**Chapter 1**

**THE PROBLEM AND ITS BACKGROUND**

Through the years in the field of information technology and rapidly growing of internet related technologies, distributed storage system has gained popularity and appeared in a huge number of implementations in different standalone, web or mobile applications that needed to store huge amount of data in the database. NoSQL database provides a real-time database that is used to store and retrieve data in real-time. It is alternative to traditional relational databases which data is placed through tables and data schema. NoSQL is an approach to accommodate a wide diversity of data models which includes key value, document, columnar, graph formats and not required to establish a relational schema. NoSQL database are prepared to use for data stores for large application where the scalability is important. The recent rise of NoSQL provides alternative solution for storing large scale data. For example, google uses BigTable, Facebook uses Hive (Data warehouse for Hadoop, supports tables and a variant of SQL called hiveQL) and Cassandra (Multi-dimensional, distributed key-value store) for Facebook's private messaging. Yahoo uses modified PostgreSQL. And YouTube uses MySQL, but they are moving to Google's BigTable. (Quora, 2014).

The Relational Database Management Systems (RDBMS) is a type of database that can store data into collection by form of related tables. RDMS is the basis of MySQL. Mostly RDMS provide to create a user relationship of tables through programmatically and via graphical user (GUI) which can see the relationship in visual diagram.

Modern organizations do not only want to know what happened and why it happened, but also want to know what is happening right now and what is likely to happen next (LaValle et al., 2011). Since organizations hunger for high performance in generation of data and collection speed has increased. Nowadays, the demand of all information and rapid technological development in big company are challenge for their developers how they will keep their big data in mobile application with scalability and complexity.

MySQL is an open source relational database management system (RDBMS) based on SQL (Structured Query Language). MySQL is popular for Web-hosting applications. It provides high performance and scalability to meet the demands, SQL and NoSQL access for performing complex queries and make simple key value operations. It also have big data interoperability using MySQL for operational data store for Cassandra and Hadoop.

Firebase was created to help developers to build mobile application with a large capability of data store and store and sync app data in short time. Firebase is a mobile and web application development platform developed by Firebase, Inc. in 2011 and acquired by Google in 2014. Firebase is a real time database that stored and sync data in NoSQL cloud database. The data is synced in real time and remains available even if the application goes offline. Firebase real time database is a cloud-hosted database which data is stored as JSON document same case in mostly of the NoSQL database system like MongoDB, Cassandra, CouchDB etc. Some of the organization have already shifted their application into Firebase like The New York Times, Trivago, Alibaba.com and etc.

**Background of the Study**

This comparative study aims on collecting data how both database perform in retrieving and executing simple query operations. Both database will be compared to each other by structure of database and how complicated in coding system. This study aims at comparing database (MySQL and Firebase) to elaborate which database works better. Database is a very complex and hard to understand so, the researchers want to explain two different types of database MySQL and Firebase through comparison which is best for the future researchers to benefit to this research will be explain what is MySQL & Firebase and what are the benefit when using such databases that helps the researchers to make an efficient use of it when creating an android, system or web application. This study aims to get the best results in using database by comparing the MySQL and Firebase that shows what they are capable of and what are their differences, disadvantages and advantages when using the database like Firebase and MySQL. The comparative study also aims to describe the MySQL and Firebase database more for other users which needed to make an android application or other applications such as a tracking application for vehicle.

This study is also based on GARDGIA Application which use data from Firebase. Through the android application of GARDGIA, Makati Garbage Driver and Makati Resident can input user information and view their current location while Web Application of GARDGIA for Makati Des-Head (admin), admin can view and get the location of drop off sites. The researchers identify what the database can handle for the users information for Makati resident and driver, location of a garbage truck and drop off sites. Thus, researchers test and analyze the two different databases which are MySQL and Firebase which is better to use in Mobile application.

**Statement of Objectives**

MySQL and Firebase, have distinct differences when applied in a mobile environment. It depends on the nature of the application. This research aims to know the technical and application-based differences between using a MySQL database and Firebase database in a mobile environment. Highlighting how the data can retrieved and stored in database in short time, accuracy of the output data, structure of database based on code complexity, response time in huge data and multiple access of user in database.

*Researchers aim to identify and prove which is better database between MySQL and Firebase that can benefit based on the nature of mobile environment.*

**General Objective**

The general objective of this research is to compare the databases between MySQL and Firebase when implemented in a mobile environment and to determine which database is more useful in mobile application.

