B2B Portal: Order Routing System

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Disclaimer

Abstract

The Business-to-Business portal (B2B portal) is taken from the advantage of business flow in real world situation. B2B commerce site allow business partners to browse through the products supported by the other partners. Basically, this B2B commerce site divided into three portions, which are Product Catalogue and Purchasing System, Order Routing System, and Supplier Fulfillment System.

Product Catalogue and Purchasing System focused on the sales channels. Business partner shopping through the product catalogue system and purchased the products through the purchasing system.

The Order Routing System is under the responsibility of the administrator in the enterprise. The administrator controls the workflow process of a purchase order request until it submitted to the supplier.

The Supplier Fulfillment System focused on the fulfillment process of an approval purchase order. It ensure that the requested product being sent out from the warehouses and reached the destination of requestor.

In short, this system is a portal of business-to-business commerce site. It implies the concepts of business flow in the real-world situation. The logical flow of the business real world is being converted into the electronic commerce through the Internet. Therefore, it works as a traditional business but in the form of electronic over the Internet.

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CHAPTER 1

INTRODUCTION

Chapter 1 Introduction

1.1 Project Definition

In conjunction with the evolution of information, science and technology in 21-century, commerce over the web is one of the most promising business enablers. Business can be made world widely through the connectivity with the outside world by using World Wide Web. This is also known as electronic commerce. Electronic commerce makes a business more efficient, profitable and well organized for a company. There are two categories for electronic commerce, which are Business-to-Business (B2B) and Business-to-Consumer (B2C).

Historically, procurement in business in large enterprises has been a large and complex exercise. The amount of stock involved in procurement is usually large. Therefore, the range of choices that managers can choose from is equally wide. Due to the traditional communication process, the process of contacting suppliers and establishing a preference among the lot can be a long process. The cost of business transaction can be reduced by automating the process of looking for suppliers, comparing between competitors and raising the purchase order. This can be achieved through a high-end business-to-business site that is designed for scalability and stability.

Business-to-business portal start from the product catalogue and purchasing system, which enable business partners browse through the products supported by the other partners. Once the business partners submitted the purchase order request, order routing system will be running in order to process the purchase order request in an appropriate workflow. The approval purchase order is passed to the particular supplier in order to fulfill the purchase order through the supplier fulfillment system.

1.2 Project Objective

For Order Routing System, procurement by business over the web require that orders be passed through it in order to screen through all the purchase order request before it is being sent out for further processing or end up to become rejected order.

Objectives of developing Order Routing System are :

- To enable a continuously automatic workflow for a purchase order request, which is the end result of Product Catalogue and Purchasing System.
- To enable a checking process of business rules on a purchase order request from one stage to another stage.
- To enable those parties who involved in the order routing process can communicate efficiently and accurately.
- To enable the administrator checks on the orders in certain status such as pending orders, approval orders or rejected orders.

1.3 Project Scope

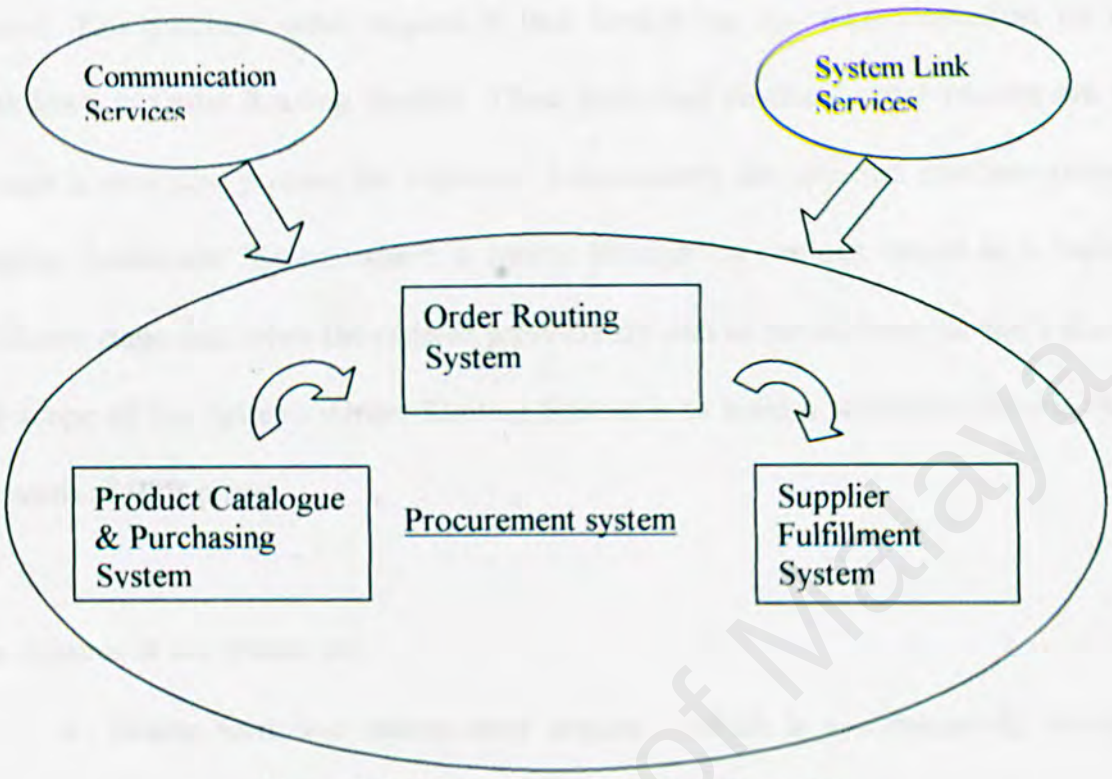


Figure 1.1 System structure of B2B portal

The scope of this project—B2B portal is development of a client/server system which emphasis on three portion, Product Catalogue and Purchasing System, Order Routing System and Supplier Fulfillment System. The system structure of B2B portal can be viewed as above. The basis of the development is emphasis on procurement system. The communication services and system link services are used to combine and integrate the three portions of the B2B portal at the end of the development stage.

The Product Catalogue and Purchasing System is the module by which the business partners are allowed to enter the system, search for products and place a purchase order request on selected choices. This purchase order request is then broken up into parts depending on the supplier breakdown in Order Routing System. These individual purchase order request are then routed through a workflow process for approval. Subsequently the approval purchase order enters the Supplier Fulfillment System where it passes through the various stages in a warehouse. The fulfillment stage ends when the ordered products are sent to the business partner's doorstep.

The scope of this system—Order Routing System is to build a workflow process that can fulfill the needs of B2B portal.

The features of the system are :

- Online workflow management system – which is a continuously process once the purchase order request enters the system.
- Messaging module – where the parties are notified of events in system by e-mail.
- Checking for the stocks on hand for on sale products by the administrator.
- Checking for the status of a purchase order request by the administrator.
- Checking for the pending orders by administrator.
- Checking for the approval or rejected orders by administrator.
- Decision making for an exceed limit purchase order request by the Credit Control manager.
- Decision making for a valid purchase order request by the Sales and Marketing manager.

The basic framework for the online order routing system can be summarized as below.

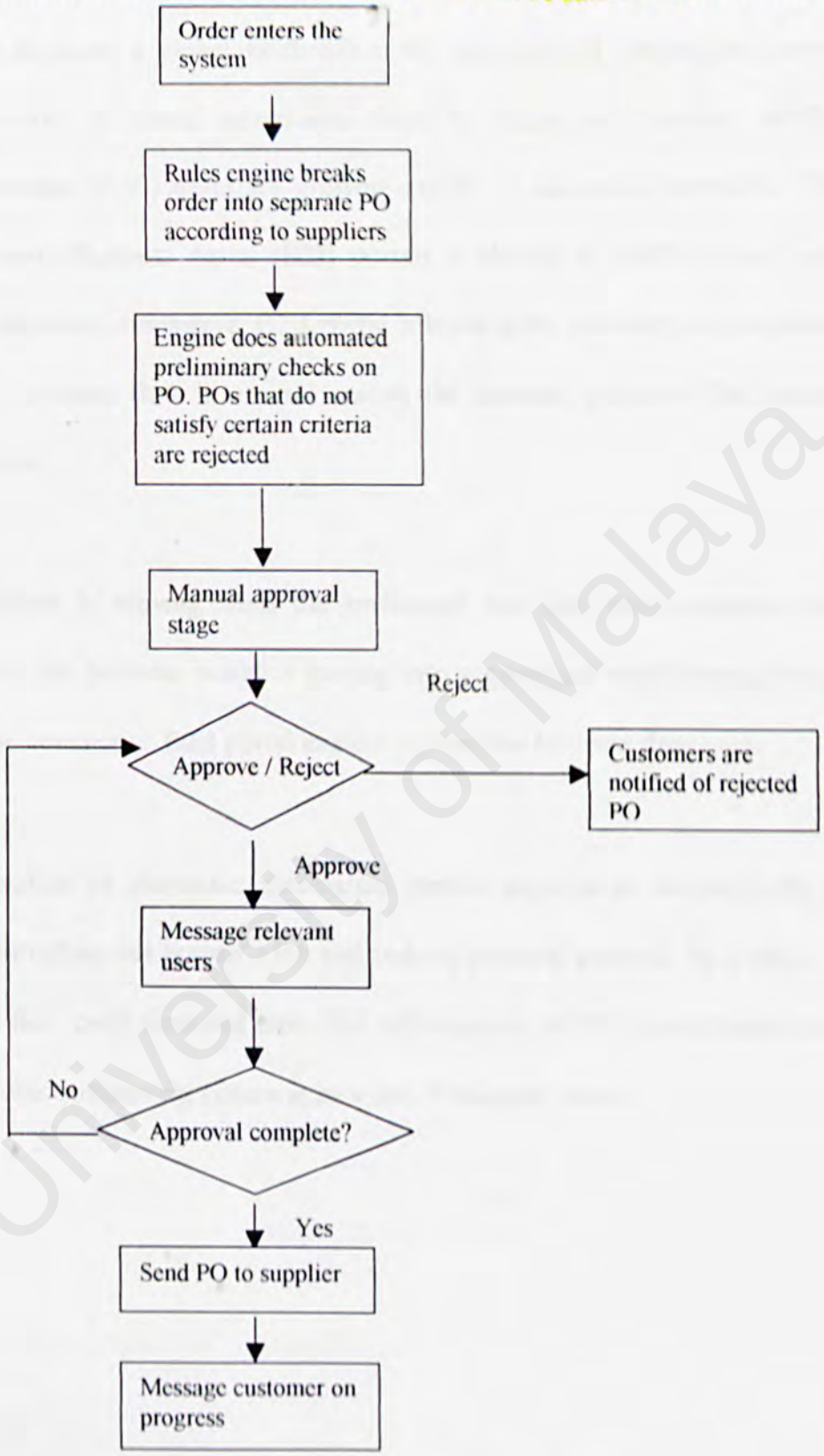


Figure 1.2 The basic flow of Online Order Routing System

1.4 Project Motivation

As the Internet becomes a global marketplace for services and information center nowadays, electronic commerce is taking advantages from it. Business-to-business (B2B) trend and Business-to-consumer (B2C) trend are growing rapidly in electronic commerce. Therefore, this project—Business-to-Business portal (B2B portal) is chosen to fulfill the real world business requirement in electronic commerce. B2B portal is taken from the model of electronic commerce, which enables a business flow in a cycle among the business partners. The reasons why B2B portal is chosen are:

- The business is moving from the traditional way into the commerce over the web. Therefore, the business world is moving into a paperless world through the evolution of electronic commerce. B2B portal enables a paperless business flow cycle.

- The evolution of electronic automating system requires an automatically running of a system to reduce the human's job and tedious physical process. As a result, it reduce the business flow cycle time and cost. The development of B2B portal meets the requirement of electronic automating system in new era of business world.

1.5 Project Limitation

B2B trend in electronic commerce cover all the process and modules in business real world situation. Due to the complicated process and some of the complex modules, this project—B2B portal did not include certain features. The limitation of the B2B portal is as:

- The system is not incorporate online payment system as it is configured to use purchase order as an alternative.
- Product shipment or delivery system is not included in the system.
- Taxation on products is not covered in the system.
- Currency and language selection are not available. Malaysia Ringgit (MYR) and English language are used as the system default.

1.6 Project Schedule

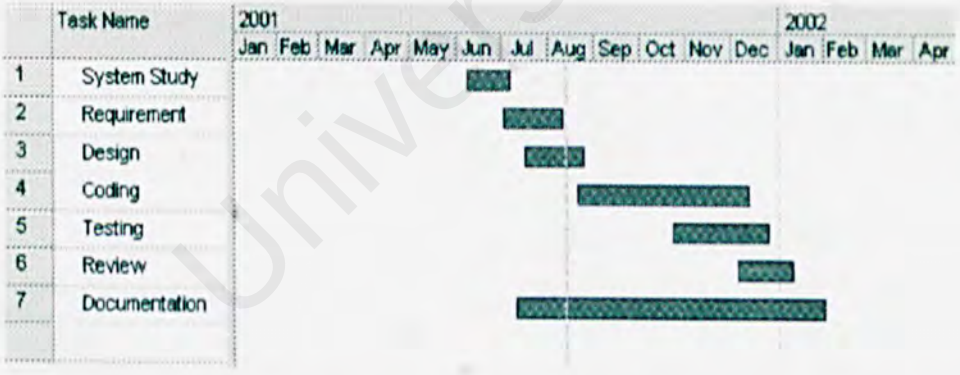


Figure 1.3 Project Schedule of B2B portal – Order Routing System

1.7 Summary

The topic of introduction gives an overall idea about Business-To-Business portal – Product Catalogue and Purchasing System, Order Routing System and Supplier Fulfillment System. The project definition, project objective, project scope, project motivation and project limitation is discussed from the view of Business-To-Business portal as well as the subsystem – Order Routing System.

CHAPTER 2

LITERATURE REVIEW

Chapter 2 Literature Review

2.1 Introduction

The evolution of computer hardware as well as the software had made the computer industry growth rapidly in 21st century. The usage of computer has change from processing and data storing at the previous time to the advance performance on the particular functions at the current time. Hence, the amazing growth of World Wide Web is one of the new evolutions of computer industry. It acts as an international communication medium, which enables worldwide relationship and communication among the people through the Internet. Therefore, the web has become a development environment for web-based application as well as providing much information and resources. The World Wide Web had become the new era of computer industry.

The development of this project—B2B portal Order Routing System requires the researches be carried out to understand the history of computer industry in computer hardware as well as computer software. The researches focused on the Internet development environment, which included the new concepts in software and development tools.

2.2 Electronic Commerce

Electronic Commerce or we known, as E-commerce is a dynamic set of applications, technologies and business processes that involved the company, corporation, communities and consumers. It takes the concept that describes the process of buying and selling or exchanging of products, services, and information via computer networks including the Internet. Electronic commerce applications started in the early 1970s, with such innovations as electronic fund transfers (EFT). But, the extent of the applications was limited to financial institutions, large corporations and a few small businesses who dare to take the risk. Then with the introduction of Electronic Data Interchange (EDI), it was expanded from financial transactions to manufacturers, retailers, services and so on.

With the commercialization of the Internet in the early 1990s and its rapid growth to millions of potential customer, electronic commerce applications are expanded rapidly. There are several contributions factors to the rapid expansion of the technology such as development of networks, protocols, software and specifications as well as the increase in competition and other business pressures.

2.3 System Architecture

2.3.1 Two Tier Architecture

The two-tier architecture consists of two computers that are client and server, with areas of logic combined on the client. The three components of an application- presentation, processing, and data, are divided among two software, entities or tiers that are client application cods and database server. A robust client application development language and a versatile mechanism for transmitting direct requests to the server essential for a two-tier implementation.

A computer acts as a client handled the presentation or output of a system. The processing is running between client computer and server computer, which enable the data flow of the system. All the data is stored on and accessed through the server computer in this architecture. The client computer assumes the bulk of responsibility for functionality logic with respect to the processing component, while the database engine, with its attendant integrity checks, query capabilities, and central repository functions, handles data intensive tasks.

2.3.2 Three Tier Architecture

The components of three-tier architecture consist of three layers, which are presentation layer, functionality layer, and data layer. Each of these layers must be logically separated in order to fulfill the requirement of three-tier architecture. The three-tier scheme attempt to overcome some of the limitations of the two-tier scheme by separating presentation, processing and data into separate entities.

The same type of tools can be used for presentation as were used in a two-tier environment. However the tools are now dedicated to handling just the presentation or output of the system. When the presentation client computer requires calculations or data accesses, a call is made to a middle tier functionality server computer in order to get the needed data from the data storing server computer.

2.3.3 Multi Tier Architecture

In a multi-tier architecture, the business logic is distributed over several machines. As requirements change during a systems lifetime, this partitioning and deployment can be reviewed and emended with minimal impact. Furthermore, additional tiers architecture included to support multiple databases and other services such as message switches, legacy system, data warehouses, communication channels and so on.

2.4 Server Platform

2.4.1 Windows 2000 Server

Windows 2000 Server is the latest commercial version of Microsoft's evolving Windows operating system. Microsoft emphasizes that Windows 2000 Server is evolutionary from Windows NT 5.0. and "Built on NT Technology". Windows 2000 Server is designed to appeal to small business and professional users as well as to the more technical and larger business market for which the NT was designed.

Windows 2000 Server is reported to be more stable than Windows 98/NT systems. A significant new feature is Microsoft's Active Directory, which enables a company to set up virtual private networks in order to encrypt data locally or on the network, and to give users access to shared files in a consistent way from any network computer.

2.4.2 Unix

UNIX is a multi-tasking multi-user operating system. It developed at AT&T Bell Laboratories. It is a network-based platform powerful and mature operating system. Besides, UNIX is an ideal platform for networked file systems and running mail servers. UNIX users normally share processing time on a central computer, or cluster of computers.

UNIX, like other operating systems, is a layer between the hardware and the applications that run on the computer. It has functions that manage the hardware and functions that manage the executives of applications.

