

**CLINIC MANAGEMENT SYSTEM: WARD MANAGEMENT SYSTEM**

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## ABSTRACT

Medical field is very important to human life because it can save a thousand of life but the usage of the clinical management system by using the electronic ways is not very popular among Malaysian. This can be compare to the overseas company that related to the medical stuff have already comfortable with the usage of electronic system. However, the overseas company still not applies the electronic system in all the clinical management phase. Example of the phase that not be discovered yet using this system is the wards department. In Malaysia, this system is not very popular because there is no interest in many of the medical staff to change from the manual system to the electronic system. Some of them think that the new ways can be more difficult compare to the usually ways. Therefore, this thesis proposes the new ways to apply some of the department in the clinical management system which is Ward Management System (WMS). By using these kinds of system all the patient information will be save into database in systematic and efficiently. This also can reduce the lost data problem because all the information will be kept in the database. This system also is not too complicated and easy to understand.

## ABSTRAK

Bidang perubatan merupakan salah satu bidang yg amat penting bagi manusia, kerana dengan adanya bidang ini pelbagai masalah dari segi kesihatan dapat diatasi dengan adanya penyelesaian bagi masalah kesihatan tersebut. Penggunaan kaedah elektronik bagi sistem klinik tidak terlalu popular dikalangan rakyat Malaysia. Berlainan pula bagi dengan syarikat-syarikat perubatan diluarnegara, penggunaan sistem ini telah menjadi kebiasaan dalam kehidupan mereka. Walaubagaimanapun tidak kesemua bahagian yang terdapat pada klinik sistem menggunakan kaedah sistem ini. Contoh salah satu jabatan yang masih belum ditemui secara spesifiknya menggunakan sistem elektronik ini ialah wad. Di Malaysia, penggunaan sistem ini tidak berleluasa kerana tiada rasa minat di dalam diri untuk berubah dari keadaan manual ke situasi yang lebih canggih dan inovatif. Ada juga yang menyatakan bahawa sistem yang mempunyai teknologi canggih lebih susah untuk diaplikasikan berbanding dengan sistem yang sedia ada. Oleh sebab itu, tesis ini dihasilkan untuk mengaplikasikan cara Teknologi Maklumat kepada sebahagian pengurusan dalam sistem klinik iaitu 'Sistem Pengurusan Wad'. Dengan adanya sistem ini semua data akan dapat disimpan dengan sistematik dan dapat menghasilkan pengurusan yang cekap. Dengan cara ini juga sistem ini dapat mengurangkan kehilangan data pesakit kerana kesemua data pesakit di simpan dalam pengkalan data pesakit. Maklumat yang terdapat didalam sistem ini mudah difahami dan tidak terlalu kompleks.

## TABLE OF CONTENTS

CHAPTER	TITLE	PAGE
	<b>TITLE PAGE</b>	<b>i</b>
	<b>DECLARATION OF ORIGINALITY AND EXCLUSIVENESS</b>	<b>ii</b>
	<b>DEDICATION</b>	<b>iii</b>
	<b>ACKNOWLEDGEMENT</b>	<b>iv</b>
	<b>ABSTRACT</b>	<b>v</b>
	<b>ABSTRAK</b>	<b>vi</b>
	<b>TABLE OF CONTENTS</b>	<b>vii</b>
	<b>LIST OF TABLES</b>	<b>x</b>
	<b>LIST OF FIGURES</b>	<b>xi</b>
	<b>LIST OF ABBREVIATIONS</b>	<b>xii</b>
	<b>LIST OF APPENDICES</b>	<b>xiii</b>
<b>1</b>	<b>INTRODUCTION</b>	<b>1</b>
	1.1 Introduction	1
	1.2 Problem Statement	2
	1.3 Objectives	2
	1.4 Scope	3
<b>2</b>	<b>LITERATURE REVIEW</b>	<b>4</b>
	2.1 Introduction	4
	2.2 Current System	5
	2.3 Introduction to Rule-Based System.	5

