

CHAPTER II LITERATURE REVIEW

2.1. Literature Review

In this study, several literature reviews will be used to support and strengthen the theory in the conducted research. The literature reviews are as follows:

In the study conducted by Srinivas (2014) entitled “Web Application Based File Transfer In Customized Cloud”. In this study, the author discusses the file transfer web application which runs on the open cloud web server. The file transfer in the web application uses the cloud automated service which is coupled with a powerful management tools. This server provide unlimited disk space without any limitation on bandwith connection. The result of this study is a fully organized cloud file transfer system with network solution. In conclusion, a web based file transfer system (FTS) is able to provide services to users in managing and sharing files through a web based storage.

In the study conducted by Kharpas et al., (2016) entitled “A Cryptographical Approach for Secured Data Sharing in Cloud Storage”. This study describes the proposed scheme in concealing secret data into the QR Code using a key decryption scheme generated from the system. The result of the study is system that provides security using multiple cipher-text that serves as decryption keys within a single application. The conclusion from this study is that QR code can be encrypted by using unique decryption scheme such as cipher-text that can only be decrypted by the application.

In the study conducted by Pandit, Nipane, Jadhav, and Naik (2016) entitled “Secured E-Documents and Sharing using Encrypted QR-Code”. The purpose of the conducted study is to develop a system that will allow access to user’s documents on the internet and supports document sharing by using a registered third parties through an encrypted QR code. The result of this system is a system that will avoid the method of carrying original documents. Therefore giving user access to the documents at any place and any time. The system is able to provide tight security by using an encryption algorithm in writing data into the QR code.

In the study conducted by Rathi and Masih (2016) entitled “Comparative Study of SDLC Processes for Desktop, Web, Mobile and IoT Applications”. The purpose of this article is to describe the comparative difference in SDLC process within different device environment. The result of the research revealed that SDLC phases experiences minor changes when implemented in different types and nature of application. Noting that the advancement in technology is taking place rapidly, the SDLC method could be developed even further and produces better methods by keeping the same foundation. Therefore the system development life cycle method is widely applicable for software development of any device.

In the study conducted by Farina, George, and Kureethara (2018) entitled “An Image Sharing Technique Using QR Code Through Cloud for Mobile Devices”. This study examines an image sharing technique using the use of QR Code associated with a web application and cloud computing. The result of this study is a platform that can be used to store data such as image snapshot and its geolocation

from mobile device and converts it into a scannable QR Code. The conclusion of this study is that QR code can be used to access transferred file through the web.

The table below shows the included research comparison against the project that is going to be developed.

Table 2.1 *Literature Review*

<i>No</i>	<i>Authors</i>	<i>Title</i>	<i>Conclusion</i>
1	Srinivas (2014)	Web Application Based File Transfer In Customized Cloud	File storage system serves as access to users in managing and sharing files from web based storage
2	Kharapas, Khandave, Dani, Godase, & Dhakulkar (2016)	A Crypto-Graphical Approach for Secured Data Sharing in Cloud Storage	QR code content can be encrypted and decrypted by the web application's key algorithm
3	Pandit, Nipane, Jadhav, & Naik (2016)	Secured E-Documents and Sharing using Encrypted QR-Code.	QR code can provide data from any place and any time
4	Rathi & Masih (2016)	Comparative Study of SDLC Processes for Desktop, Web, Mobile and IoT Applications Transformational Learning	System development life cycle method is applicable for web application development
5	Farina, George, & Kureethara (2018)	An Image Sharing Technique Using QR Code Through Cloud for Mobile Devices.	QR code can be used to access transferred file through the web.

2.2. Theoretical Basis

2.2.1. System Development Life Cycle (SDLC)

System development life cycle (SDLC) is a software development method which are implemented within given time and expectations given by the client.

SDLC processes consists of various phases such as requirements gathering and analysis, system analysis, system design, coding, testing, implementation (Dwivedi, 2015).