UNIX includes the traditional operating system. In addition, a standard UNIX system includes a set of libraries and a set of applications. It includes the file system and process control as well as a set of libraries.

One of the greatest strength of UNIX is the consistent way in which it treats files. It is very easy for the users to work with files because users no need to learn special commands for every new task.

2.4.3 Macintosh

The Mac was designed to provide users with a natural, intuitively understandable, and, in general, "user-friendly" computer interface. Many of the user interface ideas in the Macintosh derived from experiments at the Xerox Parc laboratory in the early 1970s, including the mouse, the use of icons or small visual images to represent objects or actions, the point-and-click and click-and-drag actions, and a number of window operation ideas. Microsoft was successful in adapting user interface concepts first made popular by the Mac in its first Windows operating system.

The Macintosh has its own operating system, Mac OS. Originally built on Motorola's 68000 series microprocessors, Mac versions today are powered by the PowerPC microprocessor, which was developed jointly by Apple, Motorola, and IBM.

Mac OS is the computer operating system for Apple Computer's Macintosh line of personal computers and workstations. A popular feature of its latest version, Mac OS X, is a desktop interface with some 3-D appearance characteristics. OS X has a modular design intended to make it easier to add new features to the operating system in the future. It runs UNIX applications as well as older Mac applications.

2.5 Web Server

2.5.1 Internet Information Services 5.0

Microsoft Internet Information Server (IIS) is a web server that enables you to publish information on a corporate intranet or on the Internet. IIS is built-in in the Microsoft Windows NT Server 4.0. IIS transmits information by using the Hypertext Transfer Protocol (HTTP). IIS can also be configured to provide File Transfer protocol (FTP) and Gopher services. The FTP service enables users to transfer files to and from your web sit. The Gopher service uses a menu-driven protocol for locating documents. The Gopher protocol has been largely superseded by the HTTP protocol. The creative possibilities of what the user can offer on an IIS web site are endless.

2.5.2 Apache Web Server

The Apache Server was one of the first web servers to implement the HTTP/1.1 protocol. The Apache server has become established as the dominant web server, for outpacing commercial offerings from the giants Microsoft and Netscape.

Apache is easily to customize due to its modular architecture. The most commonly used modules are contained with the Apache source code and user can easily choose which ones to compile with the final application. However, users can also find and download additional modules form the Internet or they can even create their own modules.

The server can support large systems. The server is used by many of the world's biggest and most demanding web site. Because essentially its user community develops Apache, it is always one of the first web server to support new standards and new technology. It was among the first to support virtual hosting and browser matching and the Apache server version 1.2, was the first to support the HTTP 1.1 standard. This standard allows web sites to identify themselves with a header instead of an IP address, making it much easier to use multiple domain names on a single host.

2.6 Databases

2.6.1 Microsoft SQL Server 2000

Microsoft SQL Server 2000 extends the performance, quality, reliability, and ease-of-use of Microsoft SQL Server 7.0. Microsoft SQL Server 2000 includes several new features that make it an excellent database platform for large-scale online transactional processing (OLTP), data warehousing, and e-commerce applications. The OLAP Services feature available in SQL Server 7.0 is now called SQL Server 2000 Analysis Services. Analysis Services includes a new data-mining component, which enhanced from the OLAP Services. The Repository component available in SQL Server 7.0 is now called Microsoft SQL Server 2000 Meta Data Services. The term repository is used only in reference to the repository engine within Meta Data Services in SQL Server 2000.

2.6.2 MySQL

MySQL database is a lightweight relational database engine that is suited for web database applications. It is an open source and also a cross platform database. Therefore it can be used freely if not redistributed in some platform such as Linux and Unix. MySQL database has the extremely fast connection and execution times. Furthermore, it is reported very stable and fairly scalable in the performance time as well as supported multithreaded feature. On the other hand, there are several limitations in MySQL database such as no transaction process is allowed and no support for stored views. It is lack of graphic user interface tools which most of the time the command line is the only input to the database system. Furthermore, it has no stored procedures and triggers, which may trouble the user in storing or processing data.

2.7 Development Tools

2.7.1 Microsoft FrontPage 2000

Microsoft FrontPage 2000 is one of the software that comes along with Microsoft Office 2000. It is a tool to create and design web page, which enable the user develops a web page in a short time. FrontPage 2000 has the limited functions in use as compare with others web page development tools. Hence, it is a weaker but easier application to use for develops a small-scale project.

2.7.2 Microsoft Visual InterDev 6.0

Microsoft InterDev 6.0 is software that comes along with the Microsoft suite of professional programming tools, which is known as Visual Studio. Visual InterDev is a tool to develop and design a dynamic web based applications. It is promoting as the powerful development tools for Active Server Pages (ASP) because it makes the ASP script stand out from the Hypertext Markup Language (HTML) by highlight the ASP script with yellow color. Therefore, it helps the developer to save the time during development and debugging time.

2.7.3 Notepad

Notepad is a time – honored text editor that suites for multi-purpose. It is only the text editor that enables the user to use for multi purpose. Developer of a web page can use notepad as their development tool as it is the most cheaper development tool. However, the ASP script is not highlighted in the notepad. Therefore, it may trouble the developer in debugging time.

2.7.4 Microsoft Biztalk Server 2000

Microsoft BizTalk Server 2000 provides a powerful Web-based development and execution environment that integrates loosely coupled, long-running business processes, both within and between businesses. BizTalk Server can handle transactions that run as long as weeks or months, not just minutes or hours.

BizTalk Server 2000 features include the ability to design and use XLANG schedules; integrate existing applications; define document specifications and specification transformations; and monitor and log run-time activity. Besides that, the Biztalk Server 2000 provides a standard gateway for sending and receiving documents across the Internet, as well as providing a range of services that ensure data integrity, delivery, security, and support for the BizTalk Framework and other key document formats.

2.7.5 Microsoft Commerce Server 2000

Microsoft Commerce Server 2000 is an integrated commerce solution that provides ready-to-use features and tools to quickly develop, deploy, and manage commerce applications for the Web. Commerce Server is used to build scalable business-to-consumer (B2C) and business-to-business (B2B) site applications. Commerce Server provides business managers with the ability to easily analyze and manage business operations. It includes sophisticated analytical capabilities and a real-time feedback loop that empower business managers to respond to the changing needs of customers and partners. By creating highly dynamic, personalized commerce sites, the business manager optimize the customer experience, encourage repeat business, and successfully compete in the e-commerce marketplace.

2.8 Script

2.8.1 Server Side scripting

2.8.1.1 Common Gateway Interface

The common gateway interface (CGI) is a standard way for a Web server to pass a Web user's request to an application program and to receive data back to forward to the user. When the user requests a Web page (for example, by clicking on a highlighted word or entering a Web site address), the server sends back the requested page. However, when a user fills out a form on a Web page and sends it in, it usually needs to be processed by an application program. The Web server typically passes the form information to a small application program that processes the data and may send back a confirmation message. This method or convention for passing data back and forth between the server and the application is called the common gateway interface (CGI). It is part of the Web's Hypertext Transfer Protocol (HTTP).

The common gateway interface provides a consistent way for data to be passed from the user's request to the application program and back to the user. This means that the person who writes the application program can makes sure it gets used no matter which operating system the server uses (PC, Macintosh, UNIX, OS/390, or others). It's simply a basic way for information to be passed from the Web server about your request to the application program and back again.

There's one further problem: CGI only requires the server to pass request information to the script and to be prepared for receiving the output to be returned to the client. There's no further support for building web application – the developer have to roll their own session support to remember a user's state between requests, for a sequence of pages needed to complete an order.

2.8.1.2 Active Server Pages

An Active Server Page (ASP) is an HTML page that includes one or more script (small embedded programs) that are processed on a Microsoft Web server before the page is sent to the user. An ASP is somewhat similar to a Server-side include or a common gateway interface (CGI) application in that all involve programs that run on the server, usually tailoring a page for the user. Typically, the script in the Web page at the server uses input received as the result of the user's request for the page to access data from a database and then builds or customizes the page on the fly before sending it to the requestor.

ASP is a feature of the Microsoft Internet Information Server (IIS), but, since the server-side script is just building a regular HTML page, it can be delivered to almost any browser. You can create an ASP file by including a script written in VBScript or JScript in an HTML file or by using ActiveX Data Objects (ADOs) program statements in the HTML file. You name the HTML file with the ".asp" file suffix. Microsoft recommends the use of the server-side ASP rather than a client-side script, where there is actually a choice, because the server-side script will result in an easily displayable HTML page. Client-side scripts (for example, with JavaScript) may not work as intended on older browsers.

2.8.1.3 Java Server Pages

Java Server Page (JSP) is a technology for controlling the content or appearance of Web pages through the use of servlet, small programs that are specified in the Web page and run on the Web server to modify the Web page before it is sent to the user who requested it. Sun Microsystems, the developer of Java, also refers to the JSP technology as the Servlet application program interface (API). JSP is comparable to Microsoft's Active Server Page (ASP) technology. Whereas a Java Server Page calls a Java program that is executed by the Web server, an Active Server Page contains a script that is interpreted by a script interpreter (such as VBScript or JScript) before the page is sent to the user.

2.8.2 Client Side scripting

2.8.2.1 VBScript

VBScript is one of the members of Microsoft Visual Basic family. It is a scripting language that inherits the functions from Visual Basic and embedded inside the Hypertext Markup Language (HTML) to perform such a function in web application. The structure of a VBScript program similar to the Visual Basic application program. The major difference between Visual Basic application and VBScript is the dangerous operations that can done in Visual Basic have been removed from VBScript, including the capability to access dynamic link libraries directly and to access the file system on the client machine.

2.8.2.2 JavaScript

JavaScript is a compact and object-based scripting language by Netscape for developing client and sever web application. It is embedded inside the Hypertext Markup Language (HTML) to perform the functions. When a client computer request a page from server computer, the full content of a document that included the HTML and JavaScript will sent to the client computer via the network. The browser will interpret the HTML and executes the JavaScript in order to display the output for the user at client computer. JavaScript has a simple and instance based object model that provides significant capabilities. Moreover, JavaScript also supports function without any special declarative requirements.

2.9 System Review

For system review, a research had been carried out to review the description of a purchase order workflow process provided by the B2B electronic commerce developer in the market, which has the similar characteristic with B2B portal—Order Routing System. The B2B existing system in the market is consider as private and confidential property for the enterprise or company. Therefore, a review on the B2B existing system implementation is not available for this project. As a result, a review on the general description B2B system from the view of theoretical is done for this project.

ICG Commerce is one of the B2B system developers that deliver comprehensive procurement services and solutions to bring e-procurement benefits to both buyers and suppliers. There are several conditions that need to be considered in order to approve an order request. Generally, when a requester submits the order request through the system, one or more managers have to approve the request before the items can be purchased. The approval process depends on the requestor's signature amount and each approver's authorization amount. The requestor's signature amount refer to the maximum amount a requestor spend on a single request whereas the approver's authorization amount refer to the maximum amount that an approver can authorize without requiring authorization of subsequent approvers. If the request's total greater than the requestor's signature amount, the order request is routed to that requestor's approver. As each approver approves the request, it goes to the next approver in the path. When the order request reach at the stage where the approver's authorization amount greater than or equal to the total amount of the request, the system either send the order request to the Purchasing Department in

order to converted into one or more purchase orders for further processing or processed as a purchase order and issued to the suppliers immediately.

The approvers involved in the order request approval process can be divided into two categories, which are dollar value based approvers and commodity based approvers. The dollar value based approvers will review the order request based on the total dollar value of the request. Generally these approvers are line management. The commodity based approvers need to approve all request for a given commodity, such as an approver is given authority to approve the entire request on computer hardware.

Besides of that, there are several side features in the order request approval process such as allow certain request to bypass the approval, viewing pending approvals, viewing processed approvals, viewing future approvals, checking the status of an approval and printing viewed requests. The comment or message can be attached to the order request as it goes through stage by stage to get the approval from different parties.

Furthermore, the features like approving a request, rejecting a request, putting an approval on hold, taking an approval off hold and forwarding an approval are included in the order request approval process to enable a flexible workflow process for an order request.

In a nutshell, the order request approval process required the cooperation from all the parties that involved in the approval process in order to make the approval process perform efficiently.

2.10 Summary

The topic of Literature Review discussed about the technologies that related in the new era of the computer technologies in developing a system. The development tools that are most currently used to develop a web-based system are discussed in detail from the view of functionality and compatibility. A thoroughly review is done on the description of the B2B existing system from the information that given by the developer of B2B system in the market in order to review the existing system requirements.

CHAPTER 3

METHODOLOGY AND SYSTEM ANALYSIS

Chapter 3 Methodology and System Analysis

3.1 Introduction

The development of a project requires the process of planning before project implementation to ensure such a project under the control of the developer. The careful planning and analysis can avoid the problems such as cost overrun, time delay, and incorrect system requirements of a project. Generally, the planning and analysis phases emphasis on the project development process.

3.2 Project Development Strategy

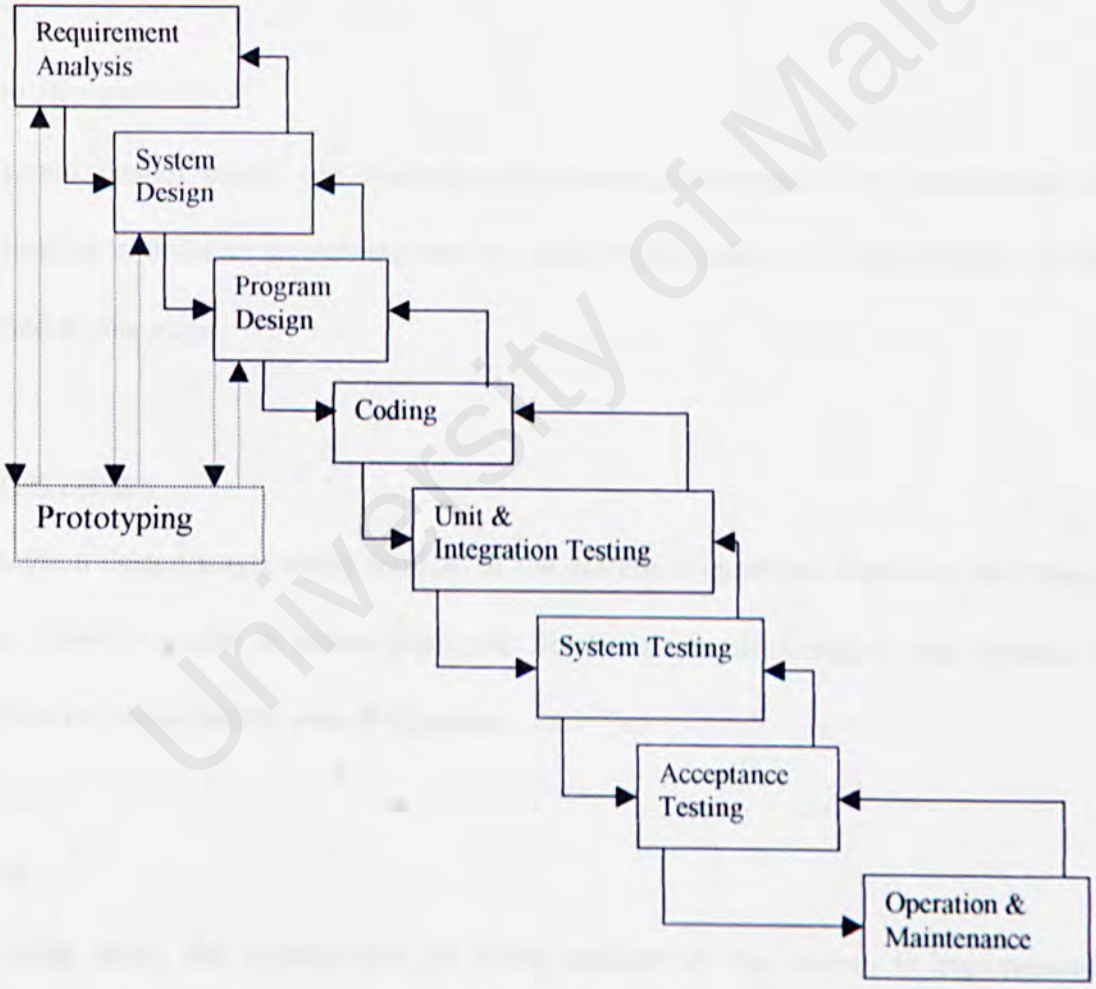


Figure 3.1 The Waterfall model with prototyping.

The waterfall model is used to implement this project—B2B portal. This model represents a process on developing a system as well as developing software. It emphasis on a staging process which is one development stage should be completed before the next stage begins. The figure 3.0 shows the stages in waterfall model.

Requirement Analysis

At requirement analysis stage, the data, process, and interface requirements from the user are documented in order to analyze the basic requirements of the developing system. The objective and scope of the system is clarified before the next stage is being process.

System Design

At system design stage, the business requirements statements are transformed into design specification in order to scratch out the overview of the system. The logical flow of the system is designed at this stage.

Program Design

At program design stage, every module of the system is identified based on the system overview design. Every module is taken from the functional requirements of the system. It has the specification of the system overall functions.

Coding

At coding stage, the construction on every module of the system is implemented by using programming languages. A specific programming language is chosen to implement the system based on the requirements of the system.

Unit & Integration Testing

At unit & integration testing stage, every implemented module is tested independently to ensure the functionality of the module. Meanwhile it is integrated with others modules to do the testing in order to ensure the fully integration among the modules in the system.

System Testing

At system testing stage, all the modules of the system are integrated to perform a fully functional system. A continuously testing process is carried on to the system until it performs in a consistent and accurate way.

Acceptance Testing

At acceptance testing stage, a whole functional system is tested in a condition such as it operates in a real world situation. It is tested to give a preview to the developer on how it is performs at the future.