	2.3.1	Theory of Rule-Based Systems	6
	2.3.2	Comparison Between Ruled-Base and genetic Algorithm	8
	2.4	Introduction to JSP	9
	2.4.1	Advantage use JSP	11
	2.4.2	JSP compared to ASP	12
	2.4.3	JSP compared to Servlets	12
	2.6	Apache Web Server	12
	2.7	Macromedia Dreamweaver MX	13
	2.8	Oracle 9i	14
<b>3</b>		<b>METHODOLOGY</b>	<b>15</b>
	3.1	Introduction	15
	3.2	Software Process	15
	3.3	Requirement and Analysis Phase	17
	3.3.1	Bed Arrangement	18
	3.3.2	Patient Record	19
	3.3.3	Patient Report	19
	3.3.4	Patient List	19
	3.3.5	Patient History	19
	3.4	Design Phase	20
	3.4.1	Preliminary Design Presentation	20
	3.4.2	Database design	22
	3.4.3	Sequence Diagram	26
	3.5	Implementation and Integration Phase	29
	3.6	Testing Phase	30
	3.7	Software and Hardware Specification	30

<b>4</b>	<b>RESULT AND DISCUSSION</b>	<b>32</b>
4.1	Introduction	32
4.2	Advantage of Ward Management System	32
4.3	Disadvantage of Ward Management System	33
4.4	Output from Testing	33
	4.4.1 Bed Arrangement	33
	4.4.2 Patient Record	34
	4.4.3 Patient Report	34
	4.4.4 Patient List	34
	4.4.5 Patient History	34
4.5	Discussion	35
4.6	Assumption	35
4.7	Output Software Deliverable	35
	4.7.1 Technical Document	36
	4.7.2 User Guide Manual	36
4.8	Constraints	36
	4.8.1 The Constraint in Technique Apply	37
4.9	Recommendations	37
	4.9.1 Product Recommendations	37
	4.9.2 Software Process Recommendations	38
<b>5</b>	<b>CONCLUSION</b>	<b>40</b>
	<b>REFERENCES</b>	<b>41</b>
	<b>APPENDICES A-D</b>	<b>42-88</b>

**LIST OF TABLES**

<b>TABLE NO</b>	<b>TITLE</b>	<b>PAGE</b>
3.1	The Data Dictionary of Detail Table	25
3.2	The Data Dictionary of Record Table	25
3.3	The Data Dictionary of Report Table	26
3.4	The Data Dictionary of Doctor Table	26
3.5	The Data Dictionary of Report1 Table	26
3.6	Software Specification	30
3.7	Hardware Specification	31

## LIST OF FIGURES

<b>FIGURE NO</b>	<b>TITLE</b>	<b>PAGE</b>
2.1	Connection in JSP	9
2.2	Process in JSP	10
2.3	Moving JSP	11
3.1	CMSWM in Rapid System Development Life Cycle	16
3.2	The Process of Determining Requirements	17
3.3	Use Case Clinic Management System: Ward Management System.	18
3.4	Architecture Layering of WMS Module System	20
3.5	Preliminary Design for WMS	21
3.6	Database design for CMSWM	24
3.7	Sequence diagram-Bed Arrangement	27
3.8	Sequence diagram-Patient Record	27
3.9	Sequence diagram-Patient Report	28
3.10	Sequence diagram-Patient History	28
3.11	Sequence diagram-Patient List	29



**LIST OF ABBREVIATIONS**

AI	-	Artificial Intelligent
ASP	-	Active Server Pages
DBMS	-	Database Management System
EJB	-	Enterprise Java Bean
GA	-	Genetic Algorithm
HTML	-	HyperText Markup Language
HTTP	-	HyperText Transfer Protocol
ISDN	-	Integrated Services Digital network
JSP	-	Java Server Pages
PC	-	Personal Computer
RSDLC	-	Rapid System Development Life Cycle
SDD	-	Software Design Document
WMS	-	Ward Management System

