In implementing a system, the representation produced during the design phase is translated into a form readable by computer. The implementation of WeRCLeA requires many elements, such as the Internet and the World Wide Web as the platform, Active Server Pages (ASP) as the development environment with Microsoft Visual InterDev as the preferred developing tool and MS FrontPage as HTML editor, MS Internet Information Services (IIS) as the web and FTP (File Transfer Protocol) Support and MS Access as the database management system.

7.1 Advantages of using Active Server Pages

ASP is a technology that has the ability to link up a combination of Microsoft products. It is widely used in software development in supporting web-based applications. ASP is not a programming language but an open, compile-free application environment that simultaneously combines scripting (VBScript or/and JavaScript) for accessing built in objects of the server, hypertext mark-up language (HTML), custom server components, and robust database management to create dynamic interactive Web-based applications (Jones, 2000).

ASP is able to do mathematical computations and text string manipulation process involving Structured Query Language (SQL) statements such as inserting and retrieving data from a variety of database. It has the power to create an interactive situation. ASP lets the web server processes user’s request and provides dynamic, individualized contents based on logic, file and database. ASP provides application scalability as it lets multiple users simultaneously run a program on a Web server.

ASP enables users to interact with the application to contribute up-to-date and individualised information, thus becoming active participants rather than just passive viewers. At
the same time, ASP gives developers a way to deliver applications in a centralized manner. Rather than installing a program on each user’s computer, ASP lets people run programs on a remote server. Because the code resides in a single place, the application developers can update the program easily.

7.2 Advantages of using Internet Information Services (IIS)

IIS uses a Windows platform and therefore is used by most people who are familiar with Microsoft products. As IIS owns most of the total Web server market, an application using ASP can potentially run, without modification in most Web servers. Furthermore, IIS is free with the NT 4.0 Option Pack or with Windows 2000. A less capable version of IIS is Personal Web Server for Windows 95/98.

7.3 Advantages of MS Access

MS Access is an end-user database management system (DBMS) originally developed as a desktop database application, creating and manipulating small-scale databases that are used to enhance personal productivity. It is easier for novice users to use and significantly less expensive to purchase than SQL Server which is a corporate level data store. MS Access supports WeRCLeA requirements. MS Access is theoretically said to be able to handle 255 concurrent users but it works at its optimum with up to 20 users. The maximum size of an Access database is 2 gigabyte which is considered sufficient enough for the development of WeRCLeA for this thesis. However, if the need arises, the programs can be easily expanded to SQL server as the common language used to manipulate the data in both is SQL. In addition, both Access and SQL are Microsoft products with the same Microsoft standards. A standard protocol for accessing the database is called open database connectivity (ODBC).
7.4 WeRCLeA Architecture

The objective of the architecture design is to determine where the identified software components of the system will best be allocated to the various hardware components on which the system will operate. Many applications today are web-based applications due to its easy accessibility and their being easily updated, satisfying users’ expectation for up-to-date information and task completion. As users’ input is continuously expected, WeRCLeA is designed to be web-based. The popular architecture which is client server architecture is used, as it can balance the process between the client and the server.

All software systems can be divided into four functions which act as the basic building blocks of any information system (Dennis and Wixom, 2003).

- **Data storage** – most information systems require data to be stored and retrieved.
- **Data access logic** - the process requires data accessing which often means database queries in SQL.
- **Application logic** – the logic documented in DFDs and functional requirements
- **Presentation logic** – the display information to the user and the acceptance of the user’s command or the user interface.

The three primary hardware components of a system are client computers, servers and the web that connects them. Figure 7.1 shows WeRCLeA architecture showing both the basic building blocks and the hardware components.
In WeRCLeA architecture, the client is responsible for the presentation logic performed by the Web browser that connects to the server. The server is responsible for data access logic and data storage. It creates and accesses the information in database, compiles and interprets the scripts and formulae. The application logic can either be in the client, the server or split between both. In the case of WeRCLeA, the application logic mostly resides on the server. Since the client side contains only the presentation function using HTML and minimal application logic using Javascripts, it is called a thin client. As the server is responsible for the data access logic, data storage and application logic which uses only two sets of computers, the client and the server, WeRCLeA is said to have a two-tiered architecture. Two-tiered architecture application has the advantage of being easy to be programmed and tested (Dennis and Wixom 2003).

Client-server architecture is chosen because it is scalable, as it is easier to increase and decrease the storage and processing capability compared to other architecture such as server-based or client-based architecture (Dennis and Wixom 2003). Furthermore, it can support different types of clients and servers thus users are not restricted to the same operating system or locked into one particular vendor. Additionally, it is simple to separate the three logic functions.
For example, the presentation logic is designed in HTML to specify how the page will appear on the screen: the fonts, colour, order of items, specific words used, command buttons and the type of selection lists. Simple program statements are used to link part of the interface to specific application logic modules that perform various functions. These HTML files defining the interface can be changed without affecting the application logic. Similarly, it is possible to change the application logic without changing the presentation logic or the data, thus made it easier to be maintained.

Finally, the client-server architecture is considered more reliable as no single server computer supports all applications, that is, no central point of failure. On the user side, the advantage of a client-server system is that users get the information they need only when they need it. Moreover, the design addresses presentation details, so that different clients can view the same data in different ways. A client system requests an action or service and the server system responds to the request. The application processing is closer to the user resulting in better performance because several CPUs can process application in parallel.

