CHAPTER 2

THEORETICAL FOUNDATION

2.1 Theoretical Foundation

This chapter provides explanation about theories that will be used in the later chapter of this thesis. This explanation might be used to support the development of mobile application.

2.1.1 Mobile Phone

Mobile Phone is a wireless handheld device that allows users to make calls and send text messages, among other features [8]. Nowadays, mobile phone has become one of the most essential things of people. The development of mobile phone can be categorized into several generations [9].

2.1.1.1 Mobile Phone 1G

First Generation mobile phone is the earliest cellular systems to develop, and they depend on a network of distributed transceivers in order to communicate with the mobile phones. This First Generation mobile phone also analogue, used for voice calls only.

Figure 2.1 Example of Mobile phone 1G (First Generation) [1]

2.1.1.2 Mobile Phone 2G

Second Generation mobile phone is the logical next stage in the development of wireless systems after First Generation mobile phone. This Second Generation mobile phone has already use purely digital technology. Even though the telephone network technology used by Second Generation mobile phone has already more sophisticated that First Generation mobile phone, the cell structure of both generations is almost the same.

Figure 2.2 Example of Mobile Phone 2G (Second Generation) [2]

2.1.1.3 Mobile Phone 2.5G

2.5G mobile phone is an enhanced version of Second Generation mobile phone (2G). This version of mobile phone is considered as a stepping-stone towards mobile phone 3G. The enhancements in 2.5G makes it possible for phones to do web browsing, use navigation and navigational maps, voice mail, fax, and sending and receiving large email messages. However, the invention of mobile phone 2.5G can’t be separated from the massive demand for better data services and access to the Internet.

Mobile phone 2.5G provides definitely higher data rate and more features that mobile phone 2G, but not as advanced as mobile phone 3G.

Figure 2.3 Example of Mobile Phone 2.5G (Enhanced 2G) [3]

2.1.1.4 Mobile Phone 3G

Third Generation mobile phone is the latest stage in the development of wireless communications technology. The data transmission rate of this version of mobile phone is much higher and more advanced. Moreover, the Third Generation mobile phone has already use packet-switching technology, which makes it more efficient and faster than the older Generation of mobile phone.

Figure 2.4 Example of Mobile Phone 3G (Third Generation) [4]

2.1.1.5 Mobile Phone 4G

Nowadays, some companies have started developing Fourth Generation mobile phone communication system. The limitation of Third Generation (3G) mobile phone triggers this situation. This generation of mobile phone allows not only more data transfer capabilities but also television system function.

Figure 2.5 Example of Mobile Phone 4G (Fourth Generation) [5]

2.1.2 Mobile Phone Types

Mobile Phone can be divided into several different categories, which are Featured phone, Smart phone, and PDA.

2.1.2.1 Feature phone

This type of phone is basically low-end mobile phones [10]. Feature phone can only do some basic features such as calling, messaging, and data saving capabilities.

2.1.2.2 Smart phone

Smart phone is basically more developed feature phone. This type of phone has almost all of the features as feature phone. Smart phone can do more complicated computation and has more advanced applications, compared with feature phone. Today's capabilities of Smart phone are basically integrated from common features of handheld computer or PDA. As noted, Smart phone gives us the power to not just carry our information around with us wherever we go; it as well gives us the power to edit the information anywhere – anytime [11].

2.1.2.3 PDA

PDA short for Personal Digital Assistant, a handheld device that combines computing, telephone/fax, Internet, and networking features [12]. PDA can perform functions as a mobile phone, fax sender, Web Browser, and personal organizer. Most PDAs began as pen-based, using stylus rather than a keyboard to input data. PDA also incorporated handwriting recognition features [13]. PDA might also accept voice input by using voice recognition technologies.

2.1.3 Mobile Phone Applications

Mobile phone application is a small bundles of code designed and developed for use on a portable device [14]. They are projected in order to improve the features of a portable device by providing additional functionalities that increase the device's entertainment features. There are many types of mobile device applications such as games, interfaces, and so on. The main purpose of mobile device applications is to educate, entertain, and assist users in their daily lives.

2.1.4 `Mobile Phone Operating Systems (iOS, Blackberry, Android)

An Operating System for mobile device is the software platform on top of which other programs, called application programs, can run on mobile device such as mobile phones, smartphones, PDAs, and other handheld computers [15]. As the massive growth of mobile phone users, the development of mobile phone Operating Systems keeps rising frequently. Variety of different Operating Systems which all work in different ways has been developed. Each Operating System has its own device. A different manufacturer may also need different Operating System. There are common operating systems including Windows Mobile, the Symbian OS, Palm OS, and so on. There are also most well-known mobile device operating systems such as iOS for apple device, Blackberry OS for blackberry device, and Android OS.