**LIST OF APPENDICES**

<b>APPENDIX</b>	<b>TITLE</b>	<b>PAGE</b>
A	Gantt chart	40
B	Result Interface Testing	42
C	User Manual	48
D	Ruled-Based Coding	69

## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 Introduction**

Clinic Management System: Ward Management System is a web base application and developed for managing and updating all patient data in the ward. It will begin when patient make a registration until the patient check out from the ward. After that the record will be save and can be use as a reference for future use. The main purpose of developing this system is to manage all data systematic and efficiently.

The user of this system is the hospital staff. All data can only be access by doctor and nurse. The system begin when the patient sign in for the particular ward. After a registration is made, the patient will automatically get the suitable bed according to their disease, work status (government or private), age and citizenship. The doctor will check patient daily and record the patient data. Other than that, a doctor can also view the progress of the patient according to the graph. In other word, a particular doctor can check their patient record easily. The histories of patient which already check out can also be access simply using this system.

The system has been developed and deployed using Rapid Development. To assign bed for the patient, the rule based system will be applied. For the development, JSP is used as a programming language and oracle 9i as a database.

## **1.2 Problem statement**

Mostly all management system is done manually, therefore it is not effective. More problems will aroused by managing manually. From the registration until check out more problems exist. Begin with assigning bed, it is difficult to sure if any bed is available. The staff must firstly make sure the bed is available by going to the ward and prepare the bed for particular patient. It is difficult for a doctor that wants to recall all the patient history during treatment if any facility of searching is not available. The doctor has to ask again the patient background before giving any treatment although the patient has been there before.

## **1.3 Objectives**

The objectives of the project will be as follows:

- (i) Convert manual to computerize. Before this, majority of the managing process in the ward is done manually. After converting it to computerize it will be easy to manage data. By computerizing this system, it is easier to understand the doctor's report which is hardly understood with different and complicated handwriting.
- (ii) Develop prototype of the Ward Management System. All sub-modules can function successfully but it is not ready to use as a real system.

## 1.4 Scope

The scopes of the project are:

- (i) Focus in flow process of ward management system but not in database

Below is the list of sub-module in the system

- (a) **Bed Arrangement**  
Assign bed for particular patient according their disease, work status (government or private), age and citizenship. (Applied rule base system).
  - (b) **Patient Record**  
Data after treatment will be recorded in this function.
  - (c) **Patient Report**  
More clear report because this system will produce graph to show patients' condition.
  - (d) **Patient List**  
Doctor can view all patients' progress under their responsibility.
  - (e) **Patient History**  
Keep the record of patient that receiving treatment at this ward.
- (ii) Develop as a stand alone module. The system is actually to be develop as an integrate module but for this time it will be develop as a stand alone module. It not will integrate with another module as an example, the registration module and billing module.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

Nowadays, everything has to be fast. That is why implementing this system is useful. All data can be saved and achieved in easy way. The Clinic Management System: Ward Management System is a web base application system and Information system. This system will be developed for hospital to manage their daily operation. The module that will be developed is to manage ward.

The Clinic Management System: Ward Management System is developed to overcome the efficiency of nurse and doctor in term of saving data. Data before this will be record manually in log book but now it will be record into database, which is more systematic and more safety. The possibility to lost data is low.

In context of this project, few topics need be to search and consider how will the current data will be record, what constrains that staff need to consider in order to assign bed to patient, the software that will be use and also the technology to develop this system.

## **2.2 Current System.**

Doing research about the current system is necessary to improve and get ideas of how the current system functioning. From the research, all processes are done manually. After registration, the patient must wait for hospital staff to ensure whether there is any availability of bed by checking at the particular ward. All the operations in ward also done manually where all the record is written in log book. Daily, the doctor will come to check their patient and also record them manually. Doctor must recall the patient history treatment record before giving any further treatment. Doctor also must check daily to see patients' progress. The process will continue until patient check out from the ward.