Operation & Maintenance

At operation & maintenance stage, the system is operating in real condition and performing all the functionality of the system. Once the system goes into the operation stage, the maintenance process is an ongoing process, which is to ensure the system performs accurately and consistently at anytime.

The advantages of the waterfall model are:

- To ensure a consistent and standard system to be developed which meet the user requirement and scope.
- To enable a system which have many uncertainties in the earlier stages to be developed successfully through the staging process.
- To ensure an accurate system to be developed through the prototyping process at the earlier stages.
- To enable a flexible developing process which allow the process in each stage to be reversed to the previous stage whenever there are problems occurred at the current development stage.

3.3 Information Gathering Approach

In order to gather relevant information to determine the requirement of the system, a process of information gathering is carried out through the following methods:

- Internet surfing
- Reading books
- Interviewing

Internet surfing

Internet surfing is one of the methods to gather the information that related to B2B portal – Order Routing System. Through the Internet, some ideas that related to the approval process of an order request have been collected as the guideline to this project. The Internet can also provide the technique on how to use the development tools in this project. All the knowledge about the hardware and software can be found in Internet.

Reading books

By reading the books that related to the business-to-business electronic commerce and others reference books, the information on the development of this project have been gathered and documented down for reference. The reference information is such as method of developing system, programming language and web application technology.

Interviewing

An informal interview had been carried out with friend, accountant and auditor to gather the information about the business rules on an order request in order to understand the system requirements. This will help to design an appropriate way for approval such an order request.

3.4 System Analysis

A review on the technologies and project development tools has been carried out in chapter 2 – Literature Review. Each of the technologies and project development tools has own functionality and characteristics. As a result, an analysis has been carried out to choose those technologies and project development tools that suite the project requirements.

3.4.1 Server Platform

Windows 2000 Server is chosen as the platform due to several advantages that are distinct in the comparison with others operating systems. The reasons why Windows 2000 Server has been chosen are as stated as below:

- Dominant Position

  Windows currently enjoys a dominant position as the preferred network operating system by most corporations. In the consumer market, Microsoft's Windows enjoys a penetration rate of almost 90% of the overall market.

- User Friendly Environment

  Windows 2000 server support multitasking and it is also extremely user-friendly. Furthermore, the user interface of Windows 2000 server is very similar to Windows 95 or Windows 98. Therefore, users have no difficulty in adapting to Windows 2000 server.

- Developments Tools

  Various development tools have been created for Windows users. Some of these have helped to speed up the software development process.

- Skilled Professional

  Microsoft boasts of extensive resources of skilled professional as its produce are widely used. However, UNIX does not have as many skilled development and support professionals. This will inherently increase the cost of developing and maintaining the system as the shortage of professional leads to competition.

3.4.2 Web Server

Internet Information Services 5.0 (IIS 5.0) is chosen as the web server in this project because it is fully integrated with Windows 2000 Server. The powerful management tools in IIS 5.0 enable the developer to easily maintain a web site and manage the content of the web site. The advantages of IIS 5.0 are as stated as below:

- The innovative web publishing features, customizable tools, and new wizard technologies unique to IIS 5.0, make Windows 2000 Server with IIS the easiest way to publish and share information securely through the Internet.

- The customizable management tools, flexible administrator options and analysis tools enable the developers to manage the web server effectively.

3.4.3 Databases

Microsoft SQL Server 2000 is chosen as the database to store the data in this project because it is a relational database management and analysis system for e-commerce, line-of-business, and data warehousing solutions. The advantages of SQL Server 2000 are as stated as below:

- Self-management

  SQL Server 7.0 can automatically configure its memory usage, grow and shrink disk space usage, and repair itself. SQL Server control memory usage, locks, connections, open objects.

- Maintenance

  SQL Server 7.0 incorporates a fast failure philosophy, where it's considered better to fail and repair as soon as an error occurs, rather than leave corruption in the database.

- Security and backup

  Database roles replace groups, and fixed server roles can be used to delegate system administrator tasks. SQL Server 7.0 now uses the industry-standard fuzzy backup strategy, which makes backups much faster and makes possible a new differential database backup option.

3.4.4 Development Tools

3.4.4.1 Microsoft Visual Interdev 6.0

Microsoft Visual Interdev 6.0 is chosen as the editor for Active Server Pages (ASP) script. It is a development tool that designed specially for ASP scripts. Therefore, Visual Interdev is fully support the development environment of ASP scripts and compatible with others development tools. The advantages of Visual Interdev are as stated as below:

- The powerful management of Visual Interdev enable the easily connectivity between a project and the database. Therefore, the transaction of the data in the scripts is extremely efficiency.

- The window-based user interface enables the user to develop a web site with all the helpful development features in Visual Interdev.

3.4.5 Script

3.4.5.1 Server Side Scripting

Active Server Pages (ASP) is chosen as the server side scripting language because it provides a great way of creating dynamic web pages. ASP uses the web server instead of using the browser to locate the page before returning the results to the user as Hypertext Markup Language (HTML). Meanwhile, ASP is an object-oriented scripting that enable reusable of the codes and reduce the memory size in developing stage.

3.4.5.2 Client Side Scripting

VBScript and JavaScript are chosen as the client side scripting language. They are both small-scale, easy to learn, somewhat limited the scripting language that enable the developer of the web page to add event-driven interactivity to web pages. VBScript and JavaScript share a core of strengths that make them much more similar.

3.5 System Requirements

3.5.1 Functional Requirements

Functional requirements are those functions that a system provided to enable a system operated in a logical way. The functional requirements for B2B portal – Order Routing System are stated as below:

3.5.1.1 Process an order request in a workflow

When a new order request comes in the Order Routing System, this order will go through a workflow process to get the approval from different parties from stage to stage. There are five modules related to the workflow process, which are checking for credit limit, checking for stock availability, approval from credit control manager and approval from sales and marketing manager.

3.5.1.1.1 Checking for credit limit

An order request from a customer needed to be check for the customer's credit limit for a particular supplier. The order request will proceed to another stage to get the approval from others parties if it is within the limit amount. On the other hand, it will be sent to the credit control manager if it is exceed the limit amount.

3.5.1.1.2 Approval from Credit Control Manager

Credit control manager is responsible on an order request which is the order amount exceed the limit amount. The manager has to make a decision whether to approve the order request, which will enable the order request to proceed to next stage in the workflow process, or reject the order request, which will notify the customer about the rejected order.

3.5.1.1.3 Checking for stock availability

An order request needed to be check for stock availability to ensure there are enough stock for the customer's request. Those products on customer's request will be checked with the supplier inventory system to ensure the stock availability. The order will be rejected if none of the requested products available whereas it will proceed to the next stage for others checking condition.

3.5.1.1.4 Approval from Sales and Marketing Manager

When a new order request go through a complete checking for credit limit condition and stock availability condition, it will be sent to the Sales and Marketing manager for further approval. The manager has to make a decision on the order request. If the manager approves the order request, the customer will be notified through the electronic mail and subsequently the order request will be sent to the supplier in order to proceed with the Supplier Fulfillment System. On the other hand, a message will send to the customer if the manager rejects the order request and it will end the flow in Order Routing System

3.5.1.2 Check stocks on hand

The administrator can check stocks on hand for a particular product by using the product's identity number. The detail stock information for a product can be viewed as reference.

3.5.1.3 Check status of orders

The administrator can check the status of an order by using the order's identity number. The order status represents where is the stage of the order stay in. The detail order information for a particular order can be viewed as reference.

3.5.1.4 View end status orders

The administrator can view the end status orders that are the approval orders and rejected orders. Those orders are known as end status orders after go through the workflow process of Order Routing System. The detail information of an end status orders will display for reference purpose.

3.5.1.5 View pending orders

The administrator can view the pending orders which are the orders waiting the approval from other parties. Those orders include the amount exceed limit orders and waiting for the approval from Sales and Marketing manager orders. The detail information of the pending orders will display for reference purpose.

3.5.2 Non-functional Requirements

Non-functional requirements refer to those functions that make the system operates smoothly and running systematically when the system is implemented. The non-functional requirements included in B2B portal—Order Routing System are stated as below:

3.5.2.1 Accuracy

The system should be able to perform an accurate result for the search functions when the administrator search for the particular order information based on the order identity number. The matched order information will be displayed for the administrator reference.

3.5.2.2 Efficiency

The system is required to perform efficiently at any time. Each process should provide the same outcome whenever it is being called or accessed. Therefore the performance of the system is efficient.

3.5.2.3 Reliability

The reliability of a system enable the system operates at the stage that meets the user requirements at the most time. The user can rely on the system to perform a function or process.

3.5.2.4 User Friendliness

The system should cater for the user friendliness feature as the user interface is designed to become friendly to the user. The consistency, structure layout and graphic guided tools of an interface ensure the maximum usage of a user.

3.5.2.5 Multi-user

The system should support unlimited concurrent user as multi user can accessed the system at the same time at different places. The system is able to response to the multi-concurrent user and performs its functionality to serve the request from multi-user.

3.5.3 Server-side Requirements

3.5.3.1 Hardware Requirements

The development of a project requires hardware devices as the backbone. The hardware requirements for this project are stated as below:

- Processor with 400 MHz at minimum level
- RAM with 256 Megabyte
- Hard disk space with 10 GB
- Network Adapter Card – for connectivity between client and server

3.5.3.2 Software Requirements

The development of a project requires software packages for developing and performing purpose. The software requirements for this project are stated as below:

- Microsoft 2000 Server as the operating system
- Internet Information System (IIS) as the web server
- Microsoft Interdev 6.0 as the development tool
- Microsoft SQL Server 2000 as the web database
- Microsoft Internet Explorer 5.5 as the web browser
- Active Server Pages (ASP) as the server-side scripting language
- VBScript as the client-side scripting language
- JavaScript as the client-side scripting languages

3.5.4 Client-side Requirements

3.5.4.1 Hardware Requirements

The client-side computer require the following to act as a workstation to the server:

- Processor with 166MHz at minimum level
- RAM with 32 MB
- Hard disk space 5 GB
- Network Adapter Card – for connectivity between client and server

3.5.4.2 Software Requirements

The software requirements of a client side computer are as stated as below:

- Microsoft Windows 95 / 98 / 2000 professional / Millennium Edition as the operating system.
- Microsoft Internet Explorer 4.0 and above as the web browser.

3.6 Summary

The topic of methodology and system analysis discussed about the methodology that is used in the development of B2B portal – Order Routing System and the analysis that has been done on the system. The methodology, waterfall model with prototyping is used to implement this project. An analysis has been done on the technologies in use and suitable development tools as well as the system requirements. The system requirements are analyze from the view of functional requirements, non-functional requirements, hardware requirements and software requirements on both server side and client side.

CHAPTER 4

SYSTEM DESIGN

Chapter 4 System Design

4.1 Introduction

In conjunction with the methodology and system analysis in chapter three, system design is a continuous stage that defines the system from the view of system architecture and system structure. System design is an important process that ensures the purpose of development project would be fulfilled. The scope of the project is rectified in order to save the development cost and reduce others unnecessary expenses in development stage. Therefore, system design plays an important role in developing a project.

4.2 System Architecture

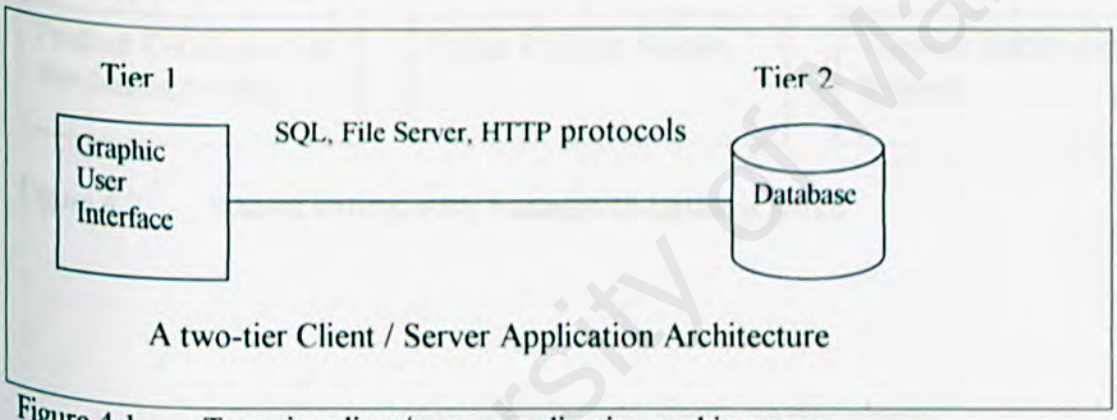


Figure 4.1 Two-tier client/server application architecture

B2B portal – Order Routing System is implemented by the two-tier client/ server application architecture as shown as above. The application logic is buried within the database on the server. A graphic user interface is run on the client and sent file systems calls, SQL, or HTTP commands over a network to the server. The server processes the request and returns the results to the client.

4.3 System Structure

The Business-To-Business portal consists of three sub systems that are Product Catalogue and Purchasing System, Order Routing System and Supplier Fulfillment System. The B2B portal – Order Routing System is divided into five modules. Each module has its own functionality that ensures the scalability and reliability of the system. The structure and modules of the system are as shown as below:

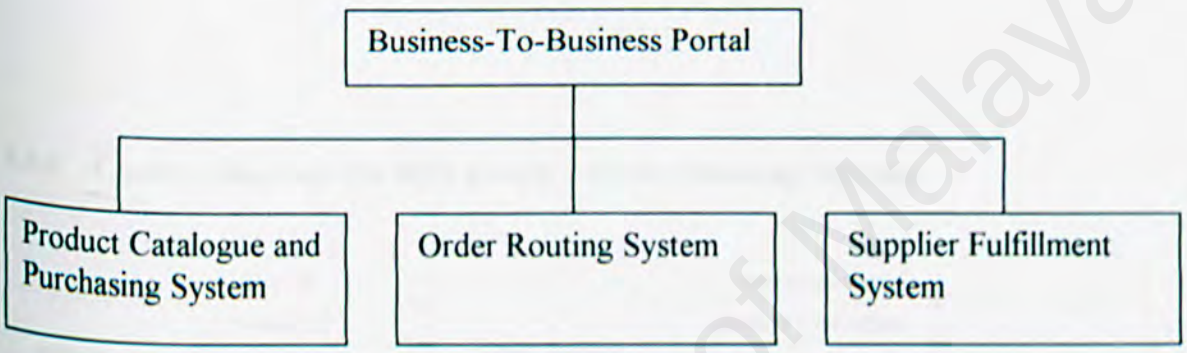


Figure 4.2 System structure for business-to-business portal

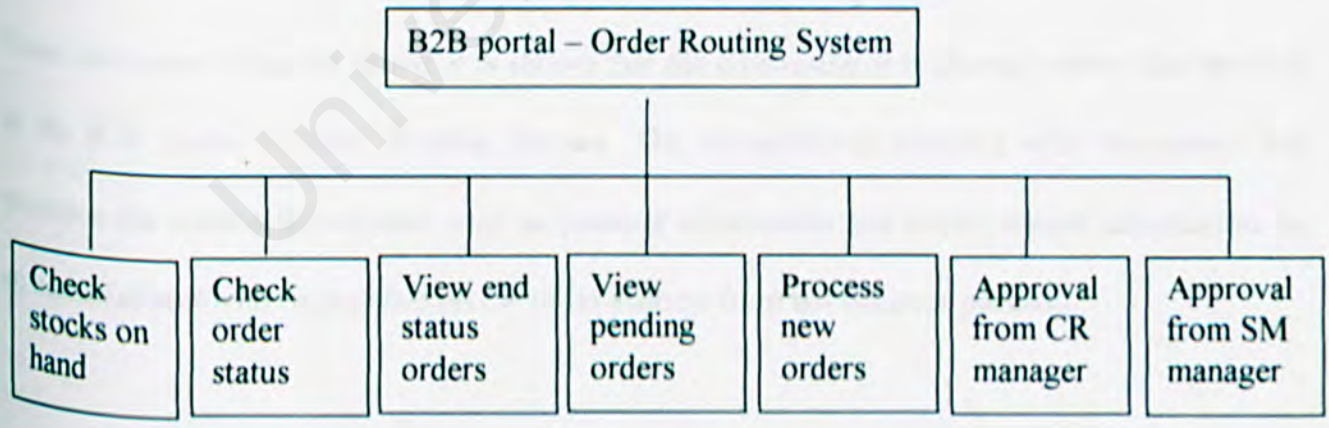


Figure 4.3 System structure for B2B portal – Order Routing System

4.4 Program Design

Data flow diagram and flowchart are used to describe the system from the view of data flow and process flow. Data flow diagram shows the data processes in simplify and easy to understand approach as it emphasize on the logic of the data flows in the system. Flowchart shows the process flow in the sequence that gives the logical flow of a system. Both data flow diagram and flowchart are as a guide for program design.

4.4.1 Context diagram for B2B portal – Order Routing System

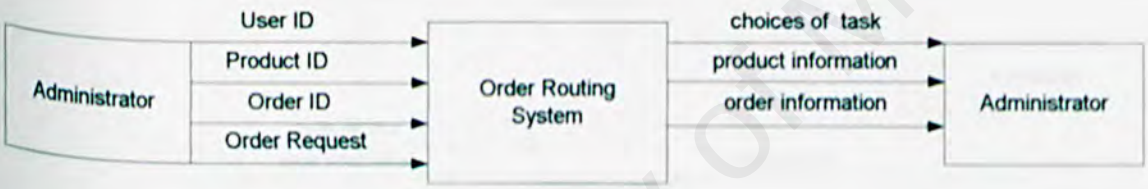


Figure 4.4 Context diagram

From the context diagram above, it is shown that the administrator is the only entity that involved in the B2B portal – Order Routing System. The administrator interacts with the system that provides the needed information such as product information and order request information for an administrator who responsible on the order request from the business partners.

