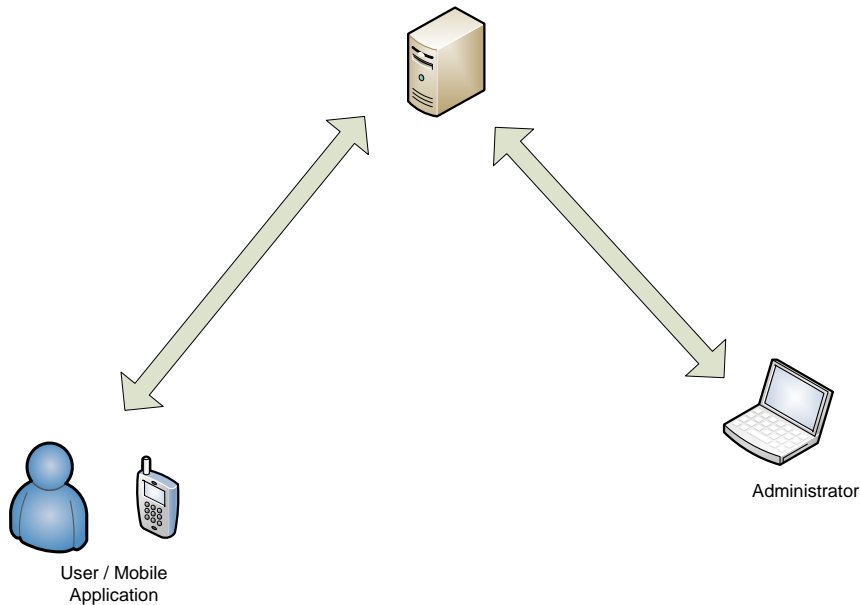
Administrator

The application that we are going to develop can be divided into 3 main components. The first component is mobile applications. The second component is server part and the third one is administration part.

➤ Mobile application

For mobile application, basically it involves user interface, location detection and data delivery. User interface is important for user to choose functions that he desired from our application. This may involves location detection, and information about crime rate of the location. User interface helps users to understand our application and ease them to use it conveniently. Other than that, mobile application functions to detect users' locations. This is to help user to determine their own location without having to check out their own location by reading street name and etc. This location information will be used to get information from users, and being sent back again to users.

➤ Server

Server acts as database storage for our application. As our application is about crime rate, almost all information that needs to be stored is information and record about crime that happened at certain places. When information about users' locations is detected, records and other information about crime rate at the associate place will be searched in database and being sent to users. Besides, precaution advices will be given to users together with the information given. This information will be kept in server too.

➢ Administration

Administration part involves data input from police. All crime record will be put in server by administration. If there's anything wrong with the application, administration plays important role to fixit and also to keep the application updated with current technology.

Interfaces between Components

```
┌─────────────────────┐      ┌──────────────────────┐      ┌─────────────────────┐
│  Mobile Application │      │ Mobile Synchronization│      │    Mobile server    │
│                     │      │        Module         │      │                     │
└──────────┬──────────┘      └───────────┬──────────┘      └─────────────────────┘
           │                             │
           │         ┌───────────────────┴─────────────┐
           └─────────┤          Mobile Client          │
                     └────────────────┬────────────────┘
                                      │
                          ┌───────────┴──────────────┐
                          │  Mobile Client Database   │
                          └───────────────────────────┘
```
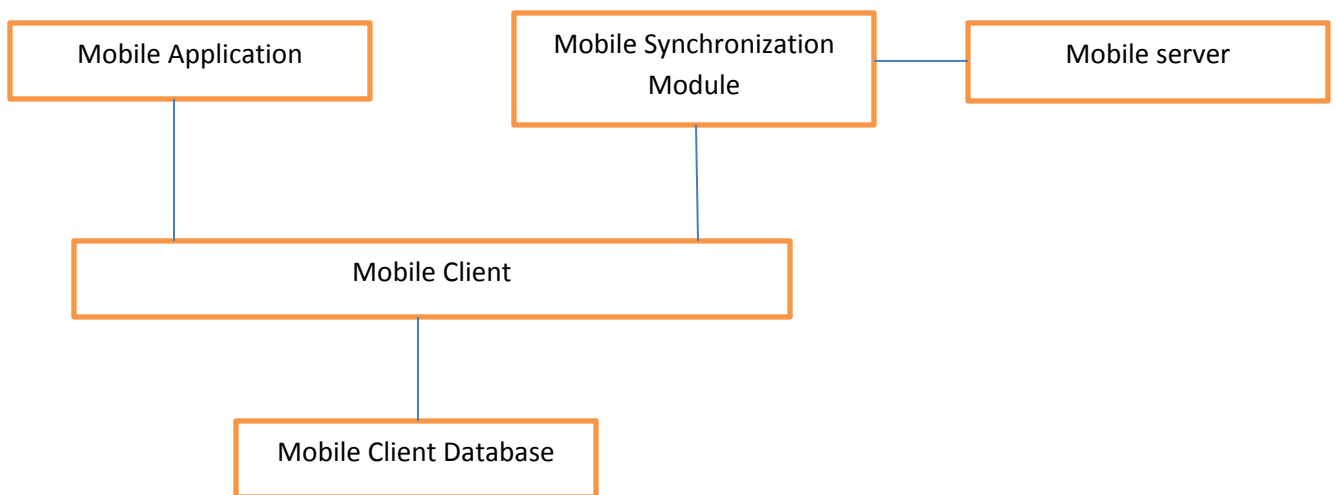
For this mobile application, there are 4 main components: collection configuration, processing, and reporting. The following diagram describes the relationships between the components:

Collection

| ga.js | analytics.js | Android SDK | IOS SDK |

Measurement Protocol

Configuration

Web Interface

Management API

Configuration Data

Logs

Processing

Processing

Query Engine

Reporting

Web Interface

Core Reporting API

MCF API
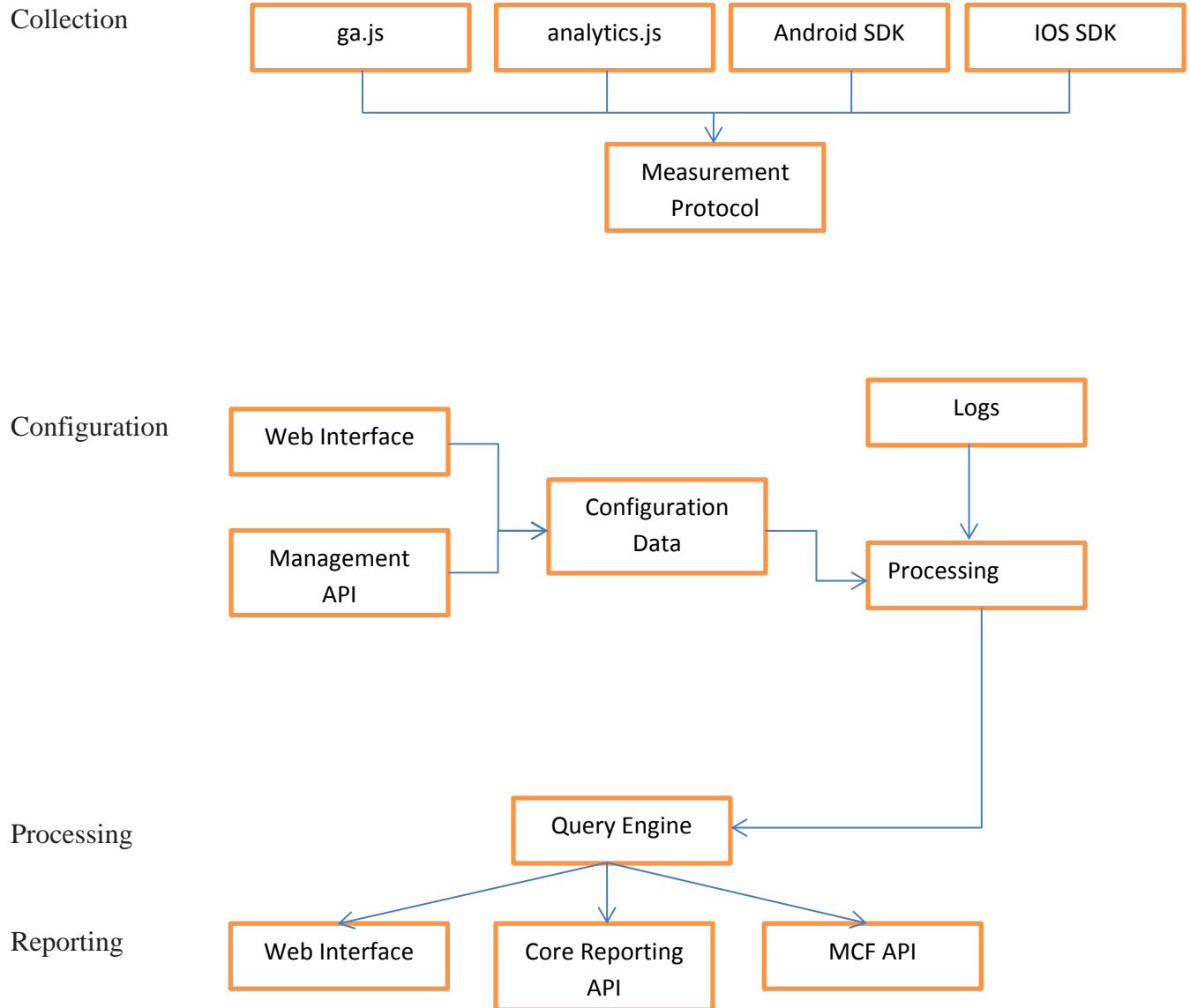
- **Collection** – collects user-interaction data.