## **2.3 Introduction to Rule-Based System.**

A rule-based system is a relatively simple model that can be adapted to any number of problems. As with any AI, a rule-based system has its strengths as well as it has limitations that must be considered before deciding if it is the suitable technique to use for a given problem.

Overall, rule-based system is only feasible for problems for which any and all knowledge in the problem area can be written in the form of if-then rules and for which the problem area is not large. If there are too many rules, the system can become difficult to maintain and can suffer a performance hit [3].

### **2.3.1 Theory of Rule-Based Systems**

The rule-based system itself uses a simple technique: It starts with a rule-base, which contains all of the appropriate knowledge encoded into If-Then rules, and a working memory, which may or may not initially contain any data, assertions or initially known information. The system examines all the rule conditions (IF) and determines a subset, the conflict set, of the rules whose conditions are satisfied based on the working memory. Of this conflict set, one of those rules is triggered (fired). Which one is chosen is based on a conflict resolution strategy.

When the rule is fired, any actions specified in its THEN clause are carried out. These actions can modify the working memory, the rule-base itself, or do just about anything else the system programmer decides to include. This loop of firing rules and performing actions continues until one of two conditions is met: there are no more rules whose conditions are satisfied or a rule is fired whose action specifies the program should terminate. Which rule is chosen to fire is a function of the conflict resolution strategy. Which strategy is chosen can be determined by the problem or it may be a matter of preference. In any case, it is vital as it controls which of the applicable rules are fired and thus how the entire system behaves. There are several different strategies, but here are the few of the most common:

#### **2.3.1.1 First Applicable**

If the rules are in a specified order, firing the first applicable one allows control over the order in which rules fire. This is the simplest strategy and has a potential for a large problem: that of an infinite loop on the same rule. If the working memory remains the same, as does the rule-base, then the conditions of the first rule have not changed and it will fire again and again. To solve this, it is a common



practice to suspend a fired rule and prevent it from re-firing until the data in working memory, that satisfied the rule's conditions, has changed [3].

#### **2.3.1.2 Random**

Though it doesn't provide the predictability or control of the first-applicable strategy, it does have its advantages. For one thing, its unpredictability is an advantage in some circumstances (such as games for example). A random strategy simply chooses a single random rule to fire from the conflict set. Another possibility for a random strategy is a fuzzy rule-based system in which each of the rules has a probability such that some rules are more likely to fire than others [3].

#### **2.3.1.3 Most Specific**

This strategy is based on the number of conditions of the rules. From the conflict set, the rule with the most conditions is chosen. This is based on the assumption that if it has the most conditions then it has the most relevance to the existing data [3].

#### **2.3.1.4 Least Recently Used**

Each of the rules is accompanied by a time or step stamp, which marks the last time it was used. This maximizes the number of individual rules that are fired at least once. If all rules are needed for the solution of a given problem, this is a perfect strategy [3].

### **2.3.1.5 "Best" rule**

For this to work, each rule is given a 'weight,' which specifies how much it should be considered over the alternatives. The rule with the most preferable outcomes is chosen based on this weight [3].

### **2.3.2 Comparison Between Rule-Based and Genetic Algorithm**

By using a Rule-based System (RBS), the structural form is consistent, the variables, comparators, rules etc. are all given names which are meaningful to both the user and the developer and the sequence of condition testing, etc. is always the same. RBS are the shells of knowledge-based systems. By associating rules with database objects it becomes possible to build models and to apply those models to real world situations [3].

By using GA's to develop resource planning and scheduling applications, is that as the complexity of the problem increases so does the number of genes needed. For complex problems, this would result in very long evolution times and may even require more genes than can be handled by the algorithm. The strategy is that as the complexity of the application increases, the developer would keep the number of genes under control at the expense of increasing the complexity of the 'simple' heuristic schedule/planner that is used in conjunction with the GA. Typical increase in complexity involves defining additional index genes to select resources from lists sorted according to domain heuristics [5].

