CHAPTER 2

THEORITICAL

2.1 Understanding the System

According toMarakas/O'Brien (2013:25) "Introduction to Information System" Sixth edition, a "system is a set of interrelated components, with a clearly defined boundary, working together to achieve a common set of objectives by accepting inputs and producing outputs in an organized transformation process".

Based on the above definition can be concluded that a system is a set of elements or components that are interconnected to achieve a certain goal.

2.2 Components of Information Systems

A system consists of a number of interacting components, which means working together to form a unity. System components or system elements can be either a subsystem or the parts of the system.

A system has three basic functions:

1. **Input** involves a capturing and assembling elements that enter the system to be processed. For example, raw materials, energy, data, and human effort must be secured and organized for processing,

2. **Processing** involves transformation processes that convert input into output. Examples are login processes, the human breathing process, or mathematical calculations.

3. **Output** involves transferring elements that have been produced by a transformation process to their ultimate destination.

4. **Control Mechanism**

   Every system is expected to generate some sort of standardized output. Hence, actual output needs to be compared with what it is supposed to generate. This comparison of actual with expected output is done with the help of control mechanism.

5. **Feedback System**

   Once the control mechanism has been devised, it needs to a reporting mechanism which should respond with a corrective action if required.

2.3 Information System and Fundamentals

A system is a set of interrelated components that function together to achieve one or moreresults. For example, a computer System includes both hardware and software toprocess any information.Information is the result of data processing, the data is processed, manipulated,organized, in order to be in suitable form for human interpretation.Information system (IS)is an arrangement of people, data, processes, andinformation technology that interact to collect, process, store, and provide as output the information needed to support an organization. An example is a hotel Online Booking System and Student Online registration System.

Information Technology (IT), as defined by the Information Technologyassociation of America (ITAA), means all computerized and auxiliary automatedinformation handling, including system analysis and design, computer programming, data conversion, information storage and retrieval, data communication, voice, video, requisite systems controls, and simulation. Generally the term Information Technology is abbreviated with informationtechnology.

2.4Database Concept

2.4.1 Data

According to Yasmi (2011: IP Class), “data are raw facts about physical phenomena or business transactions such as an employee’s name and number of hours worked in a week, inventory part numbers or sales orders”.Data is a representation of facts, concepts, or instructions in a manner suitablefor communication, interpretation, or processing by humans or by automated means; data consists of basic facts that are the system's raw material.

2.4.2 Data verse Information

According to Marakas/O’Brien (2013: 32), Introduction to Information Management Systems, data are raw facts or observations, typically about physical phenomena or business transactions. Data and information are closely related, and in fact are often usedinterchangeably. However it is useful to distinguish between data and information. Information is normally defined as data that has been

processed in such a way that it can increase the knowledge of the person who uses the data.

2.4.3 Database

According to Yasmi (2011: IP Class), “Database is an organized collection of related data elements. It means that data arestructured in manner suitable to be stored, manipulated, and retrieved by users”. By related mean the data describe domain of interest to a group of users and that the users can use the data to answer questions concerning that domain.

Moreover, database is collection of data structured in such a manner that user can retrieve desired data in a proficient way. It consist of tables which a collection of related data. Table is similar to grid with rows and columns. [1, 2] Generally, database is a combination of fields, records and files [1]. You can define field a smallest piece of data that cannot be divided further and record is a collection of related fields and files consist of multiple records. [1]

2.4.4 Identification of Entities

Entity is a basic data object in database modeling. It is a person, object, place, event, or concept in the user environment aboutwhich the organization wishes maintain data.

2.4.5 Entity Relationship Diagram

An entity-relationship (ER) diagram is a specialized graphic that illustrates theinterrelationships between entities in a database. ER diagrams often use symbols to represent three different types of information. Boxes are commonly used to represent entities..Diamonds are normally used to represent relationships and ovals are used to represent attributes.