According to Barjtya, Sharma, & Rani, (2017), the SDLC method consists of several work model such as waterfall, V model, iterative, spiral, and agile model. Although these model have different approach to it, there are 5 phases of SDLC which are conducted in every model which are:

1. Requirement analysis

In this phase, software developer will discuss with the client the needs and expectation regarding the software development. The purpose of this phase to gather as many details and information about the project and its requirement. The information that are gathered to ensure that everyone involved in the project understand the scope of the work and how to fulfill each of the requirement.

2. Design

Developers together with technical architects proceed to design the software and system to fulfill each requirement. The details and various parameters of the design such as risks, technologies requirement, team

capability, project constraints, scheduling, and budget are reviewed for the best approach.

3. Implementation

In these phase, system scope is developed by coding as required by the client. In this phase team member proceed with their given role. Position such as database administrator will start making database's structure. Programmers will start coding the system's back-end function. Front end developer will start developing graphical front-end interface.

4. Testing

Testing is conducted before the software is completed and delivered to client. Developers will review and make sure that the software works without any fault and fulfills client's expectation.

5. Deployment and Maintenance

In this final phase, software can be deployed for client use and a dedicated maintenance team will be assigned to check for post production errors. If an issue is encountered in the production, the development team will create a patch or hot fix depending on the severity of the issue and deploy it as soon as possible. Some fixes can be deployed until the next version of the software if issues are not very severe.

According to Navita (2017), system development life cycle method is helpful for user in getting high quality product in dedicated time and budget. Each model of SDLC has each of their own advantages. One of the applicable SDLC model such as waterfall model which is easy to understand and good for small

project. Spiral model and iterative model which enables feedback and evaluation in each iteration is good for large and complicated projects. So that user can select the best suited model as per his requirement.

One of the use case in system development life cycle method conducted by Pukdesree (2017) where the author apply collaborative learning with SDLC model which can be used for other courses of School of Information Technology and Innovation which helps solve problem of learner in order to develop IT group projects. The result of this study is that learners have an opportunity to help each other in giving advice and counsel each member of the team and help them to be responsible for themselves and the team member.

2.2.2. Web Application

According to Onu, Osisikankwu, Madubuike, & James (2015), web application is a website which functions dynamically and utilizes server-side programming which connects interface of the user from the front-end and the database from the back-end. There are many uses of web applications in this modern age such as online booking and reservations, e-commerce, e-banking, social media sites, content management system, and many others.

An online web applications are more used than their off-line version. Web application are able to provide multi-user interface, centralized and organized management, thin client integration, multilingual programming, distributed processing, and platform compatibility over the internet. The majority of developers are converting their applications to the web platform. Which is why the web are

able to provide wide compatibility to all kinds of applications. All kinds of application ranging from small scaled application to large enterprise software are available as web applications. (Onu et al., 2015)

2.2.3. Web Service

According to Hanna (2016), web services is defined as an XML based framework which works as a standard for communicating between discrete application system. Web service is used in exchanges of message or document in XML format over internet standard protocol such as Simple Object Access Protocol (SOAP), Web Service Description Language (WSDL), and Universal Description, Discovery, and Integration (UDDI), Web services has an important role in the e-commerce world because it provides the interaction between applications and their heterogenous services in order to fulfill user needs. One of the examples is in improving the recommender system that are used in many big e-commerce sites to help customer find the products that they would like to purchase.

One of the leading web service provider is Google. Big data in Google market and cloud services is where its web service gain advantages of other web service such as Amazon Web Services (AWS) and Azure. Some of the big data services offered by Google include Cloud BigTable, Cloud Datastore, a NoSQL database for nonrelational data, and Cloud Machine Learning. Google has an advantage in search availability though lags behind on the BI front. In many ways, the three cloud providers are in lockstep on big data services though there several

differences in performance and ease-of-use that requires hand-on testing (O'Reilly, 2016).

2.2.4. File Sharing

According to John (2017), file sharing works as an instantiation of accessing the common in terms of time, disk, resource and file sharing. The act of file and data sharing is to means giving accessible to remote users without the need of making copies of them. Some example of file sharing platforms that are widely popular in the internet such as MEGA (the sucesor of Megaupload). Users upload their files into a repository where other user will gain access. The files that are downloaded will not be taken away as the copies of the same file are made.