4.4.2 Data flow diagram for B2B portal – Order Routing System (degree 0)

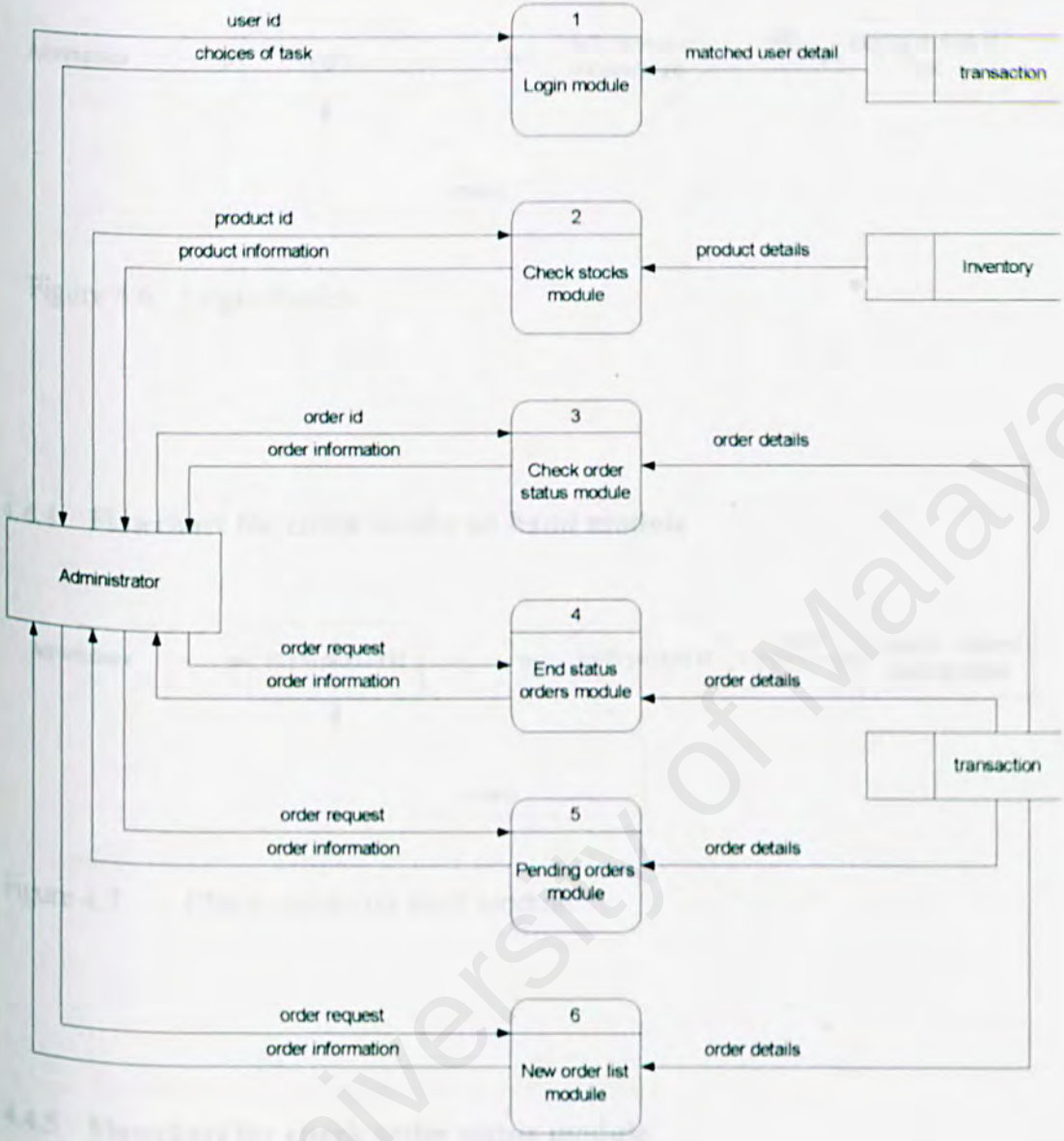


Figure 4.5 Data flow diagram (degree 0)

4.4.3 Flowchart for login module

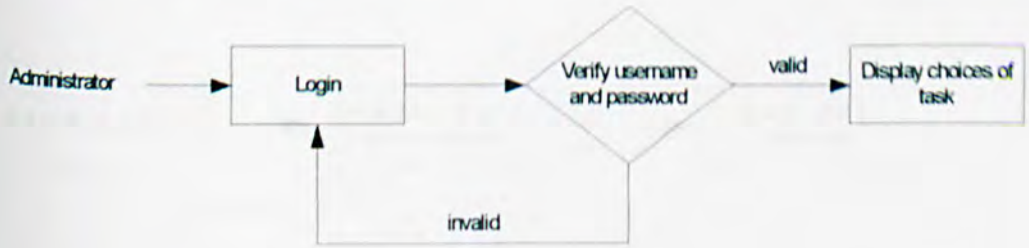


Figure 4.6 Login module

4.4.4 Flowchart for check stocks on hand module

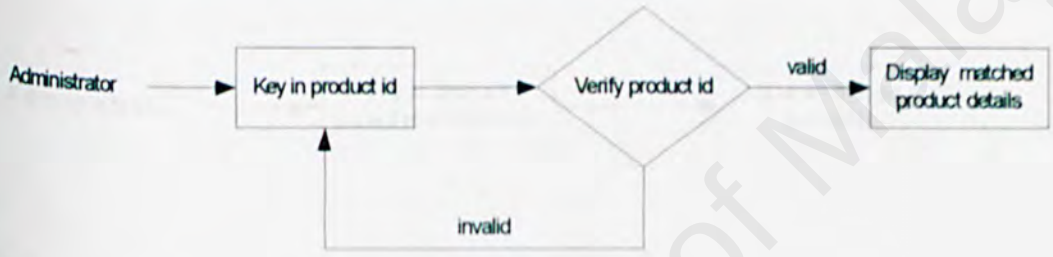


Figure 4.7 Check stocks on hand module

4.4.5 Flowchart for check order status module

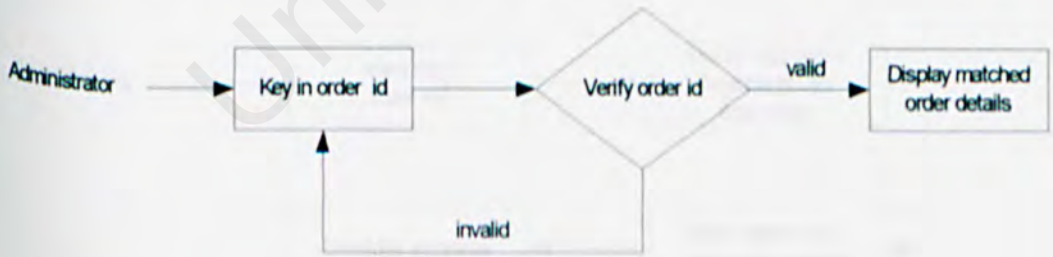


Figure 4.8 Check order status module

4.4.6 Flowchart for view end status orders module

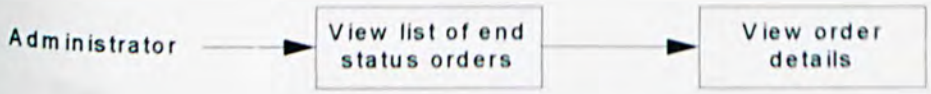


Figure 4.9 View end status orders module

4.4.7 Flowchart for view pending orders module

Figure 4.10 View pending orders module

4.4.8 Flowchart for process new orders module

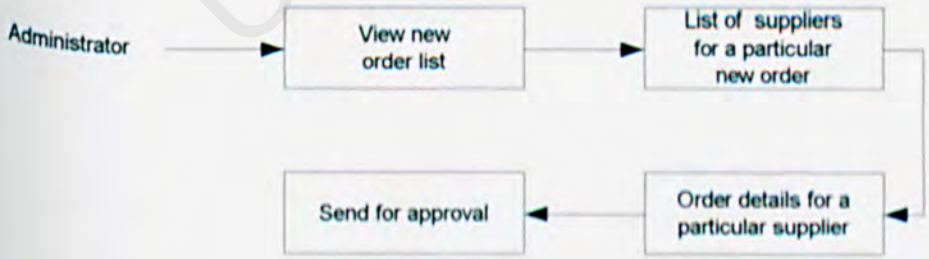


Figure 4.11 Process new order list module

4.4.9 Flowchart for approval process of an order request

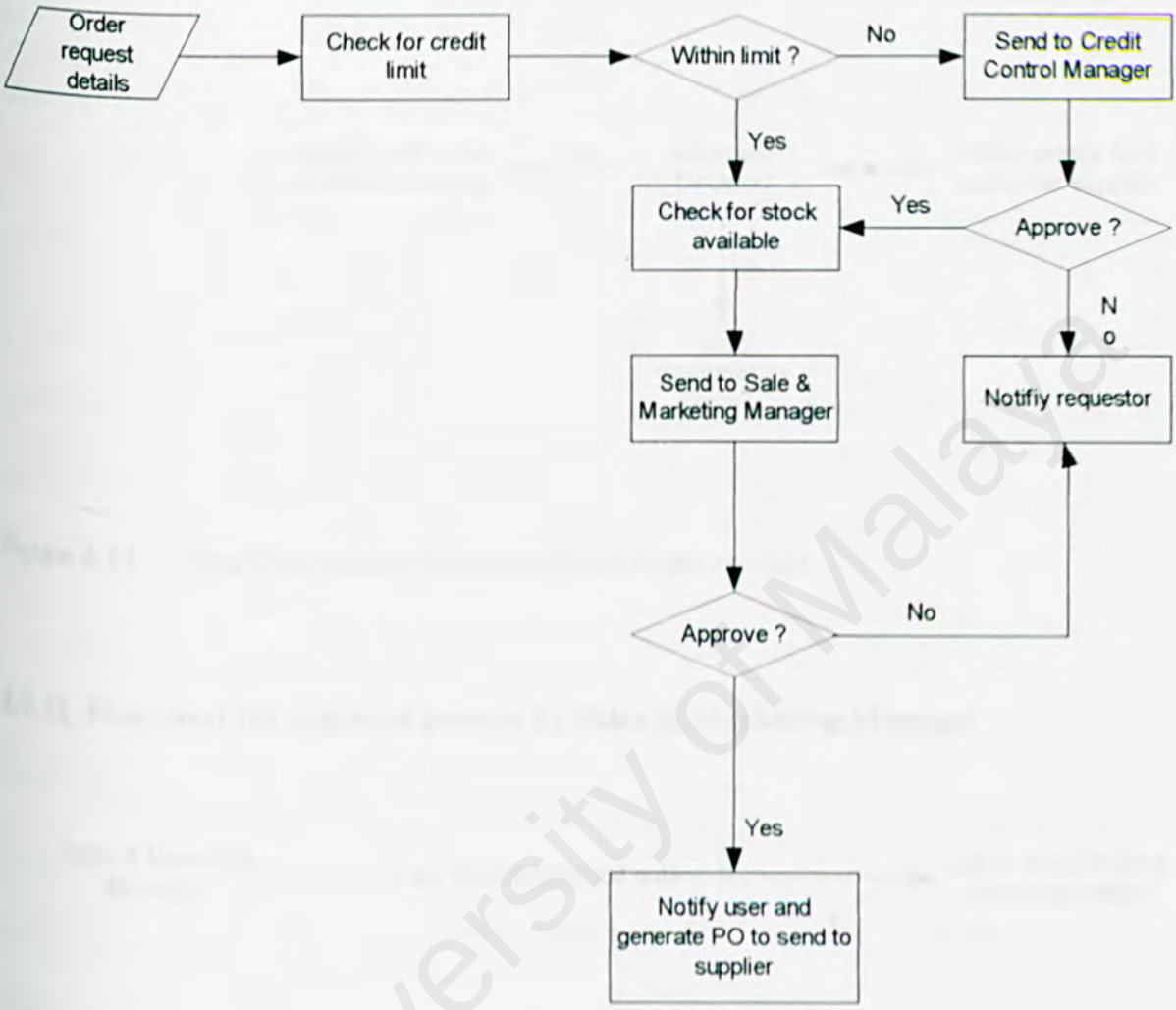


Figure 4.12 Approval process of an order request

4.4.10 Flowchart for approval process by Credit Control Manager

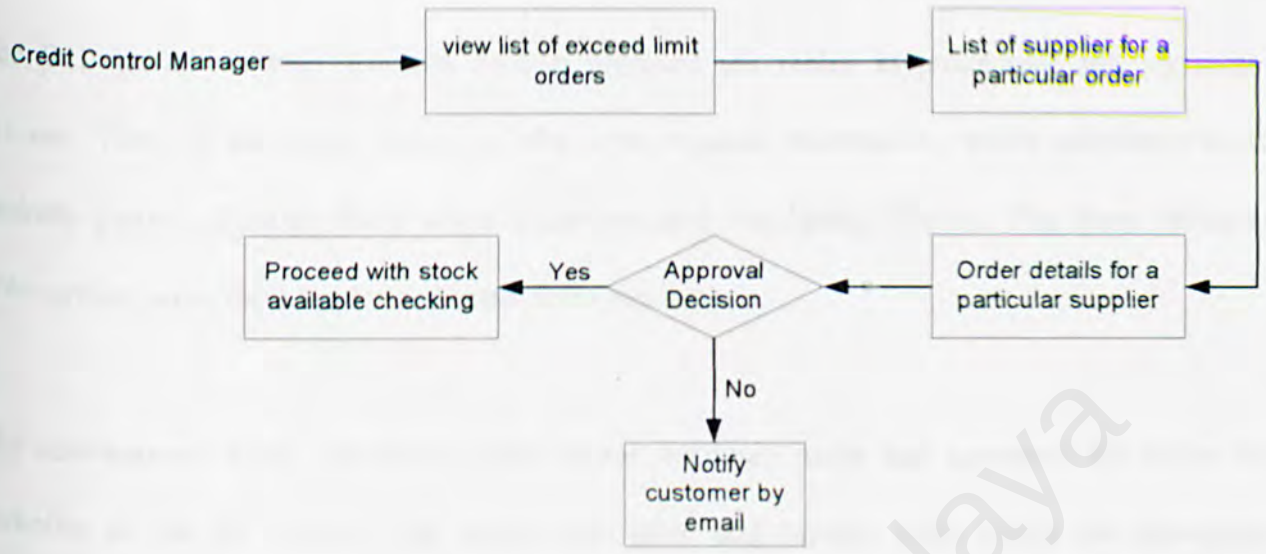


Figure 4.13 Approval process for exceed limit order request

4.4.11 Flowchart for approval process by Sales & Marketing Manager

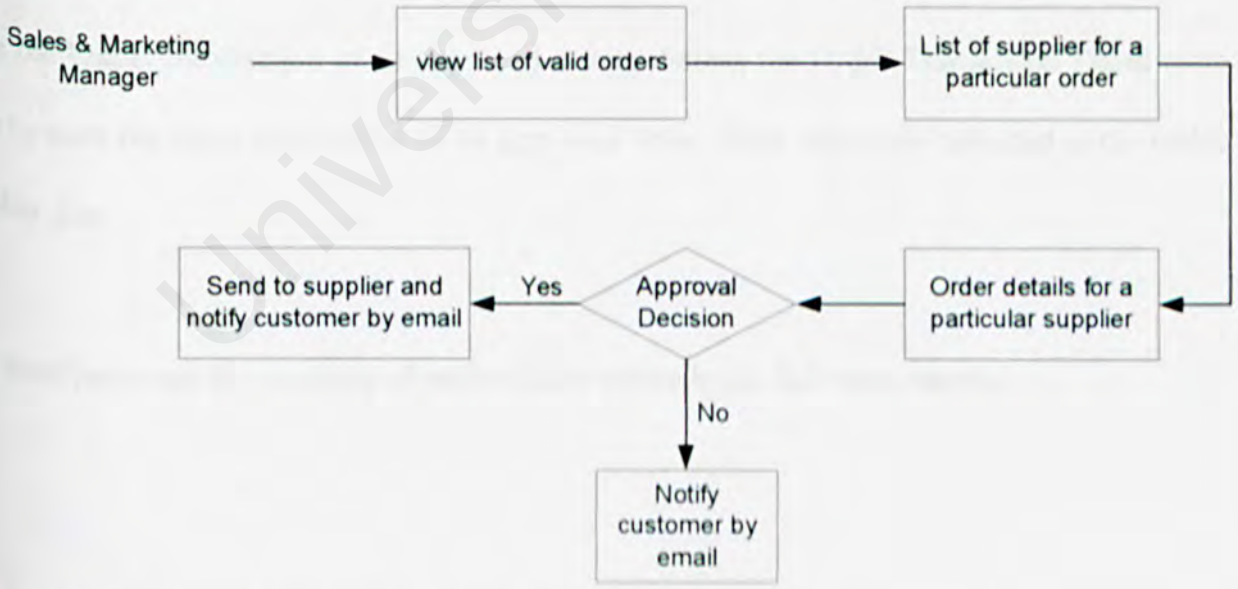


Figure 4.14 Approval process for valid order request

4.5 Databases Design

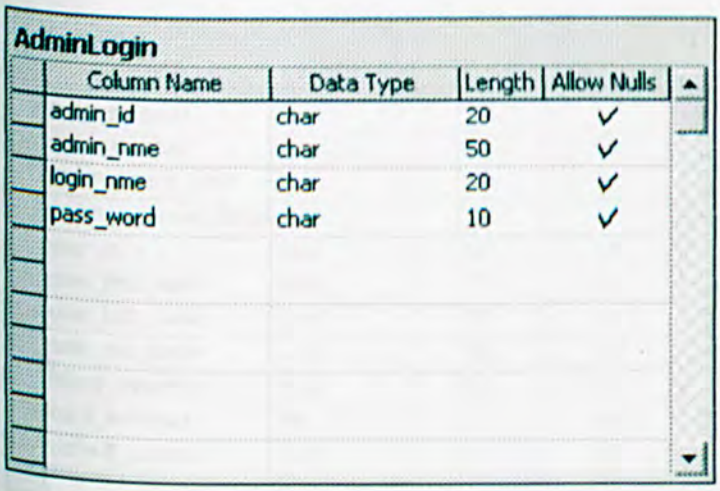
The B2B portal – Order Routing System involved ten tables in processing and transaction process. Three of the tables consist of the order request information, which submitted by the business partners through the Product Catalogue and Purchasing System. The three tables are order group, order form header and order form line item.