2.4.6 Tables

A table is a two-dimensional display of data values corresponding to an entity.The columns of a table represent the characteristics of the entity, and the rows represent instance of the entity.

2.4.7 Record

A record is a generic term of a row in database, just like a card. A record veryoften represents a piece of content of all the fields used to capture, organize, and store the attributes of an entity. The dynamic functionality and much of the content of Mambo relies in a database in order to function.

2.4.8 Field

The location in a database record reserve for a particular type of data; forexample in library catalog, author, title; subject headings would all be stored in specific fields.

2.4.9 Attributes

Entity contains a set of attributes. A named property or characteristic of an entity that is of interest to anorganization. An attribute is smallest information that cannot be divided further. In a database management system (DBMS), an attributes refers to a component such as table. It also may refer to a database field. Attributes describes instances in the row of the database. An example of attribute is such as personnel_Id.

2.4.10 Primary key

The primary key is used to create relationships between tables. It's (the entrykeyed off of) to identify the record in question.An otherwise meaningless surrogate value is often used for the primary key. The primary key for an entry must never change: if the referred to by a record in a different table, the relationship (link) will be often irretrievably broken.

Primary key attribute is that attribute which make such that each record in a table is unique. The basic principles for selecting primary key attributes are given below;

1. Primary key should be unique
2. Primary key should be not null
3. Primary key should not be updatable

When declaring primary key for table developer has two choices, firstly to select a primary key for from the original attributes and secondly developer can choose an auto generated primary key by DBMS.

2.4.11 Foreign Key

A foreign key is a reference to a key in another table, meaning that thereferencing table has, as one of its attributes, the values of a key in the referenced table. Usually a foreign key will be a primary key in another table.

2.4.12 Data Modeling

Data Modeling is performed during the initial phases of database development process. The data model focuses only on what information should be stored in the database. The information needed to build the data is obtained during the requirement analysis. A comprehensive data model should be into account the current and future needs of the organization in order to support the business process of the organization.

It is a technique for organizing and documenting a system's data. Sometimes it iscalled database modeling because it is eventually implemented as a database. The actual model is frequently called Entity Relationship Diagram (ERD), where entity means a class of persons, objects, events or concepts about which we need to capture and store data and relationship means association among the instance of one or more entity types.

2.4.13 Rational Database

Relational database creates relationships between fields in tables explicitlythrough keyed fields.Because the relationships are not handled programmatically but are integral to the data itself, users can access the data without knowing the physical structure of the data (i.e. how data are written on disk). Logically, relational databases lend themselves very efficiently to many situations, and because their structure is transparent, they can be designed and modified relatively easily.

2.4.14 Database management System (DBMS)

A collection of programs that enable a user to enter, modify, manage, and deleteinformation in a database. There are different type of DBMSs, ranging from small systems that run on personal computers to huge systems that run on mainframes.

Organizations use a lot of data. A database management system (DBMS) is a software tool that makes it possible to organize data in a database.

Following elements are contains of DBMS;

1. The physical database: The collection of files that contain the data
2. The database engine: The software that makes it possible to access and modify the contents of the database
3. The database scheme: The specification of the logical structure of the data stored in the database

2.5 Database in Network Environment

2.5.1 Network Environment

According to Wikipedia, “a computer network or telecommunication networks which allows computers to exchange data”. In computer networks, networked computing devices pass data to each other along network links (data connection). Data is transferred in the form of packets. The connections between nodes are established using either cable media or wireless media. The best know computer network is the internet.

2.5.2 Client/Server Architecture

A Network architecture in which each computer or process on the network is either a client or a server.Servers are powerful computers or process dedicated to managing disk drives (file servers), printers (print serves), or network traffic (network servers).

Client are PCs or workstations on which users run applications. Clients rely on servers for resources, such as files, devices, and even processing power. Another type of network architecture is known as a peer-to-peer architecture because each node has equivalent responsibilities.

Both client/server and peer-to-peer architectures are widely used, and each has unique advantages and disadvantages. Client-server architectures are sometimes called two-tier architectures.