Web storage are able to give access to some files through a website and therefore is shareable to other users for downloading. These uploaded files can be accessed from anywhere where if authentication is provided. Therefore this method is useful for large number of distributed user. Some of the popular service via consumer products Dropbox and GoogleDrive (Kulkari et al., 2016).

2.2.5. QR Code

According to Masalha & Hirzallah, (2014), QR code or short for Quick Response Code is a type of matrix or two-dimensional barcode which was invented by an automotive industry in Japan. These barcodes is used as labels that contains information related to the item it is attached to. QR code consists of several black modules and dots that are arranged in two-dimensional pattern inside a square grid

with white background. The QR code can store four types of data which are numeric, alphanumeric, Japanese kanji, and byte/binary. The contents of a QR code can be read by using a scanning device or a camera. The scanned image is then formatted by an underlying error correction software algorithmically to the point that the image can be determined by human eyes. The data is extracted from the horizontal and vertical patterns and components of the image.

According to Chang, (2014), QR Code provides several features that has made its usage more popular and efficient compared to traditional one-dimensional barcodes. The features of QR Code are as follows:

a. High Capacity Encoding of Data

QR Code has the capability in encoding large quantities of data. While conventional bar codes is limited to 20 digits, QR Code can provide up to a hundred times more information than bar codes. One QR code image has the ability to encode words up to 7,089 characters. The capacity of an encoded 300 alphanumeric QR code is shown in Figure 2.1 as follows.

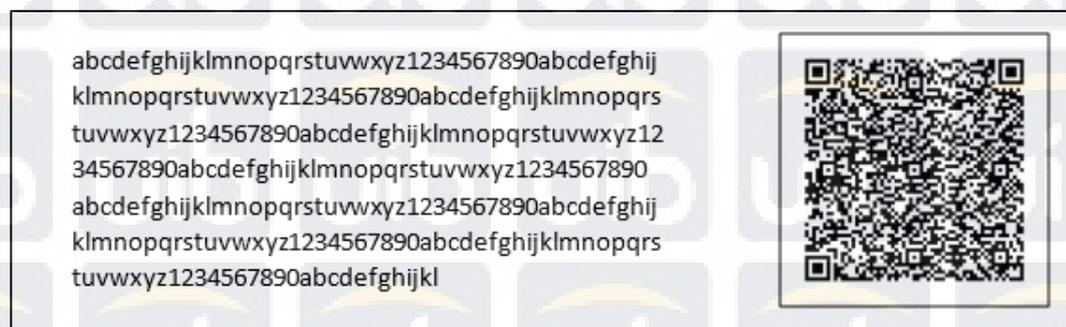


Figure 2.1 QR code that can encode 300 alphanumeric characters

b. Small Printout Size

A QR code can encode 10 times from its two-dimensional structure which can cover up more data than a one-dimensional barcode with the same size. A micro QR code that are smaller in printing size compared to a barcode is shown in Figure 2.2 as follows.



Figure 2.2 QR code available for a smaller printout size

c. Dirt and Damage Resistant Durability

QR code has the ability to perform error correction. Even though some area of QR codes are destroyed or damaged, the data contained in it can still be recovered depending on the damage severity and the level of error correction used in a QR Code. Partially dirty or damaged image that is restorable is shown in the Figure 2.3 as follows.



Figure 2.3 Partially dirty or damaged QR code symbol with restorable data

d. Readable from Any Direction in 360 Degrees

QR code can be scanned from any direction in 360 degrees by checking the position detection patterns located at three corners of the QR code. Therefore QR code can be scanned instantly by using the pattern designed to evade background interference which is shown in Figure 2.4 as follows.