**Specific Objective**

Researchers also came up with specific objectives of the study. Specifically, it aimed to:

1. To determine which database is better between MySQL and Firebase for Mobile Application.

It is beneficial to this study to analyze and gain a conclusive comparison between MySQL and Firebase. To determine which database is better and convenient to use in mobile applications such as large amount of data that can execute in short time of performance and what are the advantages and disadvantages in using MySQL or Firebase database

1. To Gather the data output from the test results in mobile using MySQL and Firebase database through a mobile application to determine which database is better for developing an application.

Through the data that have been collected, it will be a big help to researchers to analyze carefully the process of the query that have been executed. To show which, either from MySQL or Firebase database is better to use in developing a mobile application.

1. To be able to compare the comparison between two databases the researchers used the area of comparison which is Survey or User’s feedback and Technical comparison.

The researchers created a survey form to determine the better database based on the users who have used the Firebase and MySQL database.

1. To know the comparison of two databases the researchers conducted test about the compatibility of the two databases.

The researchers conducted a compatibility issue with software and hardware requirements of MySQL and Firebase.

1. To know the comparison of two databases the researchers conducted a comparison table about the structure of database.

The researchers made a table of comparison to find the differences on both databases and its structure and format. It also shows on the table the type of schema, license and other description to determine which is better.

1. To know the comparison of two databases the researchers conducted a test and compare the speed/response time.

The researchers conducted different tests to determine the speed/response time of the two databases. The researchers conducted a test to retrieve a certain number of records which varies on different hardware and software requirements.

1. To know if the two databases have a better efficiency the researchers conducted a volume test and multiple accesses of users.

The researchers conducted a test such as volume test to determine the amount of data it can handle and if it can handle a certain number of user using it at the same time.

**Scope and Limitations of the Study**

The scope and limitation of the study are based on the objectives of this study on what database is to apply. From this general objective, this study aims to formulate a comparative analysis based on MySQL database and Firebase database in order to know which is better and faster in storing and retrieving same query used in mobile application.

This study explain the big difference when using MySQL and Firebase when it comes to storing and retrieving data and the performance that benefits the programmers the most. The research also present the result showing which is better when it comes to handling data such as real-time data in Mobile Application. In addition to further test, the MySQL and Firebase database will be evaluated through testing the timestamp of both database. Though, both have different ways of writing the query to retrieve the result from the data in short period of time. But in the end, the developer will choose which of the two database can benefit in their GARDGIA application based on the nature of mobile environment.

**Significance of the study**

This study aimed to give guides and information about the difference in using MySQL database and Firebase database.

**Students**

Students will be the main beneficiary of this study, having mobile application in their project. It help the students distinguished what database would be use for project.

**The Developers**

The developers will also be the beneficiary of this study. It can help the developers analyze which either from MySQL or Firebase can be effective to use in mobile application. The developers will also be able to use MySQL or Firebase more efficient because they know the big differences in advantages and disadvantages of using either MySQL or Firebase.

**The Future Researchers**

Future researchers on comparing MySQL database or Firebase database or to other related studies will benefit from this study for an improved and additional knowledge on the area that is being studied.

**Operational Terms**

**Application Program Interface (API)** is a set of routines, protocols, and tools forbuilding software applications. API are used basically in graphical user interface (GUI) components.

**Big Table** is a distributed storage system that design for managing structured largedata. Many projects at Google store data in big table including web indexing, Google Earth, and Google Fi-nance.

**Database** is a collection of information that is organized to easily accessed,managed and update. Data are organized into rows, columns and tables, and it is indexed to easily find the relevant information.

**Firebase** is stated as cloud database including authentication, push notificationsand real-time access of database. It uses JSON that are good and fit for web and mobile application. Researchers used Firebase as database of GARDGIA application.

**JSON** (JavaScript Object Notation) a text-based format for representing structureddata based on JavaScript object syntax. It is commonly used for transmitting the data by sending.

**MySQL** is an open source relational database management system (RDBMS) thatuses structured query language (SQL). It is widely used in web database. It Use for adding, accessing and managing contents in database. Researchers comparing MySQL into Firebase

**NoSQL** is an alternative to traditional relational databases in which stored inattribute name or key with value. NoSQL databases are especially useful for working application with large sets of distributed data.

**PHP** is a server-side scripting language that widely used for web development. PHP usually created dynamic web page content or dynamic images used for websites.

**RDBMS** is a relational database management system (*RDBMS*). It is a software system that provides to access relational database which can be used to create, maintain, manage and use of the database.

**Volley** is a library that helps the networking for android application become easier and faster without writing lots of code.