2.5.3 Client Server

Client/server describes the relationship between two computer programs in whichone program, the client, makes a service request from another program, the server, which fulfils the request. Although the client/server idea can be used by programs within a single computer, it is a more important idea in a network. In a network, the client/server model provides a convenient way to interconnect programs that are distributed efficiently across different locations.

2.5.4 Database Server

A database server is a computer program that provides database services toother computer programs or computers, as defined by the client-server model.

2.5.5 Web Server

A computer program that is responsible for accepting HTTP requests fromclients, which are known as web browsers, and serving them HTTP responses along with optional data contents, which usually are web pages such as HTML documents and linked objects (images, etc.).

2.5.6 Web Browser

A web browser is a software application that enables a user to display andinteract with text, images, videos, music and other information typically located on a Web page at a website on the World Wide Web or a local area network. Some of the popular browsers are: Google Chrome, Mozilla Firefox, Netscape, and Opera and further.

2.5.7 Web Page

According to Tech Terms.com, “Web Pages are what make up the World Wide Web (www)” and it is a block of data available on the world-wide web, identified by an URL. These documents are written in HTML (hypertext markup language) and are translated by your Web browser.

2.5.8 Web Site

According to Tech Terms.com, “awebsiteis a set of interconnected web pages, usually including a homepage,generally located on the same server, and prepared andmaintained as a collection of information by a person, group, or organization”.

2.6 Tools and language Use

The following are tools and languages used during the creation of course schedule processing.

2.6.1 HTML

Hypertext Markup Language" is the authoring language used to create documents on the World Wide Web (www). HTML is similar to SGML, although it is not a strict subset.HTML defines the structure and layout of a Web document by using a variety of tags and attributes. All the information you'd like to include in your Web page fits in between the tags.There are hundreds of other tags used to format and layout the information in a web page. Tags are also used to specify hypertext links. These allow Web developers to direct users to other web pages with only a click of the mouse on either an image or word(s).

2.6.2 PHP

PHP is a powerful tool for making dynamic and interactive Web pages.PHP is the widely-used, free, and efficient alternative to competitors such as Microsoft's ASP.PHP is an HTML-embedded scripting language. Much of its syntax is borrowed from C, Java and Perl with a couple of unique PHP-specific features thrown in. The goal of the language is to allow web developers to write dynamically generated pages quickly.

2.6.3 MySQL

Mysql is a relational database management system. It stores data in separate tables rather than putting all the data in one big storeroom. This adds speed flexibility. The Mysql database server is very fast, reliable cheaper and easy to use and learn. Mysql today offers a rich and useful set of functions. Its connectivity, speed and security make it highly suited for accessing databases on the Internet, it

also supports clustering technology.Furthermore, MySQL is a software package that enables the creation, maintenance andmanagement of database. MySQL is a Structured Query Language (SQL) based,client/server relational database. Each of these terms describes a fundamental part of thearchitecture of MySQL Server.

After selecting the architecture of application, the foremost assignment was to choose the technology for the development of application. At that point, we had several choices but the issues that compelled us for PHP is as follows;

1. Open source
2. Easy to use
3. Portable
4. Relatively easy to learn
5. C-style syntax
6. Feature rich
7. Large community base
8. In active development
9. Extensible

2.6.4 Apache Server

Apache has been the world's most popular Web server (HTTP server) on theInternet since April 1996 and is generally considered to be more stable than other servers. The name Apache derives from the word patchy that the Apache developers used to describe early versions of their software. This web server has been chosen because of its performance regarding to the other servers.

2.6.5 JavaScript

A popular scripting language that is widely supported in Web browsers and otherWeb tools. It adds interactive functions to HTML pages, which are otherwise static, since HTML is a display language, not a programming language.On the client, JavaScript is maintained as source code embedded into an HTML page. On the server, it is compiled into byte code (intermediate language), similar to Java programs.