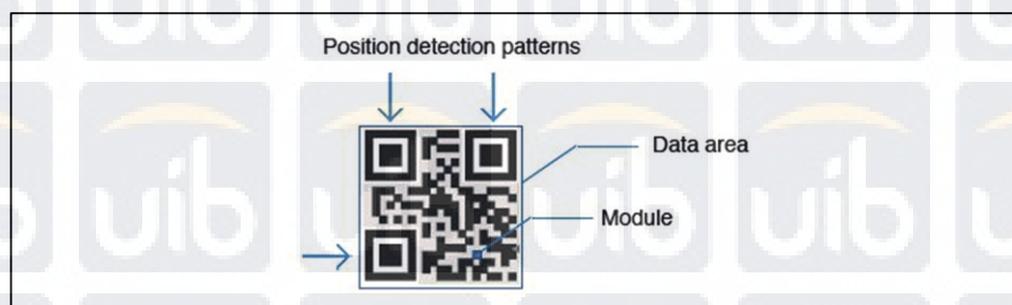


Figure 2.4 Detection patterns guarantees readability from any direction

e. Structured Appeing Feature

A QR code symbol can store up to 16 smaller piece of symbol where each of the symbol contains different unique information. By having this structure, QR code can be printed in multiple smaller spaces and conversely can be grouped to form a single data symbol as shown in Figure 2.5 below.

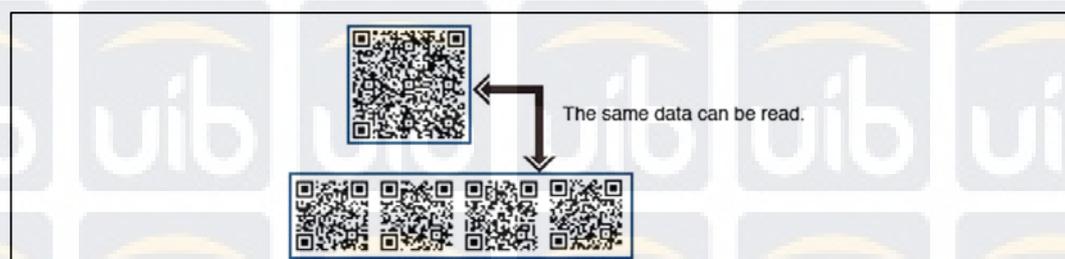


Figure 2.5 QR code divided into multiple data areas

According to Dyade & Bhande (2017), QR code can be used in any place and time. The app scanner will direct to a destination depending on the creator's choice. The usage of QR code encourages the engagement to offline customer in an artistic manner. This kind of platform has been helpful for each customer and vendor as it saves advertising cost by sharing QR code that leads to their own website URL (Universal Resource Locator). Therefore, client will be able to scan the QR code to store data for future reference.

The most frequent use case of using QR codes as stated by Lerner, Saxena, Ouimet, Turley, Vance, Tadayoshi, and Roesner (2015) are shortened URLs. The majority of website link and URL scanned from a QR code are shortened from several URL shortening services which are bit.ly or goo.gl. Furthermore, some QR codes are easier to scan because it contains shortened URLs that will have less data density and structure complexity. QR codes can also be used in encoding private information into a QR code. Some example for QR code with private information are wifi setup codes, two-factor authentication for web login purposes, device pairing, and e-tickets for boarding or events.

2.2.6. Laravel

According to Bean, (2015), Laravel is a PHP framework that reuses and assembles multiple existing components to provide developer with a cohesive layer to build web application in a more structure and pragmatic way. Laravel framework uses the Model-View-Controller (MVC) paradigm or design pattern which manages the project resources such as databases, data processing modules, and templates.

Laravel provides multiple advantages and features compared to other frameworks.

It has been designed to produce expressive and simple syntax which is more readable for someone new to a project. Laravel has a fluent query builder which issues database queries with a simpler PHP syntax where you simply chain methods instead of writing the whole SQL statement. Laravel is one of the few PHP frameworks that offer true code modularity. It provides this by combining multiple drivers and its bundle system which allows you to easily change and extend caching, storage upload and download, session, and database authentication functionality.