- **Configuration** – allows you to manage how the data is processed.

- **Processing** – processes the user-interaction data, with the configuration data.

- **Reporting** – provides access to all the processed data

System Components

Main components:

1) Mobile Application

- o For mobile application, basically it involves user interface, location detection and data delivery.

- o User interface is important for user to choose functions that he desired from our application. This may involves location detection, and information about crime rate of the location.

- o User interface helps users to understand our application and ease them to use it conveniently.

- o Other than that, mobile application functions to detect users' locations. This is to help user to determine their own location without having to check out their own location by reading street name and etc. This location information will be used to get information from users, and being sent back again to users.

2) Mobile Synchronization Module

- o Mobile Server allows new and existing applications and data on handheld devices to be synchronized, and shared with a database. Data on the device can be mapped directly to a database through a Mobile Server agent. The Mobile Development Kit uses a publish/subscribe model that manages the data sub-setting policy for the handheld client devices.

- o Data on the device is mapped to the database through transport by HTTP or Active Sync.

- o The most common method of synchronization is a fast refresh, where changes are uploaded by the client, and changes for that client are downloaded.

- o Meanwhile, a background process periodically collects the changes uploaded by all clients and applies them to the database tables, then composes new data, ready to be downloaded to each client during the next synchronization, based on predefined parameters referred to as subscriptions.

3) Mobile Server

- o Application level logic that handles functions involved in a particular operation (e.g. how to handle information requests from mobile users) and its integration with back-end database or business application systems such as mainframe financial accounting systems, manufacturing systems or crime databases from enforcement agencies.

- o Presentation services for the Mobile client device (handheld computers, notebook, PDA, etc.) i.e. application server takes raw data from database applications/queries and transforms the data on a specific thin.

- o Transaction services, in some cases - including multi-threading for heavy volumes and persistency i.e. recovery across session failures

- o Application programming level interfaces (APIs) with specialized communications protocols

4) Mobile Client

   o An architecture where the user's (client) device is untethered from the network
     i.e. wireless.

5) Mobile Client Database

   o A mobile database is either a stationary database that can be connected to by
     a mobile computing device - such as smart phones or PDAs - over a mobile
     network, or a database which is actually carried by the mobile device. This could
     be a list of contacts, price information, distance travelled, or any other
     information.

   o Many applications require the ability to download information from
     an information repository and operate on this information even when out of range
     or disconnected.

Function-means Tree Diagram

```
                    ┌─────────────────┐
                    │ Data of crime   │
                    │ occurring       │
                    └────────┬────────┘
                             │
                             ▼
                    ┌─────────────────┐
                    │ Data Collection │
                    │ Process         │
                    └────────┬────────┘
              ┌──────────────┴──────────────┐
              ▼                              ▼
    ┌──────────────────────┐      ┌──────────────────────┐
    │ Measurement Protocol │      │ Configuration of Data│
    └──────────┬───────────┘      └──────────┬───────────┘
               │        ┌──────────────┐     │
               ▼        │              ▼     ▼
    ┌──────────────────┐│      ┌──────────────────────┐
    │ Android SDK      │┘      │ Processing of Data    │
    └──────────────────┘       └──────────┬───────────┘
                                          ▼
                               ┌──────────────────────┐
                               │ Query Engine          │
                               └──────────┬───────────┘
         ┌──────────────┬─────────────────┼──────────────┐
         ▼              ▼                  ▼              
┌────────────────┐ ┌────────────────────┐ ┌────────────┐
│ Web Interface  │ │ Core Reporting API │ │ MCF API    │
└───────┬────────┘ └─────────┬──────────┘ └──────┬─────┘
        └──────────────┬─────┴───────────────────┘
                       ▼
             ┌──────────────────────┐
             │ Data conveyed to user│
             └──────────────────────┘
```