2.6.6Java Programming

Java is a programming language that can run on a variety of computers including mobile phones. This language was originally created by James Gosling while still joined Sun Microsystems is now a part of Oracle and released in 1995. These languages are adopting syntactic contained in C and C ++ but with syntax simpler object model and support top-down routines minimal.

Java based applications are generally compiled into p-code (byte code) and can run on different Java Virtual Machine (JVM). Java is a programming language that is general / non-specific (general purpose), and is specifically designed to utilize minimal implementation dependencies as possible. Because the functionality that allows Java applications can run on several different operating system platforms. Currently Java is a programming language used most popular and widely used in the development of various types of software applications or web-based applications.

According Noviyanto (2009) Characteristics of Java, among others:

- **Simple**: No programming language is simple, but is a bit easier than the popular object-oriented programming language C++. Greatly simplified and improved, easy to write and read due to its clean syntax.

- **Object Oriented**: Java is inherently object-oriented, which OOP is a popular programming approach that is replacing traditional procedural programming techniques.A Java programming is OO because programming in Java is centered on creating objects, manipulating objects, an

- **Distributed**: Distributed computing involves several computers working together on a network. Java is designed to make distributed computing easy.

- Interpreted: You need an interpreter to run a Java programs. The programs are compiled into a Java Virtual Machine code (JVM) called *bytecode.*Bytecode is machine-independent and can run on any machine that has a Java interpreter, which is part of the JVM.

- Robust: Robust means reliable. No programming language can ensure complete reliability. Java puts a lot of emphasis on early checking for possible errors, because Java compilers can detect many problems that would first show up at execution time in other language.

- Secure: Java implements several security mechanisms your systems against harm caused by stray programs. The security is based on the premise that *nothing should be trusted.*

- Neutral Architecture: Java is interpreted. This feature enables Java to be *architecture-neutral,* or to use an alternative term, *platform-independent*. With

JVM, a program can be written that will run on any platform.(Windows, OS/2, Macintosh, and various UNIX).

- Portable: Because Java is architecture neutral, Java programs are portable, can be run on any platform without being recompiled. No platform-specific features in Java language and Java environment is portable to new hardware and OS.

- **Performance:** Java's performance have been sometimes criticized. The execution f the byte code is never as fast as it could be with a compiled language, such as C++. Because Java is interpreted, the byte code is not directly executed by the system, but is run through the interpreter. But the new JVM is significantly faster due to the new JVM uses a technology known as *just-in-time compilation*.

- **Multithreaded:** Multithreading is a program's capability to perform several tasks simultaneously.

- Dynamic: Java was designed to adapt to an evolving environment.

Various Java 2 Software Developers Kit (J2SDK), among others:

- J2SE (Java 2 Standard Edition): is the premier platform rapidly developing and deploying secure, portable applications that run on the server and desktop systems.

- **J2EE (Java 2 Enterprise Edition):** for Web enterprise architects, includes all the features of Advanced Edition, plus; full distributed objects and business process integration capabilities, complete backup and restore support and many other features.

- **J2ME (Java 2 Micro Edition):** is a java platform for consumer and embedded devices such as mobile phones, PDAs, TV Set-top boxes, in vehicle telematics system and abroad range of embedded devices.

Java has a platform that is;

- Java Virtual Machine (Java VM): Java VM does such job as create user services, create and manage components and .NET assembles, consume and manipulate data, Test debug and deploy a Windows-based application, maintain and supports Windows-based application and configure and secure a Windows-based application.

- Java Application Programming Interface (Java API): is a huge library consisting of at least 3,000 canned programs, each with its own functionality, its own limitations, and its own rules for effective use.

Java applications, among others:

- Stand alone: is an application that is not running inside an application server. In technical terms, a Java Stand Alone application has a main method, which is similar to a main entry point of a traditional COBOL or PL/1 load module.

- Applets: Applets are defined as subclass of the class

a) Applets in the package java.applet or

b) JApplets in the package javax.swing

Applet is a small Java program that is embedded and ran in some other Java interpreter program such as;

a) a Java technology-enabled browser

b) Sun's applet viewer program called applet viewer

- Windows-based Applications (GUI):A page-based contouring program for crystallographic maps.