## 2.4 Introduction to JSP

Java Server Pages (JSP) is a technology based on the Java language and enables the development of dynamic web sites. JSP was developed by Sun Microsystems to allow server side development. JSP files are HTML files with special Tags containing Java source code that provide the dynamic content.

The following shows the Typical Web server, different clients connecting via the Internet to a Web server. In this example, the Web server is running on Unix and is the very popular Apache Web server [4].

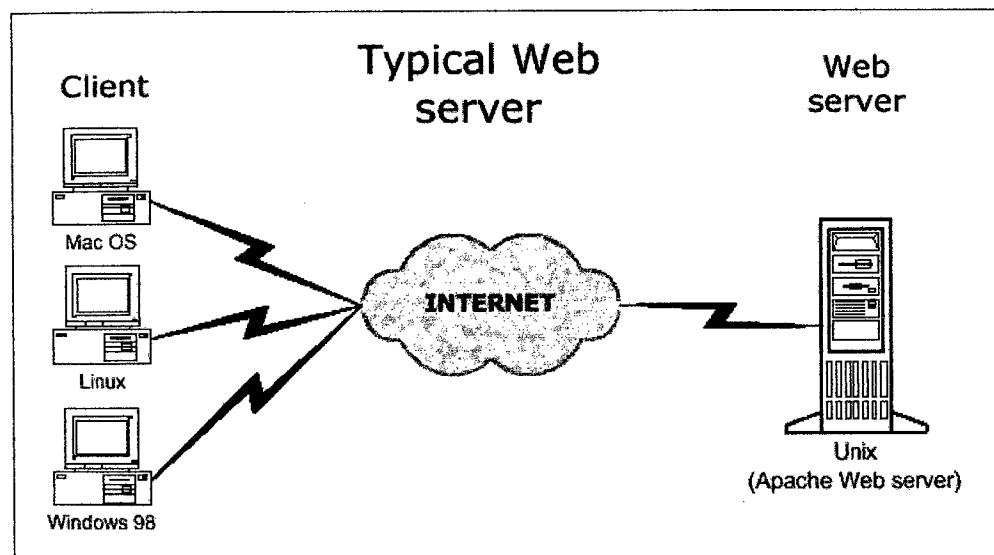


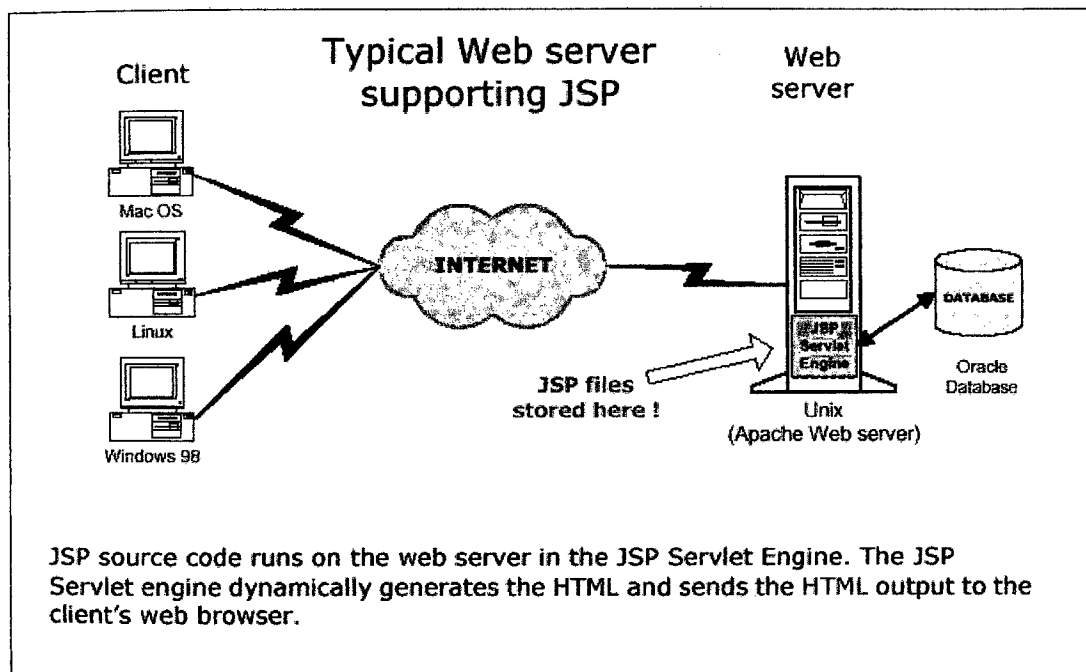
Figure 2.1 Connections in JSP [4]