One of the use case of Laravel framework by Parkar, Shinde, Gadade, & Shinde, (2016) in the journal entitled “Utilization of Laravel Framework for Development of Web Based Recruitment Tool”. In this journal, the authors implemented a general recruitment tool by considering all the activities of recruitment process. The tool is very functional, automatic and reduces paperwork. The use of Laravel framework enhanced the development process and provides security from different external attacks. Other than that, the framework also helps for fast application development.

2.2.7. Entity Relationship Diagram

According to Dedhia, Jain, & Deulkar (2015), entity relationship diagram (ERD) is defined as a blueprint of data which helps understand the complexities of a function system. ER model display the interaction among system analysis, designers, programmers, and end users. The main component of ER model are entity, attribute, relations, and cardinality. A collection of entities with more than

one property is called an entity set. Some example for entity are “shop” and “employee”. Entity is represented using a rectangle box in the ER diagram. An attribute is a property or characteristic of an entity which is represented using ellipse in the ER diagram. Some example of attributes are “name”, “age”, “address”.

Relation between entities is represented using diamond shape in the ER diagram.

For example one citizen can only own one citizenship ID which implies a one-to-one relation, an author can write multiple books which implies a one-to-many relation, a hotel room can be booked by multiple customer and reversely a customer can book multiple hotel room which implies a many-to-many relation.

According to Alkoshman (2015), in Chan ER notation, the cardinality between two entities is represented using a single line or double line. For example in Figure 2.6, each department may employ many employees, and all employees must work in only one department.

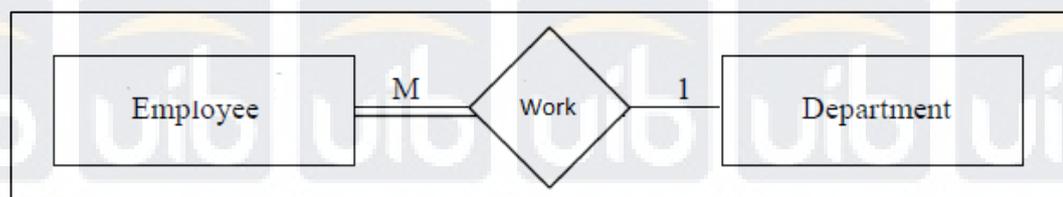


Figure 2.6 Chen notation entity relationship diagram cardinality

2.2.8. Flowchart

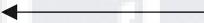
According to Tiwari & Prasad (2015), flowchart is a graphic representation that describes the logic sequence, work or manufacturing process, organization chart, or any work structure. Flowchart is used to provide common language or reference point regarding a project or process. Flowchart is a system or process

visualizer which consists of five object such as process / operation, branching / flow control, file and information storage, input output, and data processing symbols.

Flowchart is a tool developed in various field to show refined form of process. The diagram is made up of boxes, diamond, and other shapes which are connected by arrows to show the operation of an algorithm. These symbols are shown in Table

2.2.

Table 2.2 *Notations, Functions, and Shapes of Flowchart*

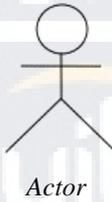
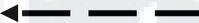
<i>Notation and Function</i>	<i>Shape</i>
<p>Process</p> <p>Process represents a process, activity, or function.</p>	
<p>Flowline</p> <p>Flowline represents the direction that the process flow.</p>	
<p>Terminator</p> <p>Terminator represents the starting point and the end point of flowchart.</p>	
<p>Decision</p> <p>Decision represents the question or branch in the process flow.</p>	
<p>Data (I/O)</p> <p>Data represents data that are available for input or output</p>	

2.2.9. Use Case Diagram

According to Aleryani (2016), use case diagram is a diagram visualization used in system analysis, identify, clarify, and organize system requirements. Use

case diagram models real world object and system and describes the behavioural diagrams. This diagram is used to show how a system interacts with the external entities and how those entities behaves internally. Symbols in the use case diagram are shown in Table 2.3.