2.1.4.1 iOS for apple device

iOS is mobile operating systems for apple device including iPhone, iPod touch, iPad, Apple TV, and similar devices. iOS has developed very well since its first version, iOS version 1.0. Nowadays, almost everyone has already know and similar with apple devices and its iOS. The newest iOS version is iOS 5 [16]. The newest version of iOS has way more advanced and sophisticated features compared with its previous version of iOS. Some of the newest features of iOS 5 include iMessage, Notification Center, iCloud, Siri, and so on [17]. One of the aspects that make iOS favorable is its graphical and design ability. The image shown by this operating system is truly clear and the gesture also smooth. Moreover, iOS provides very interesting and attractive features which make its users felt more comfortable and satisfy.

2.1.4.2 Blackberry OS for blackberry device

Blackberry OS is mobile operating systems for blackberry devices including Blackberry mobile and Blackberry playbook. Blackberry mostly used by business people who need to organize their working data frequently. Nowadays, blackberry device has already used by people from different life background and for different purpose also. The Blackberry OS offer a very interesting feature, which is Blackberry Messenger. Blackberry messenger is basically an Internet-based instant messaging application which allows messaging between Blackberry users.

Message sent via Blackberry messenger are sent over the internet and also using Blackberry PIN. Therefore the communication can only be done between Blackberry devices.

2.1.4.3 Android OS

Android is a Linux-based mobile phone Operating System developed by Google. Android is unique because Google is actively developing the platform but giving it away for free to hardware manufacturers and phone carriers who want to use Android on their devices [18]. Android OS is getting better and more popular these days. The Google features are installed as standard applications. Some example of Google features are Search and Maps. This indicates that Android users can easily search for information and directions directly from mobile phone. Another Google services are also available such as Gmail, Google Earth, YouTube, and Google Calendar.

2.1.5 UML

UML which stands for Unified Modeling Language is a standard language for specifying, visualizing, constructing, and documenting the artifacts of software systems, as well as for business modeling and other non-software systems [19]. UML is very important aspect in developing object oriented software and for software development process. UML also helps people to understand the framework and how the system developed works. There are many types of diagram that offered by UML. However, in order to support this thesis paper, there will be some of the diagram that will be used in further section of this thesis paper.

2.1.5.1 Use Case Diagram

Use case is a set of scenarios that describing an interaction between a user and a system. This type of diagram shows the relationship between actors and use cases [20]. An actor is basically represents a user or system that will interact with the modeled system. Use case represents actions that actor might perform in order to complete a task.

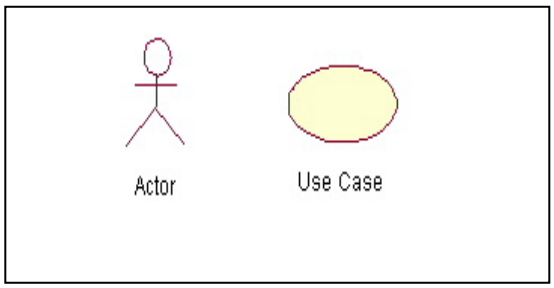

Figure 2.6 Use Case Diagram main components [6]

2.1.5.2 Activity Diagram (Swimlane)

Activity Diagram is scenarios that describe the flow of control of the target system. The sequence and conditions for coordinating behaviors are the main purpose of activity modeling. The idea is to build the control flow and object flow models of the system. Moreover, in order to ease people understand this thesis paper; a swimlane method will be applied for the Activity Diagram. Swimlane is a way to group activities performed by the same actor on an activity diagram or to group activities in a single thread [21].