First static web pages were displayed. Typically these were people's first experience with making web pages so consisted of My Home Page sites and company marketing information. Afterwards Perl and C were the languages used on the web server to provide dynamic content. Soon most languages including Visual basic, Delphi, C++ and Java could be used to write applications that provided dynamic content using data from text files or database requests. These were known as CGI

server side applications. ASP was developed by Microsoft to allow HTML developers to easily provide dynamic content supported as standard by Microsoft's free Web Server.

Internet Information Server (IIS), JSP is the equivalent from Sun Microsystems, a comparison of ASP and JSP will be presented in the following section.

The following diagram shows a web server that supports JSP files. Notice that the web server also is connected to a database [4].



**Figure 2.2** Processes in JSP [4]

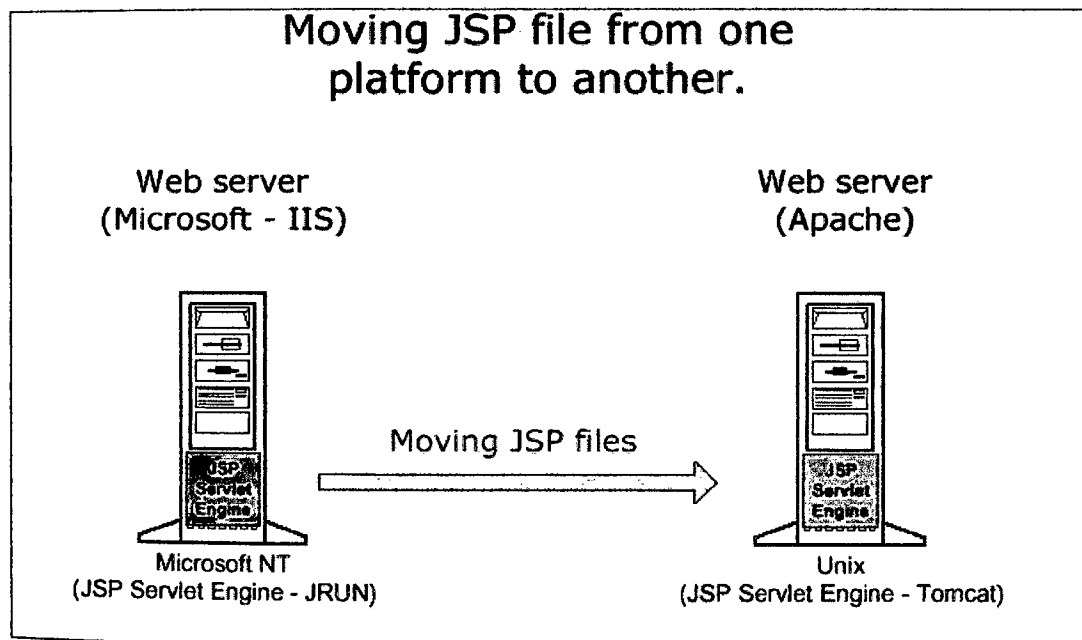
JSP source code runs on the web server in the JSP Servlet Engine. The JSP Servlet engine dynamically generates the HTML and sends the HTML output to the client's web browser [4].