The administrator login information table stores the login name and password for those who authorize to use the system. The status code table and supplier table stores the appropriate identification for status description as well as supplier description. The credit limit tables stores the appropriate information for credit limit amount between a customer and a particular supplier.

The stock inventory balance information table is used to cross-reference with the supplier side for check stocks available for the products on sale. The Order Transaction Header table is used to store the header information of an approved order whereas the Order Transaction Detail table is used to store the detail information of an approved order. Both tables are indicated as the tables in supplier side.

The description and file structure of each table is shown in the following section.

4.5.1 Administrator login information table



AdminLogin

Column Name	Data Type	Length	Allow Nulls
admin_id	char	20	✓
admin_nme	char	50	✓
login_nme	char	20	✓
pass_word	char	10	✓

Table 4.1 AdminLogin

The administrator login table stores the information, login name and password for those who authorize to use this system – B2B portal Order Routing System. The authorize people include administrator, Credit Control manager and Sales and Marketing manager. The primary key for this table is administrator ID in which is used for reference with the administrator personal information.

4.5.2 Order group information table

OrderGroup

Column Name	Data Type	Length	Allow Nulls
ordergroup_id	char	20	✓
order_number	char	10	✓
order_create_date	char	15	✓
order_approval_decisi	char	15	✓
user_id	char	10	✓
user_first_name	char	10	✓
user_last_name	char	50	✓
user_org_name	char	50	✓
billing_currency	char	5	✓
total_lineitems	int	4	✓
default_currency	char	5	✓

Table 4.2 OrderGroup

The order group information table stores the general information of the requestor who submitted the order request on behalf of the company or enterprise. The primary key of this table is order group id that used for the reference for a particular record. It is designed as the main reference to others tables such as order form header table and order form line items table.

4.5.3 Order form header table

OrderFormHeader

Column Name	Data Type	Length	Allow Nulls
ordergroup_id	char	20	✓
orderform_id	char	20	✓
order_number	char	10	✓
user_id	char	10	✓
user_first_name	char	10	✓
user_last_name	char	50	✓
user_org_id	char	10	✓
user_org_name	char	50	✓
user_email_address	char	50	✓
total_lineitems	int	4	✓
billing_currency	char	5	✓

Table 4.3 OrderFormHeader

The order form header table is designed to store the general information on the order form when a requestor submitted the order request into the system. The order form general information such as order form id, order form date, purchase order number, name of the buying organization and name of the selling organization for each order request are stored in this table. The primary key for this table is the combination of order group id and order form id that refer to the unique record in the table.

4.5.4 Order form line items table

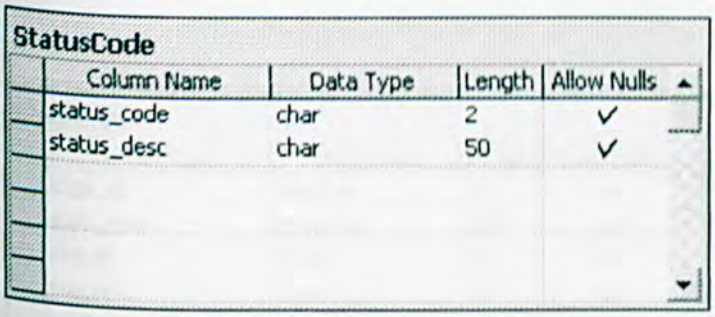
OrderFormLineItems

Column Name	Data Type	Length	Allow Nulls
ordergroup_id	char	20	✓
orderform_id	char	20	✓
lineitem_id	int	4	✓
quantity	int	4	✓
unit_code	char	2	✓
cy_unit_price	money	8	✓
product_id	nvarchar	255	✓
description	nvarchar	255	✓
order_number	char	10	✓
line_item_status	char	2	✓
supplier_ID	varchar	32	✓
order_approval_decisi	char	15	✓

Table 4.4 OrderFormLineItems

The order form line items table is designed to store the detail information on the order form when a requestor submitted the order request to the system. The information of each product that on the order request such as line item id, order quantity, product id and product description are stored in this table. The primary key for this table is the combination of order group id, order from id and line item id.

4.5.5 Status code description table



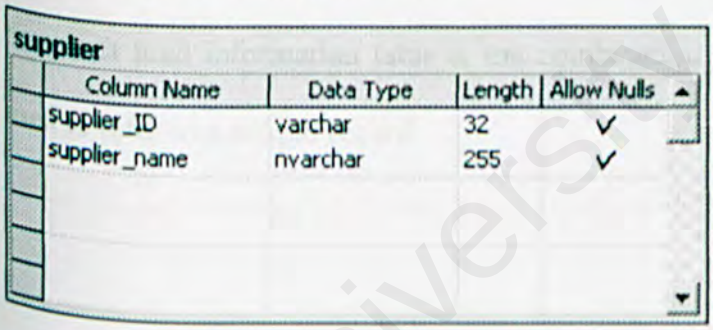
StatusCode

Column Name	Data Type	Length	Allow Nulls
status_code	char	2	✓
status_desc	char	50	✓

Table 4.5 StatusCode

The status code description is designed to store the description for different status code such as new, within limit, exceed limit, stock available, stock not available, approve and reject.

4.5.6 Supplier description table



supplier

Column Name	Data Type	Length	Allow Nulls
supplier_ID	varchar	32	✓
supplier_name	nvarchar	255	✓

Table 4.6 supplier

The supplier description table is designed to store the description for different supplier who are involved in this project – B2B portal Order Routing System.

4.5.7 Credit limit information table

CreditLimit

Column Name	Data Type	Length	Allow Nulls
supp_id	varchar	32	✓
supp_nme	nvarchar	255	✓
cus_id	char	10	✓
cus_nme	char	50	✓
total_limit	money	8	✓
used_limit	money	8	✓
date_last_update	char	10	✓

Table 4.7 CreditLimit

The credit limit information table is designed to store the credit limit amount such as total limit and used limit for the particular customer that provided by particular supplier. The primary key for credit limit information table is the combination of supplier id and customer id in which are used to refer to a unique record.

4.5.8 Stock inventory balance information table

INBALN1P

Column Name	Data Type	Length	Allow Nulls
RCTY	char	1	✓
CRDT	numeric	5	✓
YYMM	numeric	5	✓
FIRM	varchar	50	✓
WHSE	char	3	✓
PROD	nvarchar	255	✓
TQTY	numeric	9	✓
OQTY	numeric	9	✓
UQTY	numeric	9	✓
AQTY	int	4	✓
PRODDESC	nvarchar	255	✓
FIRMNAME	nvarchar	255	✓

Table 4.8 INBALNIP

The stock inventory balance information table is designed to store the balance information of the products on sale. The stock availability of a product can be checked from this table as it stores the total quantity, ordered quantity, available quantity and unavailable quantity of the products on sale. The primary key for this table is the combination of firm, warehouse, product id and current date.

4.5.9 Order transaction header table

OrderTransactionHeader

Column Name	Data Type	Length	Allow Nulls
RCTY	char	1	✓
CRDT	char	15	✓
TXCD	char	2	✓
REF	char	10	✓
ORDT	char	15	✓
STAT	char	1	✓
ACNO	char	10	✓
PAYM	char	2	✓

Table 4.9 OrderTransactionHeader

The order transaction header table is designed to store the header information of approved order once the order request enter the supplier side as a valid purchase order. The information that to be stored are such as order create date, reference number, status of the orders, customer id and payment type. The primary key for this table is reference number, that is used to unique identify a record in the table.

4.5.10 Order transaction detail table

OrderTransactionDetail

Column Name	Data Type	Length	Allow Nulls
RCTY	char	1	✓
CRDT	char	15	✓
TXCD	char	2	✓
REF	char	10	✓
PROD	nvarchar	255	✓
QTY	int	4	✓
PRIC	float	8	✓
CCY	char	5	✓
AMT	float	8	✓
STAT	char	2	✓

Table 4.10 OrderTransactionDetail

The order transaction detail table is designed to store the detail information for the approved order that approved by the Sales & Marketing manager. The detail information for the approved order such as product id, ordered quantity, unit price and currency are stored in this table. The primary key for this table is reference number and line item id.

4.6 Interface Design

The interface design is the stage that arranges the information in an appropriate way in order to perform to the user. The interfaces act as a communication tool between the user and the system. The users interact with the system by the data input and the system fulfills the request of the user by giving the expected output. The prototyping of interface design gives a preview of the system to the user as well as the developer. It will help to develop a system that suite the user requirement at maximum level.

The B2B portal – Order Routing System consist of fifteen interfaces which cover the login module, check stocks on hand module, check order status module, view end status orders module, view pending orders module and process new orders module. The interfaces are designed to become user friendly, consistent, simplify, guided way to a user who acts as the administrator that in charge of the approval process of order request of the enterprise. The main functionality that the interfaces are provided to the user is the needed and well-organized information. Some of the interfaces design is shown at the following section.

4.6.1 Check stocks on hand screen

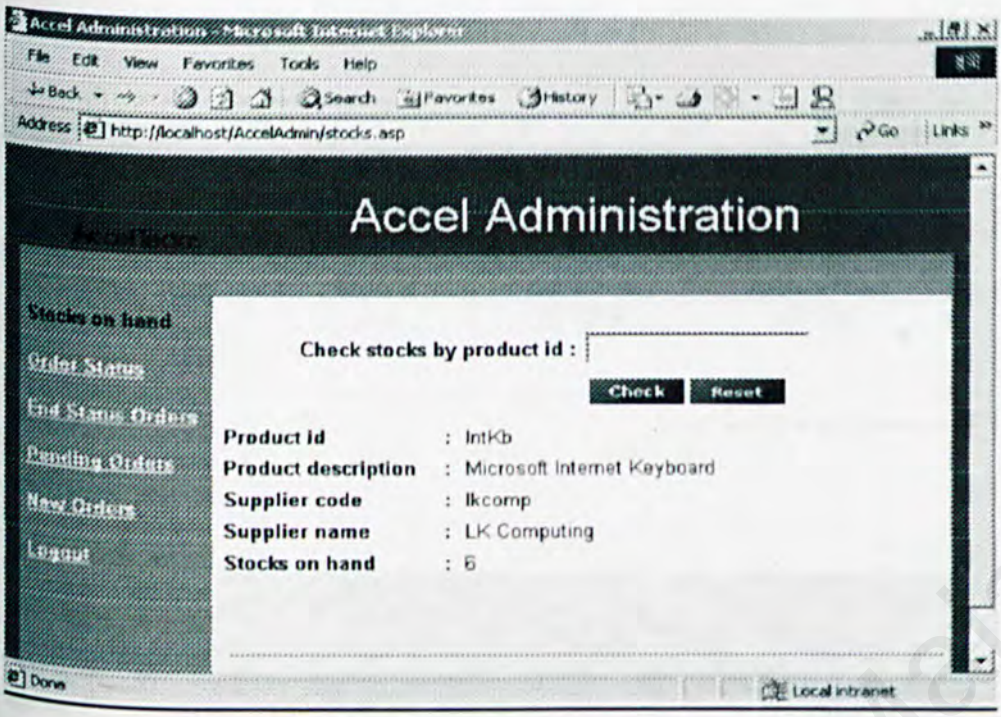


Figure 4.15 Check stocks on hand screen

4.6.2 Check order status screen

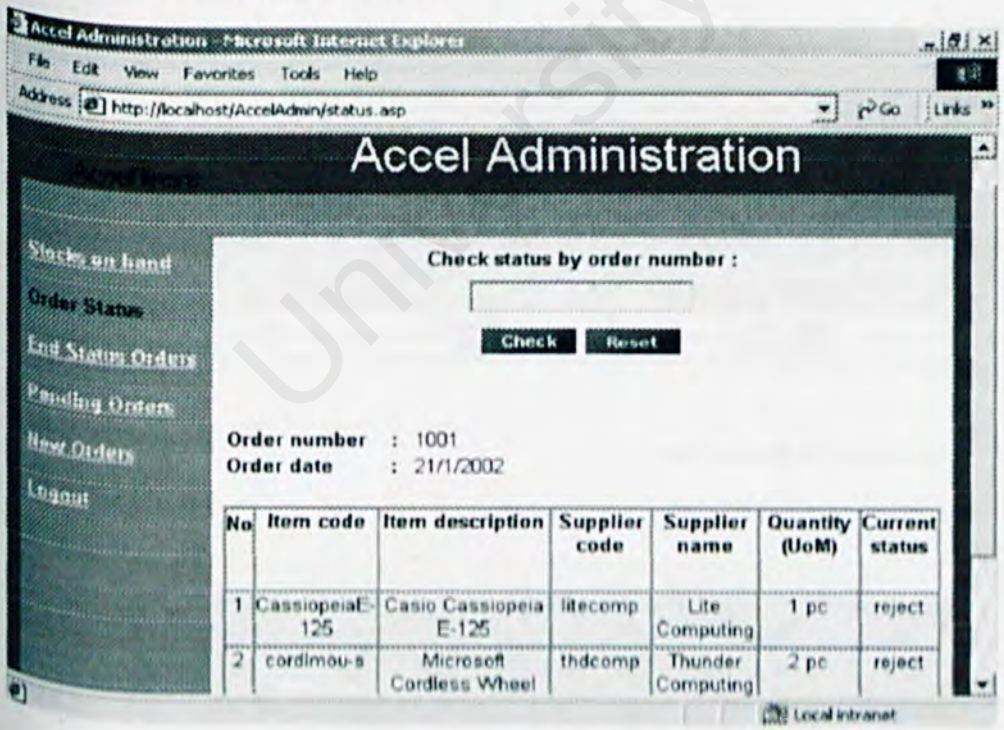


Figure 4.16 Check order status screen.