- Java Servlet: Java Servlet are generic extensions to Java embedded servers. Their most common use is to extend Web servers, providing a very efficient,

portable, and easy-to-use replacement for CGI. A Servlet is a dynamically loaded module that serves request from a Web server.

- **Java Server Pages (JSP):** Java Server Pages also known as JSP, are simple but powerful technology used to generate dynamic HTML on the server side. It is a direct extension of Java Servlet and provides a way to separate content generation from content presentation.

- **Java Beans and Enterprise Java Beans**: is a developmental architecture for building highly scalable and robust enterprise level applications to be deployed on J2EE compliant Application Server such as JBOSS, Web Logic, etc.

- Java Micro Edition:

2.6.7CSS (Cascading Style Sheet)

It stands for Cascading Style Sheet. Style sheet refers to the document itself.Style sheets have been used for document design for years. They are the technical specifications for a layout, whether print or online. Print designers use style sheets to insure that their designs are printed exactly to specifications.

2.6.8 Unified Modeling Language (UML)

According to Adi Nugroho (2005). "Unified Modeling Language (UML) is a tool of analysis and design of object-based software". Unified Modeling Language (UML) is a standard modeling language consisting of clusters diagram, developed to help developers and software systems in order to accomplish tasks such as: Specifications, Visualization, Architectural Design, Construction, Simulation and testing and documentation ".

Based on some of the opinions expressed above can be concluded that the "Unified Modeling Language (UML) is a language that is based on the graphic or picture to visualize, specify, build and documentation of a software development system based OO (Object Oriented)". UML is a collection of the best techniques that have proven successful in modeling large and complex systems. UML is not only used in process modeling software, but almost in all the fields that require modeling. The main parts of the UML is View, Diagram, a model element, and general mechanism.

1. View

View used to see the system being modeled from several different aspects. View not see the graph, but is an abstraction that contains a number of diagrams. Several types View in UML, among others: Use Case View, Logical View, Component View, concurrency View, and Deployment View.

2. Use Case View

Use Case View describe the functionality of the system is supposed to do according to the desired external actors. Actors that interact with the system can be either a user or system is described in other. View Use Case Diagrams and sometimes with Activity Diagrams. This view is used primarily for the customer, the designer, developers, and system testers.

3. Logical View

Logical View describes how the functionality of the system, the static structure (class, object, and relationship) and dynamic collaboration that occurs when an object sends a message to another object in a particular function. This view is described in the Class Diagram for the static structure and the State, Sequence,

and Activity Diagrams for dynamic models. This view is used for the designer and developers.

4. Component View

Component View describe the implementation and dependency modules. Components which are other types of code modules are shown with the structure and dependence also resource allocation component and other administrative information. This view is described in the Component View and used for the developers.

5. Concurrency View

Concurrency View divide the system into the process and processor. This view is described in the dynamic diagram (State, Sequence, Collaboration, and Activity Diagrams) and Diagrams implementation (Component and Deployment diagrams) and used for the developers, integrator, and testers.

6. Deployment View

Deployment View describe physical systems such as computers and devices (nodes) and how it relates to this other. View described in Deployment Diagrams and used for the developers, integrator, and testers.

7. Diagram

Diagram shaped graph showing symbol of model elements are arranged to illustrate certain parts or aspects of the system. A diagram is a part of a particular View and when described usually allocated for a particular View. The type of diagram, among others are:

1. Use Case Diagram

According to Rosa A.S M. Shalahuddin, Software Engineering, 2013: 155, Use case or use case diagram is a model for the behavior information systems will be made. Use case describes an interaction between one or more actors with information systems that will be made. Roughly speaking, the use case is used to determine what function is in an information system and who is entitled to use those functions. Terms naming the use case is defined name as simple as possible and understandable.