### 2.4.1 Advantage use JSP

JSP is easy to learn and allows developers to quickly produce web sites and applications in an open and standard way. JSP is based on Java, an object-oriented language. JSP offers a robust platform for web development.

Main reasons to use JSP are Multi platform, Component reuse by using Javabeans and EJB and Advantages of Java.

Can take one JSP file and move it to another platform, web server or JSP Servlet engine [4].



**Figure 2.3 Moving JSP [4]**

HTML and graphics displayed on the web browser are classed as the presentation layer. The Java code (JSP) on the server is classed as the implementation.

By having a separation of presentation and implementation, web designer's work only on the presentation and Java developers concentrate on implementing the application [4].

#### **2.4.2 JSP compared to ASP**

JSP and ASP are fairly similar in the functionality that they provide. JSP may have slightly higher learning curve. Both allow embedded code in an HTML page, session variables and database access and manipulation. Whereas ASP is mostly found on Microsoft platforms, JSP can operate on any platform that conforms to the J2EE specification. JSP allow component reuse by using Javabeans and EJBs. ASP provides the use of COM / ActiveX controls [4].

#### **2.4.3 JSP compared to Servlets**

A Servlet is a Java class that provides special server side service. It is a hard work to write HTML code in Servlets. In Servlets, you need to have lots of println statements to generate HTML [4].

### **2.5 Apache Web Server**

Apache is a full-featured, powerful Web server available absolutely free. "Because the Apache Software Foundation is not deriving revenue from the Apache server, however, it cannot afford to offer robust technical support (Schafer, 2004)."

Amenities such as phone or online support are not included with Apache. Apache is open source so the source code is available and can be modified according to needs.

Most people do not use the source code to modify how Apache works; they use it to modify how Apache is built, that is, what options are compiled into the server. In addition, Apache is cross-platform as it is available for multiple platforms including UNIX, Linux, Windows, Novell NetWare and Mac OS X. Besides a few minutes' details, such as the placement of its files in the file system, Apache operates the same on all aforementioned platforms.

Apache is maintained by the Apache Software Foundation and is under continual development and improvement. Bug and security fixes take only days to find and correct, making Apache the most stable and secure Web server available. Another advantage of rapid development and releases is the robust feature set. New Internet technologies can be deployed in Apache much more quickly than in other Web servers. Apache supports almost all Internet Web technologies, including proprietary solutions such as Microsoft's FrontPage Extensions. Apache supports all manners on HTTP protocols, scripting and platform integration [6].

## **2.6 Macromedia Dreamweaver MX**

The only software tool used to develop this system is Macromedia Dreamweaver MX. It is used because it provides a powerful combination of visual layout tools, application development features, and code editing support, enabling developers and designers at every skill level to create visually appealing, standards-based sites and applications quickly.

From leading support for CSS-based design to hand-coding features, Dreamweaver provides the tools professionals need in an integrated, streamlined environment. In addition, Dreamweaver can be used with the server technology of multiple choices to build powerful Internet applications that connect users to databases, web services, and legacy systems [4].

## **2.7 Oracle 9i**

Oracle9 *i* Database is a features full XML database functionality with Oracle XML DB, enhancements to the groundbreaking Oracle Real Application Clusters, and self-tuning and self-management capabilities to help improve DBA productivity and efficiency. In addition, the built-in OLAP functionality has been expanded and significant enhancements and optimizations have been made for the Windows and Linux operating systems. These Oracle9*i* Database products are all built using the same robust and reliable database engine architecture. The Oracle9*i* database can be run in the jakartatomcat in the local host of a computer and also will be interact with Java to communicate the database with the interface that have been created in the Macromedia Dreamweaver MX[6].