4.6.3 List of end status orders screen

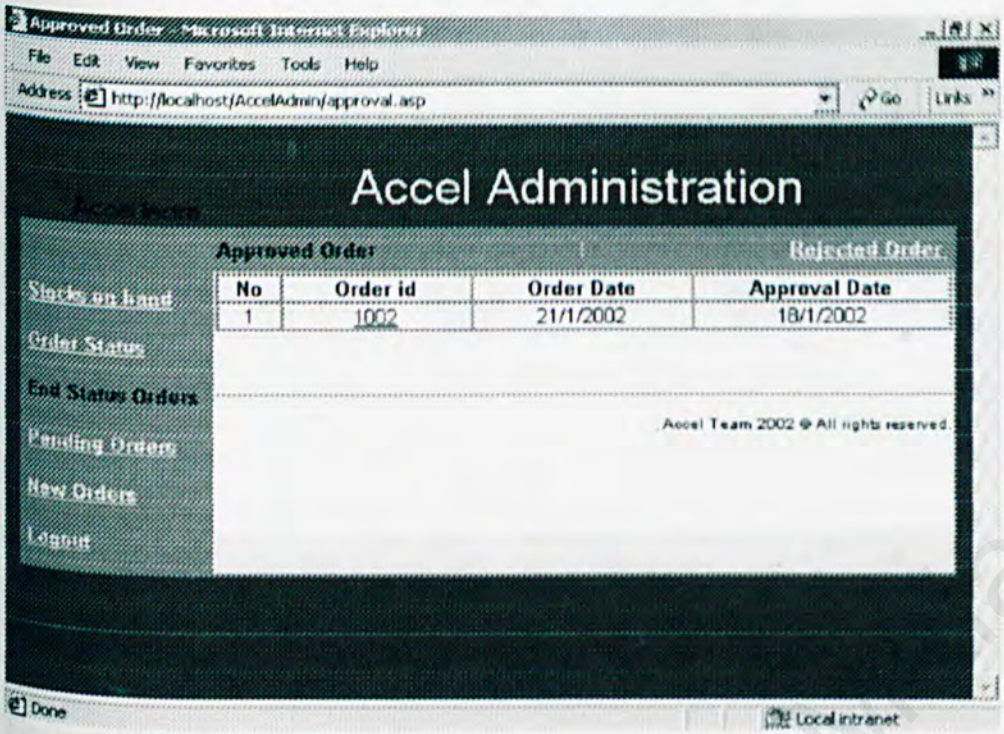


Figure 4.17 List of end status orders screen

4.6.4 List of pending orders screen

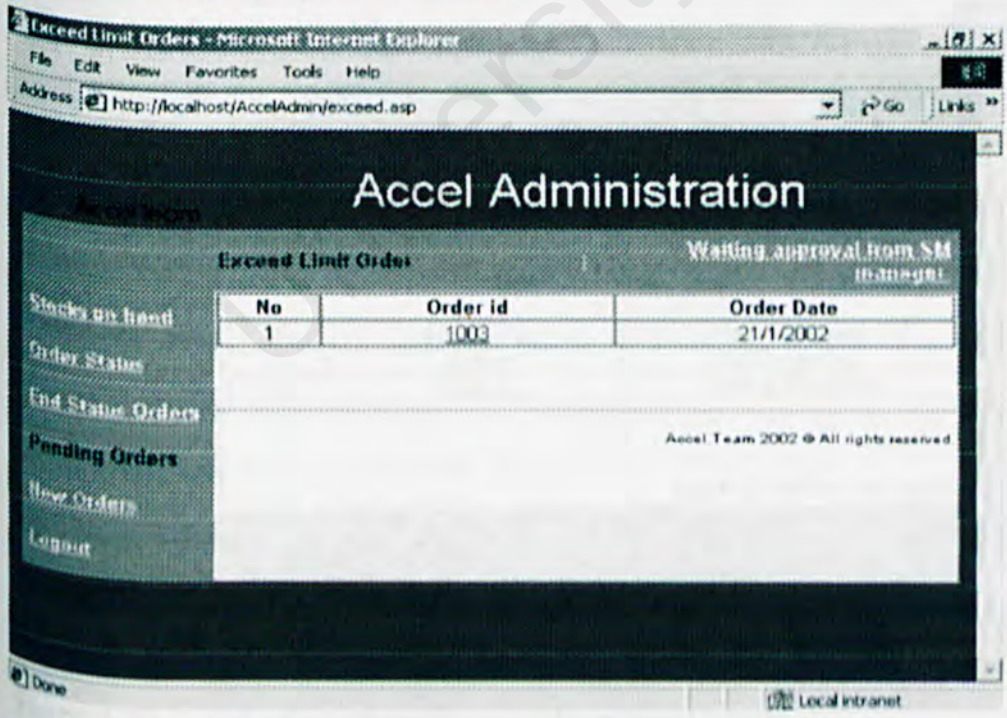


Figure 4.18 List of pending orders screen

4.6.5 List of new orders screen

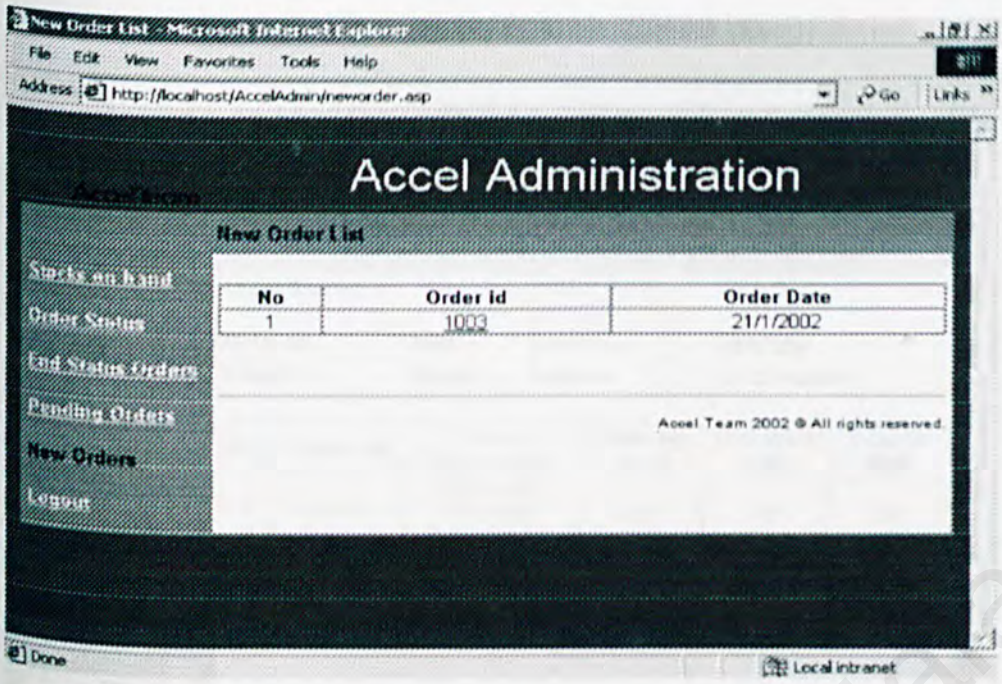


Figure 4.19 List of new orders screen

4.6.6 List of suppliers for an order request

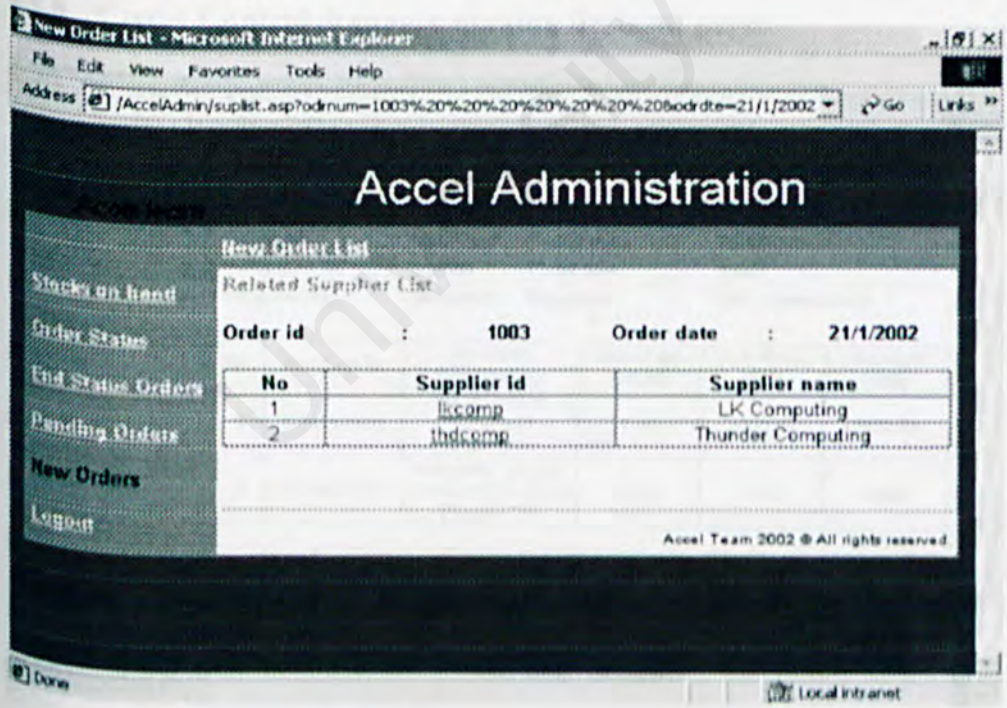


Figure 4.20 List of suppliers for an order request screen

4.6.7 Order details for a supplier screen

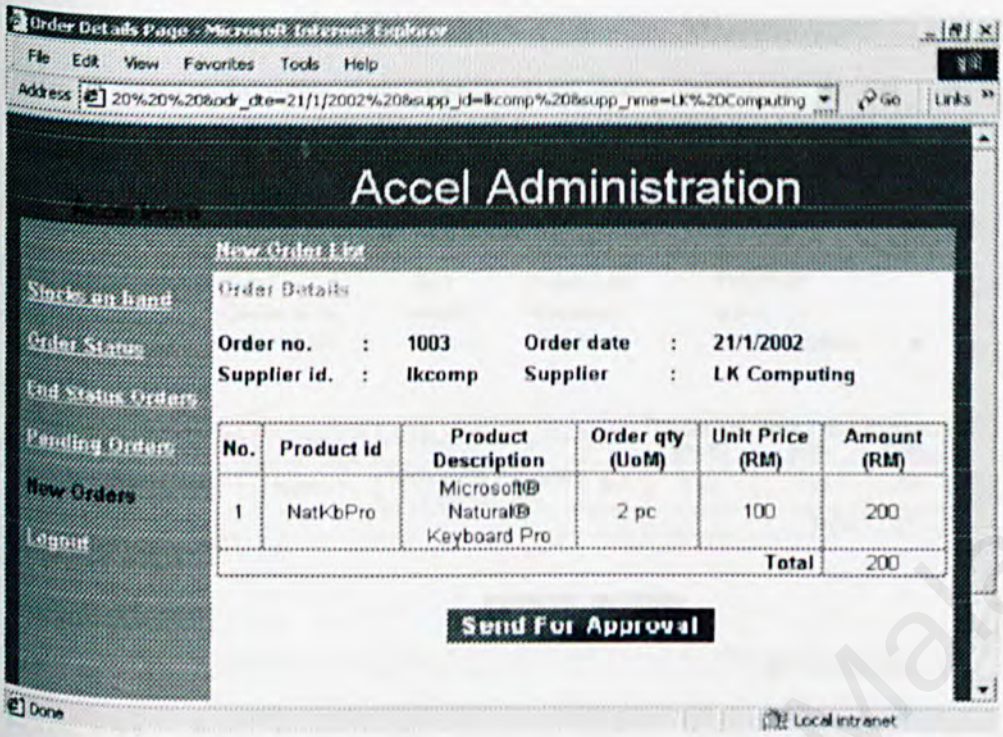


Figure 4.21 Order details for a supplier screen

4.6.8 Credit Control manager making decision page

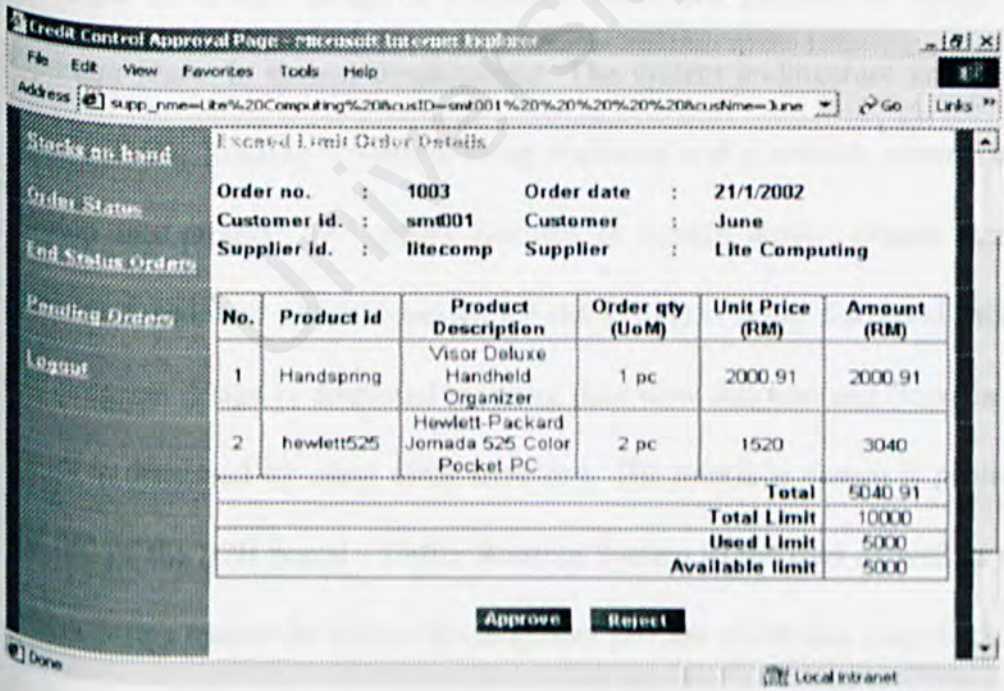


Figure 4.22 Credit Control manager making decision page

4.6.9 Sales & Marketing manager making decision page

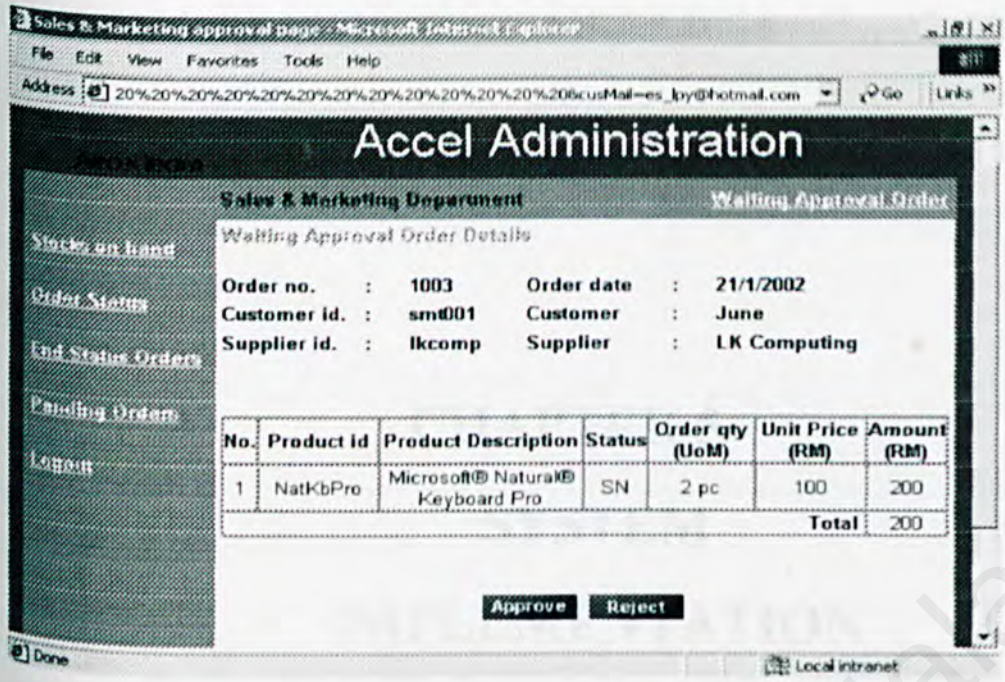


Figure 4.23 Sales & Marketing manager making decision page

4.7 Summary

The topic of system design is discussed about the process of design the system that is an important phase in system development. The system architecture and system structure of B2B portal – Order Routing System is being discussed and a suitable system architecture is chosen to develop this project. The others features in system design phases included program design, database design and interface design for the system is being discussed thoroughly in this chapter. The program design is discussed by using data flow diagram and flowchart whereas the database design is discussed by using table structure. The interface design is prototyped to give the look and feel of the B2B portal – Order Routing System to the user as well as the developer. In short, system design makes the system development process more easy and efficiency.

CHAPTER 5

SYSTEM IMPLEMENTATION

Chapter 5 System Implementation

5.1 Introduction

In conjunction with the System Design in chapter 4, System Implementation is a stage to change the thing from the scratch to the reality. The flowchart design for each module and the file structure design for each table in the database as well as the interface design are move from the design scratch to the real implementation stage by using hardware development requirement and software development tools. The system implementation phase plays an important role to ensure the existence of the system.

5.2 Development Environment

The development environment is important to ensure the system to be developed by using suitable development tools in order to meet all the system requirements and maintain the quality of the system.

5.2.1 Hardware development requirements

The hardware development requirement that use to develop B2B portal – Order Routing System are as stated as below:

- Processor with 400 MHz at minimum level
- RAM with 256 Megabyte
- Hard disk space with 5 GB
- Network Adapter Card – for connectivity between client and server

5.2.2 Software development tools

The software development tools that use to develop B2B portal – Order Routing System are as stated as below:

- Microsoft 2000 Server as the operating system
- Internet Information System (IIS) as the web server
- Microsoft Interdev 6.0 as the development tool
- Microsoft SQL Server 2000 as the web database
- Microsoft Internet Explorer 5.5 as the web browser
- Active Server Pages (ASP) as the server-side scripting language
- VBScript as the client-side scripting language
- Microsoft FrontPage as the design interface tool
- Microsoft Paint as the design interface tool
- Microsoft Word as the documentation tool

5.3 Development and Implementation

The development and implementation of the system is a process to implement the system from the design scratch. There are four phases in implementation stages, which are database implementation, module implementation, interface implementation and security implementation.

5.3.1 Database implementation

The database implementation involved ten tables, which are Admin Login, Order Group, Order Form Header, Order Form Line Items, Status Code, Supplier, Credit Limit, Balance Information, Order Transaction Header and Order Transaction Detail. All the tables are created inside a database namely Accel Admin. The file structure for each table such as field name and the data type of the particular field are setup based on the database design in the previous chapter. The primary key is setup for each table to enable cross-reference among each other tables for data sharing in processing purpose. The database setup is the first phase in System Implementation stage as some of the data are inserted into database for testing in conjunction with the implementation of each module.

5.3.2 Module implementation

The module implementation phase is a process to change the flowchart of design for each module to become system executable software. In other words, it translates the design scratch of each module into coding by using appropriate programming languages. The flow of the system is translated into coding by using Active Server Pages scripting language. The front-end of each module are coded by using Hypertext Markup Language (HTML) for static part and Active Server Pages (ASP) for dynamic part. The back-end of each module is coded by using Active Server Pages (ASP) and VBScript for processing purpose such as connecting to database and data processing.

5.3.3 Interface implementation

The interface implementation is the process after the implementation of each module. When each module has established completely, the implementation of interface comes in on the road to design and arrange the information that to be displayed. The purpose of interface implementation is to setup a user-friendliness and efficiency interface for user. This included the choice of the background color, font size, font style and color, error message, the arrangement of the data and the linking among each interface.

5.3.4 Security implementation

The security implementation is the final phase in System Development and Implementation stage. The security is setup to ensure that the provided data is private and confidential when it transmitted over the Internet. This included using authentication user and password encryption to identify the authorize people.

5.4 Summary

The topic of System Implementation is discussed about the development and implementation of the system from the design scratch to the real system executable software. The hardware development requirements and the software development tools are being discussed in this chapter. There are four phases in implementation stage, which are database implementation, module implementation, interface implementation and security implementation. The combination of four phases of implementation has made the completely system implementation process.

CHAPTER 6

SYSTEM TESTING

Chapter 6 System Testing

6.1 Introduction

System testing plays an important role in the process of system development. It is a process of executing a program with the intention of finding bugs, errors or defects that present in the system. System testing also can be defined as the process of analyzing a software item to detect the difference between existing and required conditions and to evaluate the features of the software items.

There are several objectives of system testing as stated as below:

- To demonstrate that behavioral and performance appear to have been met
- To demonstrate that software functions appear to be working according to the specification and user requirement.
- To reveal different classes of errors with a minimum amount of time and effort

6.2 Testing Strategies

In system testing stage, there are several testing strategies that can be carried out to test a system from different view thoroughly. The system is tested on the functionality, accuracy of the output data and expected output result. The testing strategies can be divided into unit testing, integration testing and system testing.

6.2.1 Unit Testing

Unit testing focused on the module independently testing. The functionality of each module is being tested in unit testing independently without dependency among modules.

In unit testing for such a module, it starts with the input validation testing if there is an input field. Then, the testing continues with the flow of control of the particular module to ensure the logical flow of the module is the flow that expected. A test case is built to carry on the testing on the logical flow in which a set of input data is prepared and the output data or result is captured for reference and comparison purpose. Next, the testing continues with the passing parameters in a particular module. The testing had to be carried out for those parameters to ensure the correct parameters are passed to other modules for reference. Hence, the unit testing ends when modules is tested thoroughly on its functionality and perform accurately as the expected result.