Table 2.3 *Notations, Functions, and Shapes of Use Case Diagram*

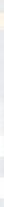
<i>Notation and Function</i>	<i>Shape</i>
<p>Actor</p> <p>Actor is a person or a group of people outside the system which has a role in one or more interaction with the system using use case. Actor represents where information comes from and where it goes.</p>	
<p>Use Case</p> <p>Use Case shows the function provided by the system as an message exchange unit with actor.</p>	
<p>Association Relationship</p> <p>Association relationship represents the connection between use case and actor.</p>	
<p>Include Relationship</p> <p>Include relationship represents use case which is required in the process of executing another use case.</p>	<p><<include>></p> 
<p>Extend Relationship</p> <p>Extend relationship represents an extension of a use case if it fulfills certain requirement and conditions.</p>	<p><<extend>></p> 

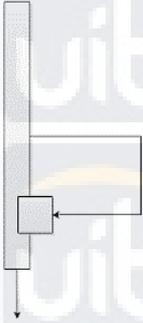
<p>Boundary</p> <p>Boundary determines the boundary of the system where the use case of the system resides.</p>	
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2.2.10. Sequence Diagram

According to Valarmathi, Thiyagaraj, Jayapriya, Sowmiya, & Balamurugan (2015), sequence diagram models the behavior of use cases by describing interaction between group of objects to complete certain task. This diagram demonstrate how object supports the behavior such as data and message exchange and represents sequence of events that occurred in order. Sequence diagram contains elements which are shown in Table 2.4.

Table 2.4 *Notations, Functions, and Shapes of Sequence Diagram*

<i>Notation and Function</i>	<i>Shape</i>
<p>Object</p> <p>Objects that participate in the sequence diagram is drawn across the top which represents entity class.</p>	
<p>Lifeline</p> <p>Lifeline is a dotted line dropped from each object in the sequence diagram. Lifeline indicates messages that are sent to the object. Sequence flows from top to bottom.</p>	

<p>Active</p> <p>Active depicts that an object is executing in that duration.</p>	
<p>Message</p> <p>Message in form of horizontal arrow sent from one object to another with parameters.</p>	
<p>Return</p> <p>Return indicates when one object commands another in which a value is often returned to itself.</p>	
<p>Iteration</p> <p>Iteration represents square brackets which indicates expression that describes the iteration rule</p>	

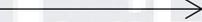
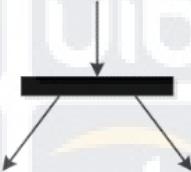
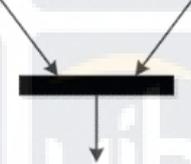
2.2.11. Activity Diagram

According to Thanki & Shinde (2014), activity diagram depicts the flow behavior of a system that extracts the main process contained in flowchart. The activity diagram contains activity states made up of smaller actions represented in a workflow. Activities are to be reused in the application and are typically specific. Notations in activity diagram are inspired by flowchart. Activity diagram starts with initial node and end with final node. Detail code, pre-condition, and post-condition

of an activity is included in the activity diagram. The nodes represents process or process control such as action, activity, decision, swimlane, fork, join, and object.

Symbols used in activity diagram are shown in Table 2.5.

Table 2.5 *Notations, Functions, and Shapes of Activity Diagram*

<i>Notation and Function</i>	<i>Shape</i>
<p><i>Activity</i></p> <p>Activity depicts a process or an ongoing activity.</p>	
<p><i>Control flow</i></p> <p>Control flow shows the flow of an activity execution.</p>	
<p><i>Initial node</i></p> <p>Initial node is a starting point of activity diagram with no incoming edge.</p>	
<p><i>End node</i></p> <p>End node is the last point of activity diagram.</p>	
<p><i>Fork node</i></p> <p>Fork node splits an incoming flow into multiple outgoing flows.</p>	
<p><i>Join node</i></p> <p>Join node merges multiple flows of an activity into to a single flow.</p>	
<p><i>Decision node</i></p> <p>Decision node determines and control different output flows based on Boolean</p>	

expression. This node contains one incoming flow and produces multiple outgoing flow where only one flow will be taken.

Swimlane

Swimlane is depicted as the boundary of where the activity workflow is visualized.