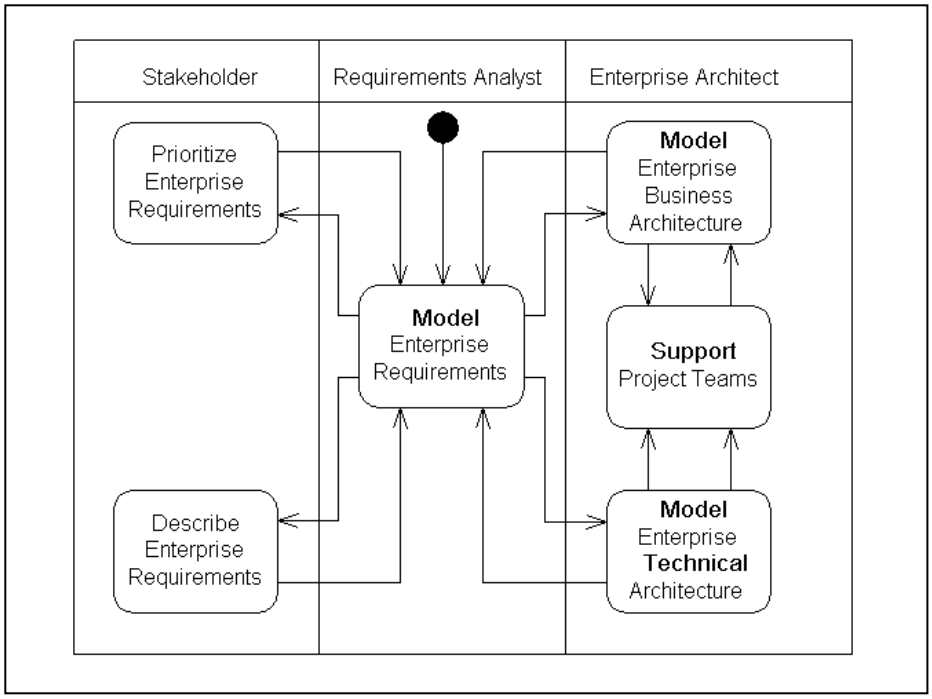

Figure 2.7 Swimlane method in Activity Diagram example [7]

2.1.5.3 Class Diagram

Class diagram is UML structure diagram that represents structure and architecture of the designed system at the level of classes and interfaces which show their constraints, features, and relationships. Class diagram is very important for this paper because it explains how the architectures of the designed system briefly in details.

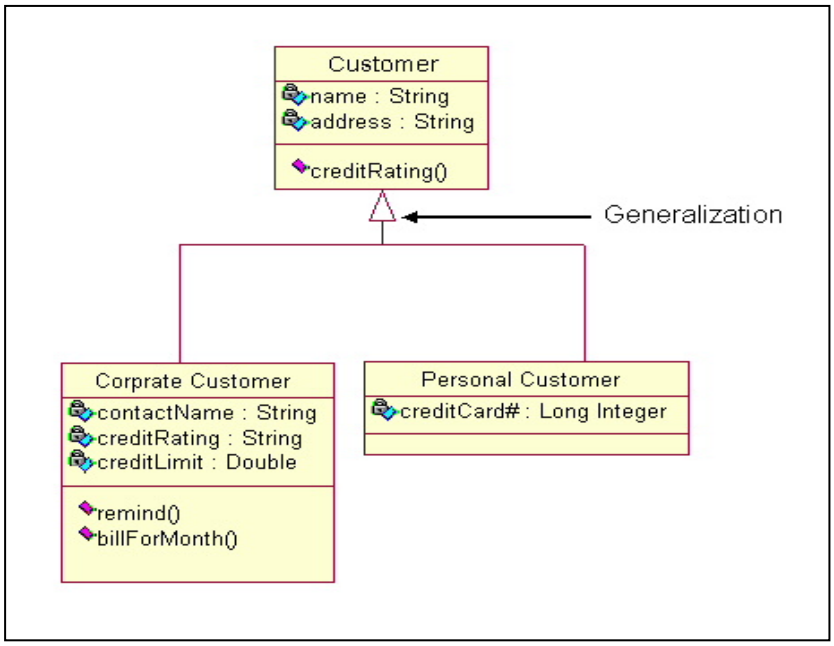

Figure 2.8 Class Diagram Example [8]

2.1.5.4 Communication Diagram

Communication diagram is an interaction diagram which represents interactions between objects. There are some nodes and edges available in UML communication diagrams which are frame, lifeline, and message.

- **Frame**

  Interaction frame provides a context or boundary to the diagram elements, such as lifeline or message.

- **Lifeline**

  Lifeline represents the objects that included in an interaction. Each instance in an interaction is represented by a lifeline. For example, in a school scenario, lifelines can represent objects such as a school system or students and employees.

- **Message**

  Message is a connector between objects represented by lifelines in the diagram. This pathway indicates that objects in the diagram can pass messages in the interaction.

2.1.5.5 Sequence Diagram

The sequence diagram is used primarily to show the interactions between objects in sequential manner that those interactions occur [22]. This type of diagram is very useful for organization's business purpose in order to communicate how the business currently works by showing various business objects interact. Moreover, sequence diagram may also be used in the requirements phase of a project.

2.1.6 API and API used Architecture

An Application-Programming Interface (API) is a set of programming instructions and standards for accessing a Web-based software application. Mostly software companies release its API to public so that other software developers can design and develop products that powered by its service [23]. Some of the most well-known companies have already distributed their API widely. Some those companies including Amazon.com, Google.com, Yahoo.com, and so on. API plays very important role in this thesis paper because; it's perfectly helpful for gathering all of the information and schedules of flights needed.

2.1.7 RSS Feed

RSS which for Really Simple Syndicate is a technology used in order to deliver frequently changing web content. People usually use RSS feed to keep track information from their favorite websites.