6.2.2 Integration Testing

Integration testing focused on the combining and testing multiple components together. It was done once the module of unit testing was satisfied. The combination of several modules would form a logical flow of the system in back-end processing. Integration testing is carried out to ensure the back-end processing run smoothly, accurately and effectively by conducting tests to uncover errors associated with interfacing.

In integration testing, the test case that involved shared data is built to ensure the accuracy of the passing parameters and well communication between programs as well as modules. The logical flow of back-end processing are being tested from stage to stage to ensure the fully functionality of the back-end processing. The errors that prompt out in integration testing are being solved and corrected in order to proceed with the next stage of testing, that is system testing.

6.2.3 System Testing

System testing focused on the whole system testing. It involved the full testing of the system on hardware elements as well as software elements. The objective of system testing is to validate and verify the functional requirements and non-functional requirements of the system. The functional requirements refer to the modules of the system whereas the non-functional requirements refer to the subjective constraints of the system.

In system testing, every process flow of the system is being tested to ensure the overall flow functioning properly. Furthermore, it also ensures the well communication and linking among each module. The well established between the program and the database is tested to ensure the accuracy of the input data and output data. Test cases are carried out to ensure all the components in the modules work well as a larger system after integration with the software elements as well as hardware elements. Hence, the system testing ends when all the components perform allocated functions and the whole system running as expected result.

6.3 Summary

The topic of system testing is discussed about the purpose and objectives of the system testing in development process. The testing strategies that had been carried out to perform the testing process are unit testing, integration testing and system testing. Each strategy perform different task of testing to ensure the fully functioning of the particular part of the system.

Chapter 7 System Evaluation

7.1 Introduction

System evaluation is a process at the end of development process. The development of B2B portal – Order Routing System has come to the end in this chapter. There is several unexpected condition and event happened during the development process of this project. The following section discussed about the problems encountered as well as the solutions, the system strengths, limitations and future enhancement.

7.2 Problems and Solutions

7.2.1 Lack of the knowledge and experience in the web application development

The problem of lack of the knowledge and experience in the web application development has made the delay in the development process. A lot of the time is spending to study and explore the method in order to develop an effective web application by using appropriate scripting language in coding. Furthermore, lack of the experience in developing web-based application has made the insufficient use of the coding in development process. As a result, more time have to spend in order to solve the problems occurred and refer to those experience people in order to improve the skill of coding.

7.2.2 Difficulty in understanding the business flow

The business flow in the real world business environment is a complicated flow. The business flow involved different parties and enable two-way communication among each other in real world business environment. Due to the lack of the business knowledge, the business logical flow becomes a problem to the developer of this project. Time is spent on fully understand the business logical flow in order to change the real world business flow into business electronic flow in this project. The flow of communication among related parties such as Credit Control Department, Sales & Marketing Department and Account Receivable Department has to be understood in order to apply to the electronic flow of this project. As a result, an interview has been carried out between the developer and the experience people in business world such as Accountant to fully understand the business flow.

7.2.3 Difficulty in inserting data in inter-related tables in SQL Server database.

This project involved ten tables in the database for development purpose. Some of the tables in the database are inter-related, which are Order Group, Order Form Header and Order Form Line Items tables. The relationship among these tables has made a difficulty in the process of inserting data for testing purpose. If one of the fields in Order Form Line Items table exists as in Order Group table, the value of that field cannot be inserted unless the data is inserted through the Order Group table. The condition will become worst if the particular field is known as unique identifier. Therefore, the relationship among the tables is ignored from the database setup but remain in the theory to enable the process of inserting data for testing purpose.

7.3 System Strength

The system strength refers to the ability and the functionality of the system as well as the advantages of the system.

7.3.1 Distribute an order request into different purchase order based on different supplier

Order Routing System enables the distribution of order request into different purchase order based on the different supplier. A new order request may involve one or more suppliers as the ordered items are from different supplier. A purchase order with a particular supplier is needed to enable the approval process of the purchase order. Therefore, Order Routing System perform this advantage in responsible to distribute the order request into separated purchase order.

7.3.2 Enable an automatic approval process for an order request

Order Routing System enables an automatic approval process for an order request. When a customer issued an order request, the order request is able to go through an approval process automatically. The order requests go through from checking credit limit stage to checking stock availability stage automatically without the manual process. The approval process may stopped and wait for the approval from the authorize people for different case of the purchase order. After the authorize people make the decision on the particular purchase order, the approval process will continue for further process until it ends up to send to supplier. Therefore, the Order Routing System provides an automatically approval process for the order request.

7.3.3 Notify the customer by electronic mail

Order Routing System enables the customer to receive the notification by electronic mail. The customer will be notified for the end status of an order request that had been separated into different purchase order based on different suppliers. The end status of a purchase order is either approved or rejected. Notification the customer by electronic mail keeps the customer to the latest information, as there is no time delay in the notification process.

7.4 System Limitations

There are several limitations in Order Routing System due to the lack of time and lack of the knowledge as well as the experience in developing web-based application. The limitations of the system are as stated as following section.

7.4.1 Insufficient business flow

The business flow that designed for this project – Order Routing System is a simplify business flow that present in the business real world environment. Therefore it cannot be apply for all of the company that involved in the business-to-business portal as each company has its own business rules. The insufficient business flow has made the Order Routing System a limitation.

7.4.2 One way electronic communication with the customer

Order Routing System enables only one-way electronic communication with the customer. The customer unable to communicate automatically with the trading partners through the electronic communication. The notification to the customer is in static contents as the customer unable to communicate with the trading partners through that notification. The content of the notification is act as a notice to the customer.

7.4.3 Managers have to log on to system frequently

The people who authorize to make decision on the purchase orders such as Credit Control manager and Sales and Marketing manager have to log on to the system frequently to process those pending orders. They have to check on the system about the pending orders frequently while they are not being notified for the new pending orders by any electronic media. Therefore, it has become the limitation of Order Routing System.

7.4.4 Lack of the system security control

Order Routing System is lack of the security control. The only security control is the authentication of the valid user and the encryption of the user password. Therefore, the system is under a poor security control.

7.5 Future Enhancement

Based on the listed limitations in the previous section, the system is opened for more future enhancements in several aspects. These enhancements are to ensure the system become robust, easy to use, more flexible, more secure, more effective and efficient.

7.5.1 Fully automatic flow for approval process

The implementation of two-way communication by using appropriate electronic media should provide a fully automatic flow for approval process of an order request. The administrators as well as the related manager need not to depend on the system to process the order request. In other words, the managers need not to log on to the system to process the pending orders as they can do so once they receive the notification by electronic media. This ensures the effectiveness and efficiency of the system.

7.5.2 Using Microsoft Biztalk Server for workflow process

Microsoft BizTalk Server 2000 provides a powerful Web-based development and execution environment that integrates loosely coupled, long-running business processes, both within and between businesses. The server provides a standard gateway for sending and receiving documents across the Internet, as well as providing a range of services that ensure data integrity, delivery, security, and support for the BizTalk Framework and other key document formats. Therefore, the use of Microsoft Biztalk Server ensures the flexibility and the robust of the system, as it is special designed for the business-to-business workflow process.

7.5.3 Implementation of firewall and Secure Socket Layer (SSL)

The security of the system is important in order to make the system a private and confidential for those authorize people. The architecture of the firewall and Secure Socket Layer (SSL) implementation should be robust enough to deter any intrusion by hackers and to ensure the highly secure of the system.

7.6 Summary

The main objective of the topic of system evaluation is to evaluate the developed system – Order Routing System from different view. The topic discussed about the problems encountered during development process as well as the solutions to the particular problem in order to proceed with the development process. Other than that, the topic also discussed about the system strengths, which identify the advantages of the system, system limitations, which identify the disadvantages of the system and future enhancement of the system, which identify the effort to make the system more effective and efficient in the future.

CONCLUSION

Conclusion

The B2B portal – Order Routing System is a web-based system that enables an order request goes through the approval process in a workflow process, which consists of several business rules. This system divided into two main sections that are the front end and the back end. The front end process display the needed information in a well-organized way to the user whereas the back end process is a continuous process that get the stimulus from the event occurred such as a new order request, an approval from the Credit Control manager or Sales and Marketing manager. The combination of front end and back end process of this system will make this system a paperless and automating electronic system.

The successfulness development of B2B portal – Order Routing System is a partially automating electronic system that enables an order request to be approved by one or more manager according to the order request status within the workflow process. Furthermore, it encourages data interchange among different parties in the workflow process without the use of papers. Therefore, it will make the approval process of an order request a simplify way.

The development of B2B portal – Order Routing System has built up the skill of developing web-based application to the developer. The developer gains the technical knowledge as well as the non-technical knowledge from the development process of the system. The technical knowledge refer to the web-based programming skills, installation knowledge, client-server architecture and security issues while the non-technical knowledge refer to the time management skills and organizing skills.

In conclusion, the future enhancements for B2B portal – Order Routing System are widely performed due to the limitations of the current developed system features.

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Appendix (i) – Questionnaires

Title : B2B Portal—Order Routing System
Subject : Questionnaires for interviewee
Prepared by : Lee Pho Yen (WEK 990242)
Date : 6/6/2001

Questionnaires

1. How the administrator will process an order request once they received the order request from their business partners?

2. Who are the person or parties that are involved in the processing of an order request?

3. What are the conditions for approve an order request?

4. What are the tasks for an administrator in business transaction process?

5. Can the business partners cancel their order once they submit the order request? If yes, when should the business partners make the decision?

Appendix (ii) – User Manual

Introduction

This manual is divided into three parts, which consist of hardware and software requirements to implement the system, system setup information and the way of how to use the system.

(a) Hardware and software requirements to implement the system

To implement the Order Routing System, the hardware requirements and software requirements are as stated as below:

Hardware requirements

- Server -side
  - ❖ Processor with 400 MHz at minimum level
  - ❖ RAM with 256 MB
  - ❖ Hard disk space with 5 GB
  - ❖ Network Adapter Card

- Client-side
  - ❖ Processor with 166 MHz at minimum level
  - ❖ RAM with 64 MB
  - ❖ Hard disk space with 5 GB
  - ❖ Network Adapter Card

Software Requirements

- Server-side
  - ❖ Microsoft 2000 Professional / 2000 Server / 2000 Advanced Server
  - ❖ Microsoft SQL 2000 / SQL 7.0
  - ❖ Internet Information Services 5.0 (IIS)
  - ❖ *Microsoft Internet Explorer 5.5 / Netscape Navigator 6.0

- Client-side
  - ❖ Microsoft 95 / 98 / 2000 Professional / NT
  - ❖ *Microsoft Internet Explorer 4.0 / Netscape Navigator

(*best view in IE 4.0 and above)

(b) System setup information

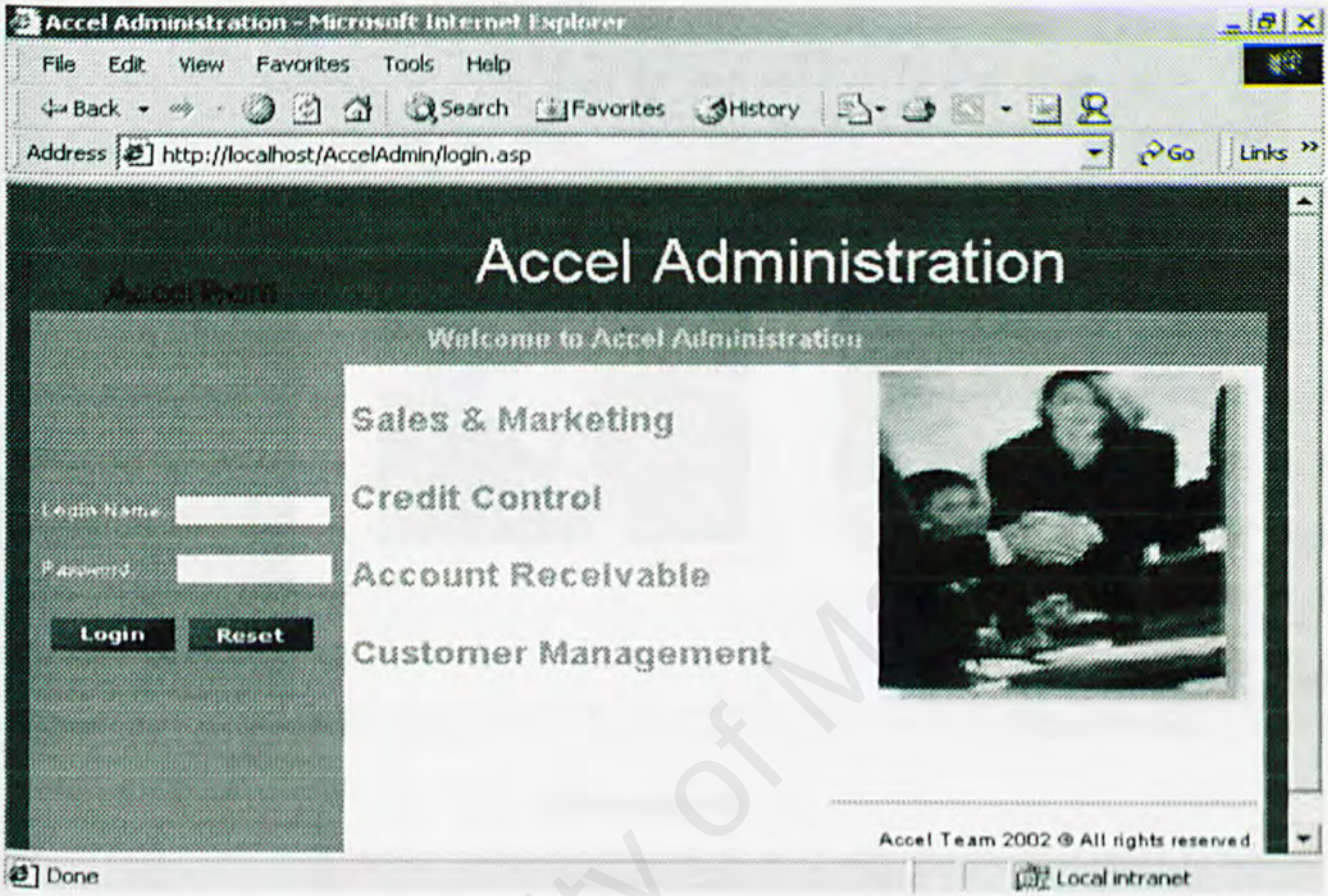
- Server-side
  - ❖ Make sure all the hardware requirements and software requirements had been ready
  - ❖ Copy the Active Server Pages (ASP) coding from the source file with the folder name AccelAdmin
  - ❖ Paste the folder into root directory C:\Inetpub\wwwroot
  - ❖ Open Microsoft Internet Explorer or Netscape Navigator
  - ❖ Type the following in the address bar to test the page: http://localhost/AccelAdmin/login.asp
  - ❖ Run the whole system once to ensure the functionality

- Client-side
  - ❖ Make sure all the hardware requirements and software requirements had been ready
  - ❖ Open Microsoft Internet Explorer or Netscape Navigator
  - ❖ Type the following in the address bar to test the page: http:// **ip_address_for_server /AccelAdmin/login.asp
  - ❖ Run the whole system once to ensure the functionality

(** Please refer to the system administrator to get the correct Internet protocol address for the server that runs this system)

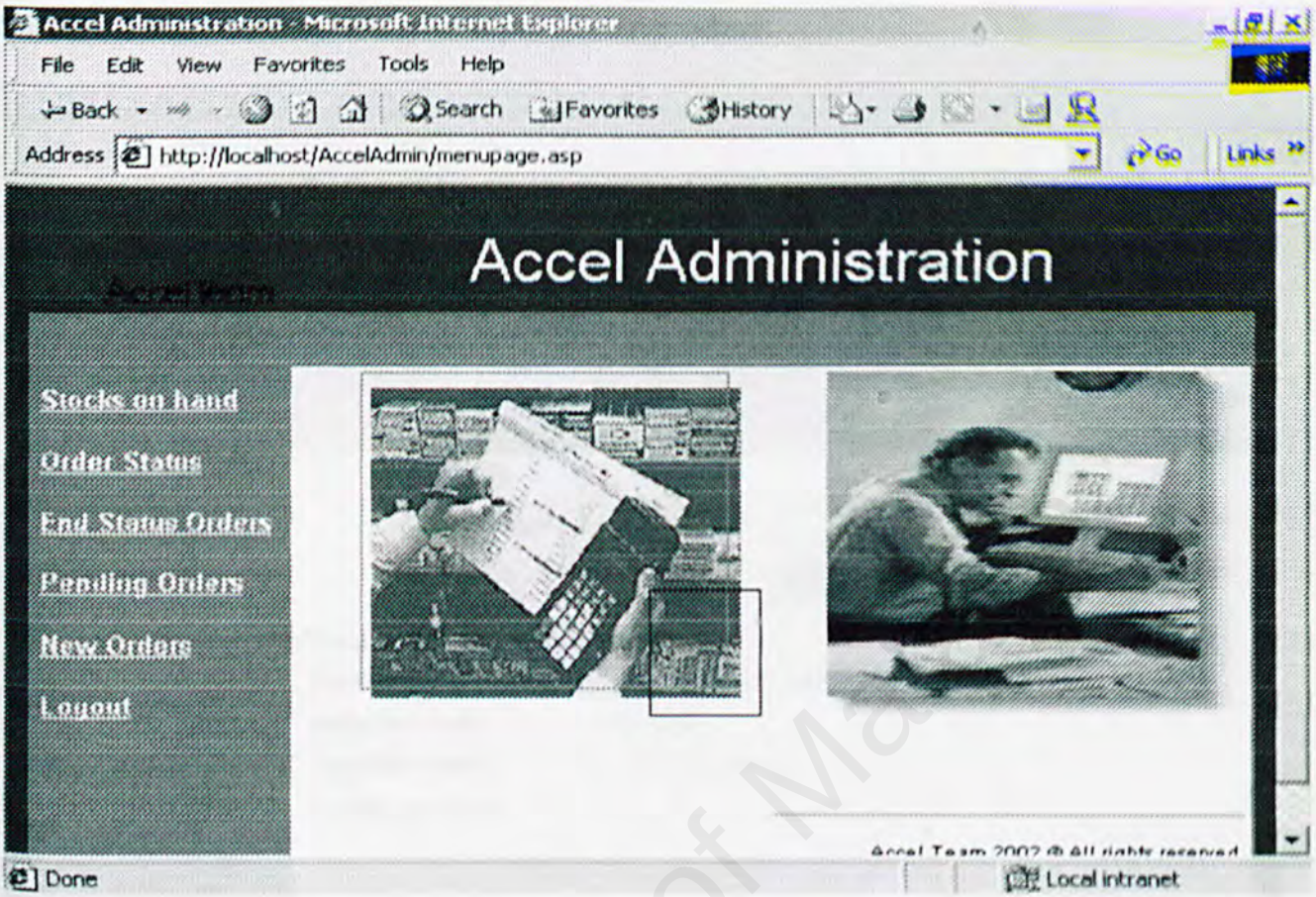
(c) How to use the Order Routing System

(i) Login



login.asp

This is the main page of Order Routing System. Users are required to login to perform task. If the user login as administrator, it will redirect the user to menu page. If the user login as Credit Control manager, it will redirect the user to Credit Control Department main page. If the user login as Sales and Marketing manager, it will redirect the user to Sales and Marketing Department main page.