2. Activity Diagrams

According toRosa A.S M. Shalahuddin, Software Engineering, 2013: 161, Diagram activity or activity diagram illustrates the workflow or the activity of a system or business process or menu in the software. Noteworthy here is that the activity diagram illustrates the activity of the system is not what actors do, so activities can be carried out by the system.

3. Sequence Diagram

According to Rosa A.S M. Shalahuddin, Software Engineering, 2013: 165, Diagram sequences or sequence diagram illustrates the behavior of objects in use case by describing the life time of the object and the message that is sent and received between objects. Therefore, to describe the sequence diagram objects must be known to be involved in a use case along with the methods of the class owned instant(computer operational) become the object. Creating a sequence diagram is also needed to look at the existing scenario in the use case.

4. Class Diagram

According to Rosa A. S M. Shalahuddin, Software Engineering, 2013: 141, grade or class diagram is a diagram depicting the structure of the system in terms of

defining the classes that will be made to build the system. Classes have what are called attributes and methods or operations. Attributes are variables owned by a class, operations or methods are functions that are owned by the class.

The class diagram is made so that the programmer or programmer make appropriate design classes in the class diagram that between design and software documentation in sync.

5. Component Diagram

According to Rosa A. S M. Shalahuddin, Software Engineering, 2013: 148, Diagram components or component diagram is made to show the organization and dependence among a collection of components in a system. Diagram component focuses on components and systems needed in the system.

6. Deployment Diagram

According to Rosa A. S M. Shalahuddin, Software Engineering, 2013: 154, Diagram deployment or deployment diagram showing the configuration of the components in the process of execution of the application. Deployment diagram can also be used to model such things, additional systems (embedded systems) that portray the device design, nodes, and hardware.

The purpose of the use of UML as follows:

A. Provide modeling language that is free from various discuss programming and engineering processes.

B. Brings together the best practices contained in the modeling.

C. Provide ready-made model, expressive visual modeling language support to develop and exchange models easily and commonly understood.

D. UML can also function as a blueprint for a very complete and detailed. With this blueprint will be known bias detailed information about the coding program or even to read and interpret the program back into shape diagram (reserve engineering).

While the software that supports the creation of UML diagram, namely:

a) Star UML

Star UML is an open source project for developing Star fast, flexible, extensible, featureful, and freely-available UML / MDA platform running on a platform Win32.Tujuan of Star UML project is to build a software modeling tool and also platform that is interesting is the replacement tool commercial UML Rational Rose, Together and so on.

b) Acceleo

Acceleo is a code generator that transforms the model into code. Acceleo is easy to use and provide "off the shelf" template generator and editor for Eclipse.

c) Argo UML

Argo UML is a UML modeling tool Star open reputable source and includes support for all standard UML 1.4 diagrams. It runs on any Java platform and is available in ten languages.

2.6.9 SQLite

The database system used by Android are SQLite. SQLite is a SQL-based database, but it has many limitations, one of which is the provision of data types is limited and does not support the concept of normalization. Database created can only be accessed by the application itself. And for what we use SQLite?

Commonly used to store data temporarily. While normally used for permanent data web service.

SQLite is an embedded SQL database engine. Unlike most other SQL databases, SQLite does not have a separate server process. SQLite reads and writes directly to ordinary disk files. A complete SQL database with multiple tables, indexes, triggers, and views, contained in a single disk file. Database file format is cross-platform - you can freely copy a database between 32-bit and 64-bit or between big-endian and little-endian architectures. These features make SQLite a popular choice as an Application File Format. Think of SQLite not as a replacement for Oracle but as a replacement for fopen ()

2.7 Scheduling

Definition

Scheduling is an ongoing process.

2.7.1 The notion of scheduling is as follows:

Scheduling is a collection of policies and mechanisms in the system operations related to the sequence of work done by a computer system. Scheduling in charge of deciding:

The process should be run:

a) When and for how long the process was running

b) Main target Scheduling Optimization Process work by certain criteria.