### 7.5 Execution of WeRCLeA

WeRCLeA aims to guide teachers in reviewing CL applications. The homepage acts as the centre of the system. It can be accessed at:

http://202.185.109.64/NewAnalysisTools

Figure 7.2 presents WeRCLeA’s homepage. The homepage provides an overview of WeRCLeA, its functions and the categories of tools of CL applications for both learners and teachers.
7.5.1 Categories of Tools and List of Features

Users are able to see on the homepage the main categories of tools of CL applications for both learners and teachers. Clicking on any of the categories will bring the users to the list of features of each tool. This list is illustrated in Figure 7.3.
Each tool and feature has a link which will bring user to the description of that particular tool or feature. Figure 7.4 illustrates the case where a user clicks on Performance Rubric link. At the end of each description is the assigned weighted average value (WAV) for a feature or mean value for a tool. Each tool or feature has its own back button to return to the homepage.
7.5.2 First User of the WeRCLea system

The first user of the system who attempts to click on these four buttons, namely ‘Compare’, ‘Report’, ‘Add Summary’ and ‘Modify’ will receive an alert message from the system informing that the user cannot perform these four commands until an application has been reviewed. This is because WeRCLea is being used for the first time. The first user needs to click on ‘New’ button to make a review.

For example, as shown in Figure 7.5, an attempt to click the ‘Compare’ button would prompt the alert message informing that no application has been reviewed yet. Figure 7.6 illustrates the drop down box displayed when an attempt is made to click the ‘Report’ button.
Welcome to WeRCLeA (pronounced we're clear), a web-based tool for guiding teachers in reviewing collaborative learning applications. WeRCLeA uses the comparison of tools and features for supporting collaboration and learning to create a list of features. Each tool and feature is rated based on the importance of the feature and the availability of information on the tool. Each listed tool is then added and compiled.

WeRCLeA calculates the scores and ranks for all the listed tools in a new application or modifies and updates a tool. A more detailed report on the latest input for each application can be added and compiled.

Figure 7.5: Display message using an alert box for ‘Compare’ button
7.5.3 New Review

When the button ‘New’ is clicked, a form is displayed consisting of an input box to enter the name of the application and checkboxes to select the available features. Failing to enter the application name will cause a message box to appear on top of the form as depicted in Figure 7.7.
Figure 7.7: New review page

After selecting the features available in the new application, the button ‘Score’ is clicked and the result page consisting of the list of available and unavailable features indicated by * and NA respectively is displayed as portrayed in Figure 7.8.
The second section of the result page displays the weighted average scores for both the learner and teacher tools. These include the CWA scores for each category of tools, CumL for learners and CumT for teachers and OWA scores for the application. The corresponding collaborative capability levels are displayed next to each score as shown in Figure 7.9. The scores are coloured according to collaboration capability level for easy view.
Next, in the result page under the title user summary, are the list of previous summaries and the text box for user to submit a summary of the CL application. For a new review, a message ‘no summary available yet’ is displayed as illustrated in Figure 7.10.

**Figure 7.9 : Result page-Weighted average scores and Collaborative capability level**
After a summary has been posted, the report page is displayed. The report page is almost similar to the result page, with the list of tools and available features, weighted average scores, collaborative capability level and list of summaries but there is no text box area. Another difference between the report and the result page is that on the report page the user is immediately warned or reminded using a prompt box to print the report in order to keep the present result as later users may modify and overwrite the list. This is shown in Figure 7.11.

Figure 7.10: Result page - Available summaries & a textbox area for new input
Figure 7.11: The report page with the warning message
Figure 7.12 shows a list of users’ summaries in the report page.

7.5.4 Subsequent users of the system

Subsequent users of the system can use the full options on the menu. To review an application, a user can first check the list of reviewed applications from the four buttons: ‘Compare’, ‘Report’, ‘Add’ and ‘Modify’. A dropdown box of the report button as shown in Figure 7.13 enables users
to get a quick view of the list of the reviewed applications.

Figure 7.13: A dropdown box of list of reviewed applications

Comparing reviewed applications

By clicking the ‘Compare’ button, a side-by-side table for the results of all reviewed applications is displayed one column per application. The results include the list of available and unavailable features and the three weighted average scores. The columns are alternately shaded as shown in Figure 7.14, to allow a quick comparison of all reviewed applications.
Figure 7.14: Comparison of available features of all reviewed applications

The three weighted average scores are coloured according to the collaborative capability level as shown in Figure 7.15. The figure also shows that WeRCLeA ranks the applications by arranging the columns automatically in a descending order of the overall weighted average scores (OWA) for the applications.
Figure 7.15 : Comparison of the three weighted average scores: For learner, teacher and the overall weighted average scores

**Viewing reviewed application’s report**

The ‘Report’ button can be used to obtain the report of any of the reviewed applications for reading or printing. The report page has been described in subsection 7.5.3. However, no warning sign as shown in Figure 7.11 is displayed to the user.

**Adding new summary**

WeRCLeA allows other users to add their opinions of an application that has already been reviewed. This can be accomplished by accessing add summary page for the application using the ‘Add’ button. The page is illustrated in Figure 7.16. On posting the opinions written on the
summary textbox using the ‘Post Summary’ button, the new summary is added to the summary list.

Figure 7.16: Add a summary page

Modifying a reviewed application

WeRCLeA allows users to modify previous review of an application. Modification is needed because features are added or removed from time to time due to the upgrading of the application. To modify, the users click on the ‘Modify’ button and select the application from a dropdown box. WeRCLeA displays the ticked checkboxes of the very last review of the application. An example is as shown in Figure 7.17. On posting the new checklist, a new result page will be displayed.
Suggestions and enquiries

WeRCLeA lets all users send in suggestions and enquiries about the system through an email link at the homepage as shown in Figure 7.18.
This chapter described the environment of development in implementing WeRCLeA and the reasons for choosing Active Server Pages (ASP), Internet Information Services (IIS) and MS Access. The functional requirements defined in Chapter 6 are transformed into the WeRCLeA system and illustrations of WeRCLeA pages have been given.