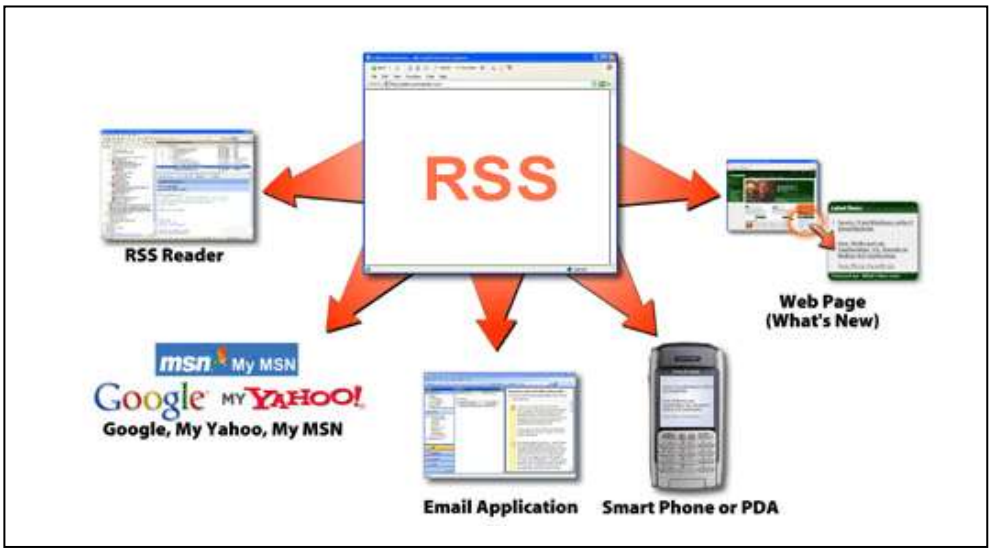

Figure 2.9 How RSS Feed works[9]

The picture shown above is basically how RSS feed works in a nutshell. RSS feed is applicable in almost the entire platform (Email application, Smartphone, Web Page, RSS Reader, and so on). Moreover, for the purpose of this thesis paper, the author has decided to develop and use RSS Reader in order to access the RSS feed information.

2.1.8 Database

Database is a shared collection of logically related data (and a description of this data), designed to meet the information needs of an organization. All of the data inside of the Database is logically related. Moreover, a database is very important to be used because it's an efficient way for an organization to store and get their information.

2.1.9 Android SDK

SDK short for Software Development kit is a programming package which enables a programmer or developer to develop applications for a specific platform or device.

Basically an SDK contains one or more APIs, documentation, and also programming tools. There are so many examples of SDK. One is the Java SDK that contains all the libraries which are needed in order to develop Java-based application.

For the purpose of this thesis, author will use special SDK called Android SDK. Android SDK offers the tools and APIs required to begin developing applications on the Android platform using the Java programming language.

2.1.10 Eclipse

Eclipse is an open source Integrated Development Environment (IDE) that written in Java Language. The main purpose of Eclipse is to facilitate developers or programmers to develop their applicationby providing features including extensible frameworks, tools and runtimes for building, deploying and managing software across the lifecycle. Author chooses Eclipse as the IDE because it offers more support and facilitation for developing Android applications. The plugin and other support materials to support Android applications development are distributed widely. Moreover, the environment setup for Android applications development is much easier compared to other IDE.

2.1.11 FeedBurner

In order to aggregate feeds, one need to use a RSS reader. RSS reader is basically an online interface where one can record addresses of RSS Feeds desired to Subscribe, and it will automatically gather the information from these addresses. However, too many addresses will result in over redirect.

This situation may lead to the data parsing error. In order to address this condition, a supporting tool in gathering RSS Feed address is required.

FeedBurner is a web feed management tool. This tool is very crucial in developing the application. The actual actions that FeedBurner do is collect the RS Feed from sites and then distribute them to the Subscribers. This tool is needed in developing the author's proposed solution design in order to ease the RSS Feed mining.

2.1.12 GUID

GUID short for Globally Unique Identifier is basically a unique character generated by the API provider, in this case FlightStats, in order to bind a user in using their service. For the purpose of this thesis, GUID must be used in order to earn permission from API provider.

2.2 Methodology

The best solution for this thesis is to develop a Generic Travel Planner for Android Phone. The software development method used by the author in development process is agile method. The author believes that agile method is suitable for this thesis because its flexibility. Moreover, Research on the internet for API and RSS feed, read resources from books and any others resources may help author in order to accomplish the solution.

Below is the development steps in developing Generic Travel Planner for Android phone system, they are:

- Overview the existing system of Travel agent, web, and mobile
- List the advantages and disadvantages of the existing system
- Analysis of Android application similar to this application being developed
- Explain the system Architecture
- Develop the application prototype
- Testing the application prototype
- Evaluating the prototype