2.7.2 Scheduling Criteria

According to (Tan: 92 and MIL:92),the criteria for measuring and optimization of scheduling performance:

1. Fair
2. Efficiency
3. Response Time
4. Turnaround Time
5. Throughput

1. Fair (Fairness)

   Fair is similar process as necessary to get the allotted time processing a similar where there is no process that is not assigned to the service processor thus experiencing start vision. Scheduling target should ensure each service process gets a fair processing.

2. Efficiency

   Efficiency of processor utilization is calculated by comparison (ratio) time busy processing. Scheduling target is to keep the processor into a busy state thus achieving maximum efficiency. Busy is not processing

unemployed; including the time spends to execute user programs and the operating system.

3. Response time

Different response time for;

a. Interactive Systems
b. Real-time Systems

i. Response time in interactive Systems

Response time interactive system is defined as the time spent from the time from the last character of the command or transaction entered until the first result appears on the screen (terminal). The response time is known as terminal response time.

ii. Response time to the real time system (Real Time)

In Real-time systems, response time is defined as the real time from the moment events (internal or external) until the first instruction routine service is executed, known as event response time. Target scheduling is to minimize response time.

4. Turnaround Time

Turnaround time is the time spent on the current program or job starting to get into the system until the system completed. Time is the

time spent in the system, expressed as the amount of time execution (service time job) and waiting time, as, Turnaround Time = execution time + waiting time. Target scheduling is to minimize the response time.

5. Throughput

Throughput is the amount of work that can be completed in one unit of time. How to express the throughput is the number of tasks that users can executed in one unit time or interval. Target scheduling is to minimize the amount of task that is processed at a time interval. Higher number throughput more work done system. This criterion is mutually joined and can also be contradictory so it is not possible optimization of all criteria simultaneously. For instance, to give a small response scheduling requires a frequent switching between the processes. It will help increases the throughput and reduces system overhead. Wisdom design scheduling involves a compromise between the needs of its other. This compromise relies on nature and use of computer systems.

2.7.3 Physic Class

Physic is the study of the world of its most fundamental levels, whatever those levels turn out to be. It is a field which underlies everything else. Students who are eligible are those students who meet the requirements of the University criteria. Those are students from the National High Schools and Secondary

Schools throughout the country only accepted to further their interest of knowledge. Also students from other Pacific countries and nationals are accepted on the conditions that those required requirements are met under the education system of the country.

2.8 Networking Topology

In communication networks, a topology is usually a schematic description of the arrangement of a network, including its nodes and connecting lines. There are two ways of defining network geometry: the physical topology and the logical (or signal) topology.

2.8.1 Basic Types of Network Topologies

The basic topologies used in wide area and local area telecommunication networks are as follows:

1. Star
2. Ring
3. Bus
4. Mesh
5. Wireless

Star, According to Marakas/O'Brien (2013: 266), Introduction to Information Management Systems, star network ties end-user computers to a central computer.

There is a central computer or server to which all workstations are directly connected. Every workstation is indirectly connected to every other through the central computer.

Ring,According to Marakas/O'Brien (2013: 266) Introduction to Information Management Systems, ring network ties local computer processors together in a ring on a more equal basis. The workstations are connected in a closed loop configuration. Adjacent pairs of workstations are directly connected. Other pairs of workstations are indirectly connected, the data passing through one or more intermediate nodes.

Bus, According to Marakas/O'Brien (2013: 266) Introduction to Information Management Systems, a bus network is a network in which local processors share the same bus, or communication channel.Every workstation is connected to a main cable called the bus. Therefore, in effect, each workstation is directly connected to every other workstation in the network.

Mesh is a variation of ring network. It uses direct communications lines to connect some or all of the computers in a ring to one another.

Wireless is cell-based technology that uses unbounded media. Two types of wireless topologies are:

a. Ad hoc

b. Infrastructure

The physical topology of a network is the actual geometric layout of workstations. There are several common physical topologies, as described above.