References:

1) http://developer.android.com/index.html
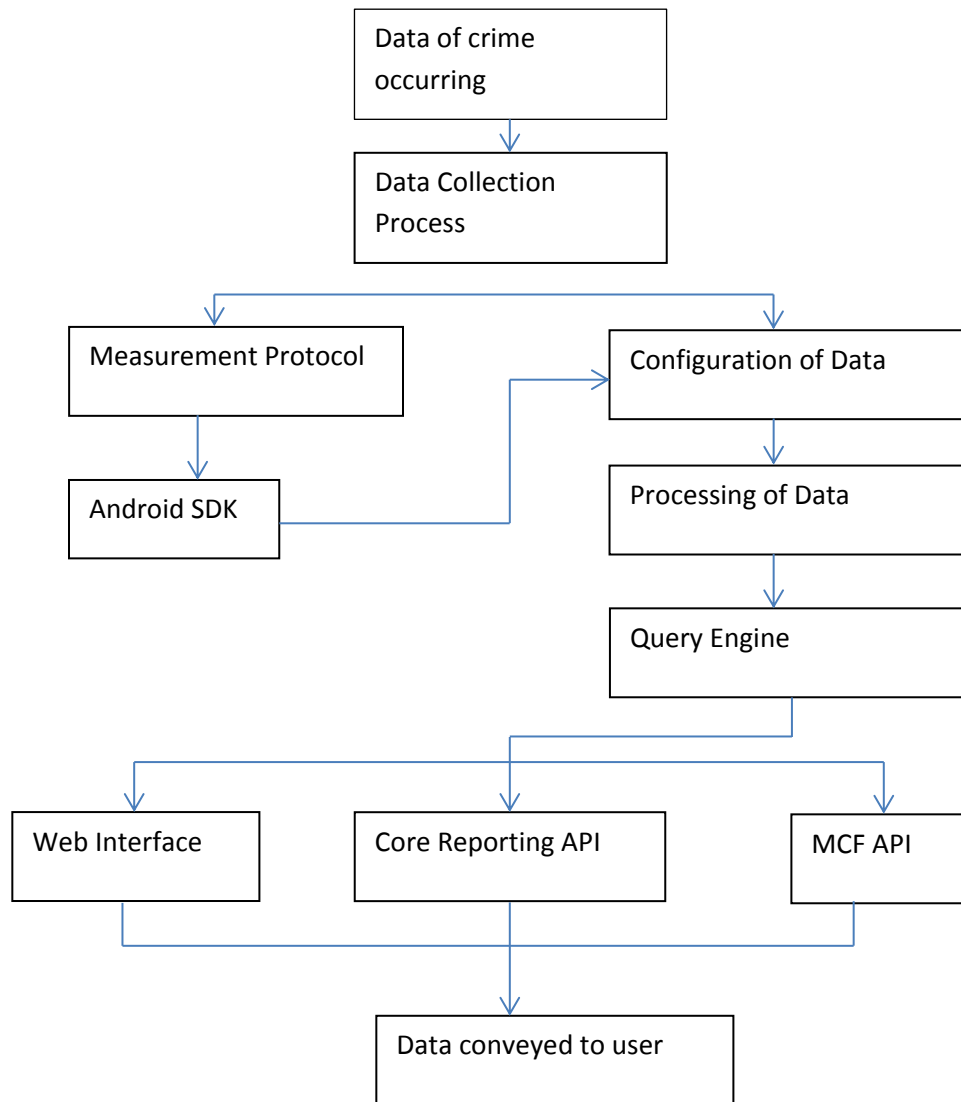
2) "Overview for designing mobile Applications" Web.

   http://docs.oracle.com/cd/E12095_01/doc.10303/e12090/nvovw.htm

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