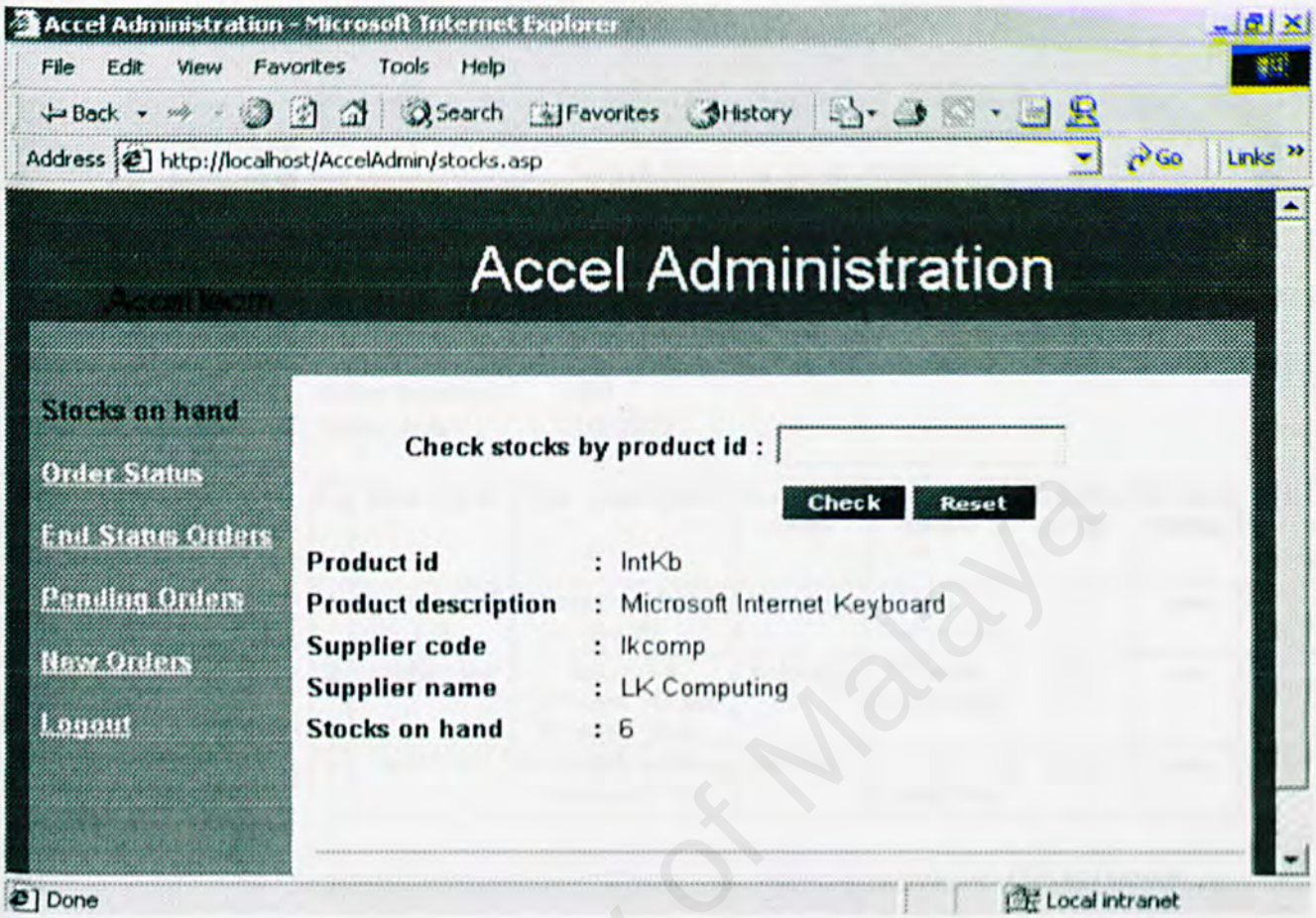


menupage.asp

Once the administrator login success, the administrator will reach the menu page. There are six linking in menu page to enable the administrator to perform tasks.

Linking	Description
Stocks on hand	Link to the check stocks on hand page
Order Status	Link to the check order status page
End Status Orders	Link to the approved/rejected orders page
Pending Orders	Link to the exceed limit/waiting approval orders page
New Orders	Link to the list of new orders page
Logout	Link to logout page, clear the login name and password

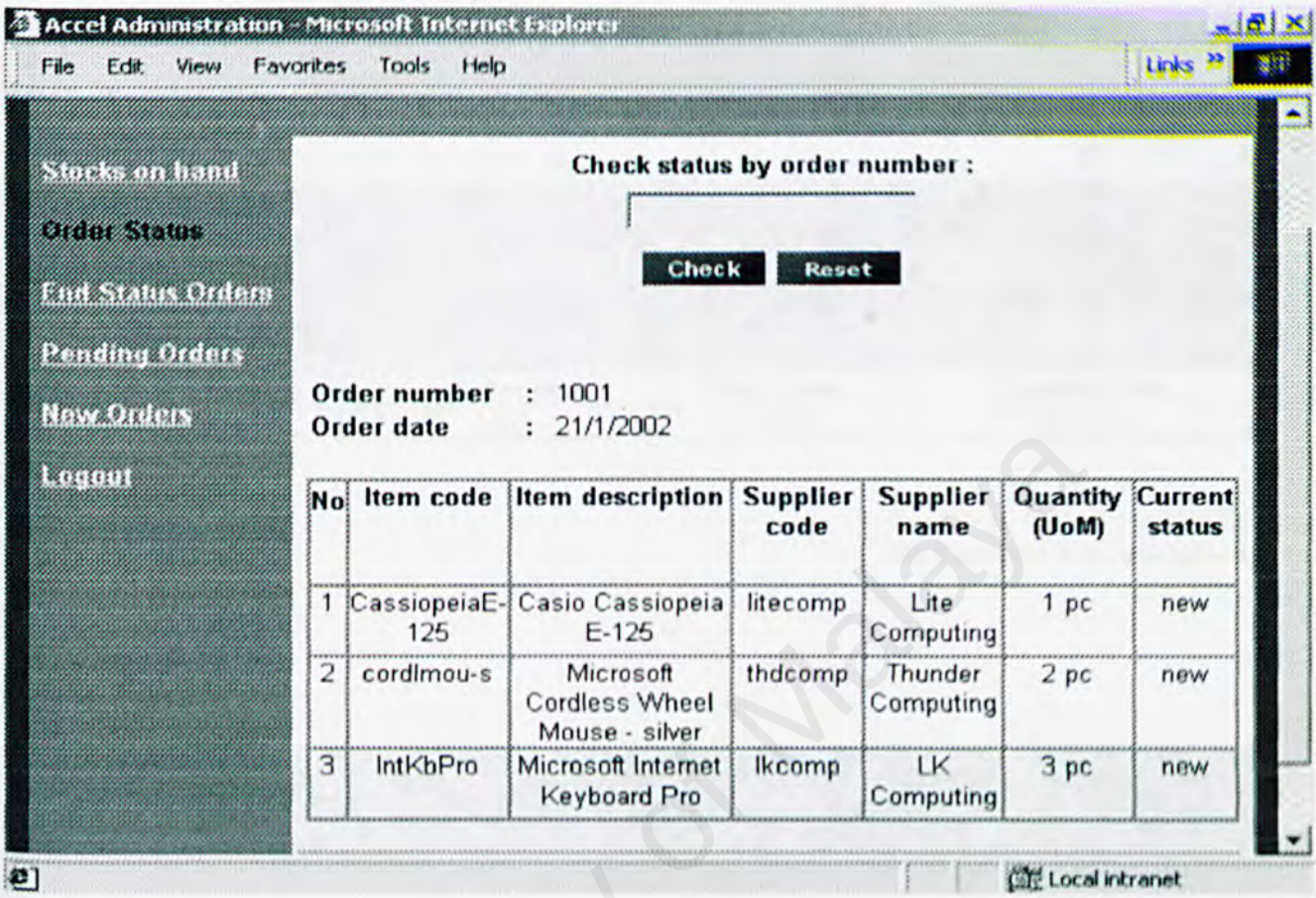
(ii) Check stocks on hand for a particular product



stocks.asp

The administrator enters a valid product id into the input field and click the check button. The matched product's information is displayed at the below of the input field. The product's information included product description, supplier code and supplier name of the checked product, and the number of the available quantity of the product. The administrator may check on the stocks on hand information for all products on sale.

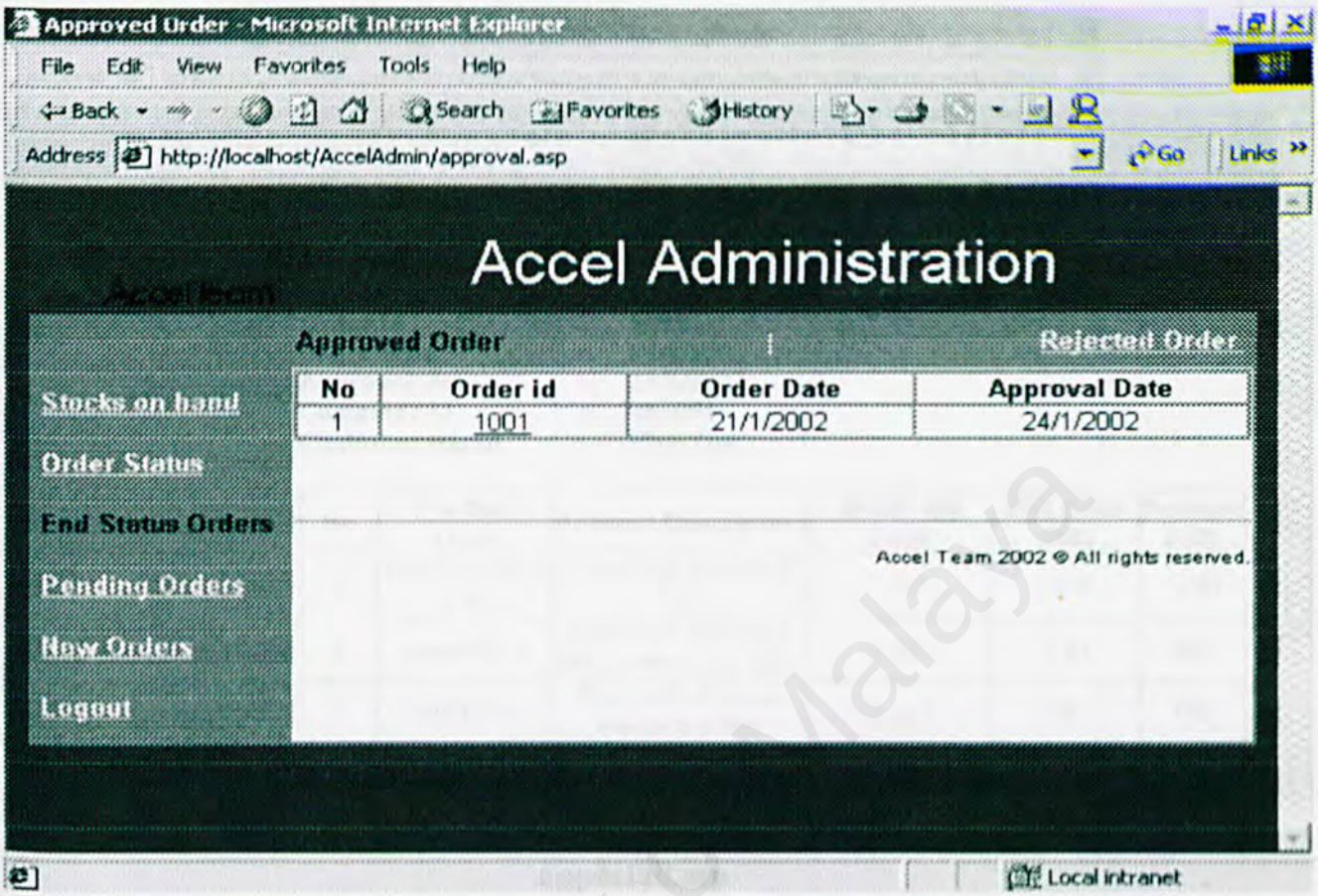
(iii) Check order status for a particular order



status.asp

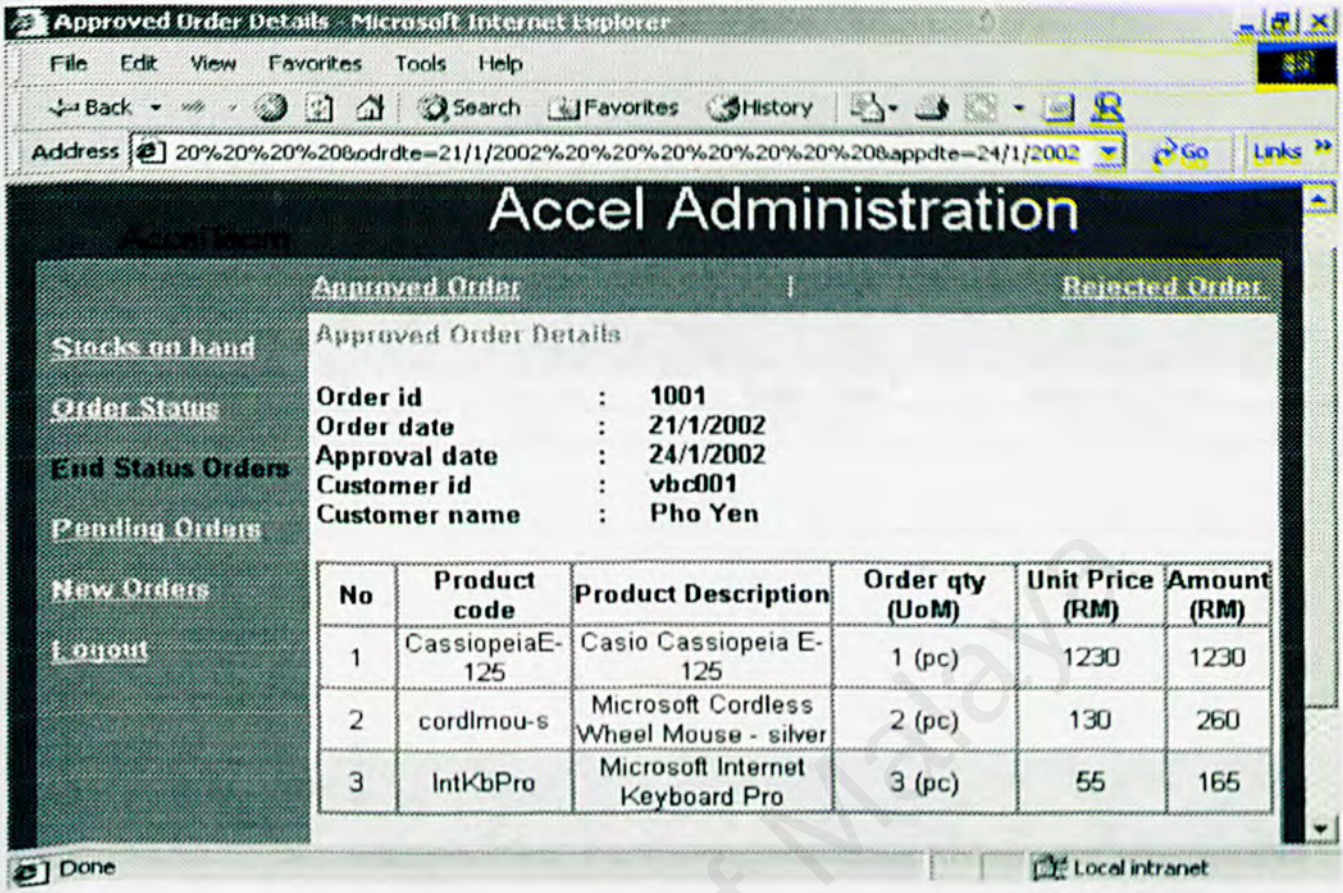
The administrator enters a valid order number into the input field and clicks the check button. The matched order's information is displayed at the below of the input field. The order's information included order date, ordered items code as well as the description, supplier code and supplier name for the ordered item, ordered quantity with the unit of measurement, and current status of the ordered item. The administrator may check on the order's information for all valid orders.

(iv) View end status orders



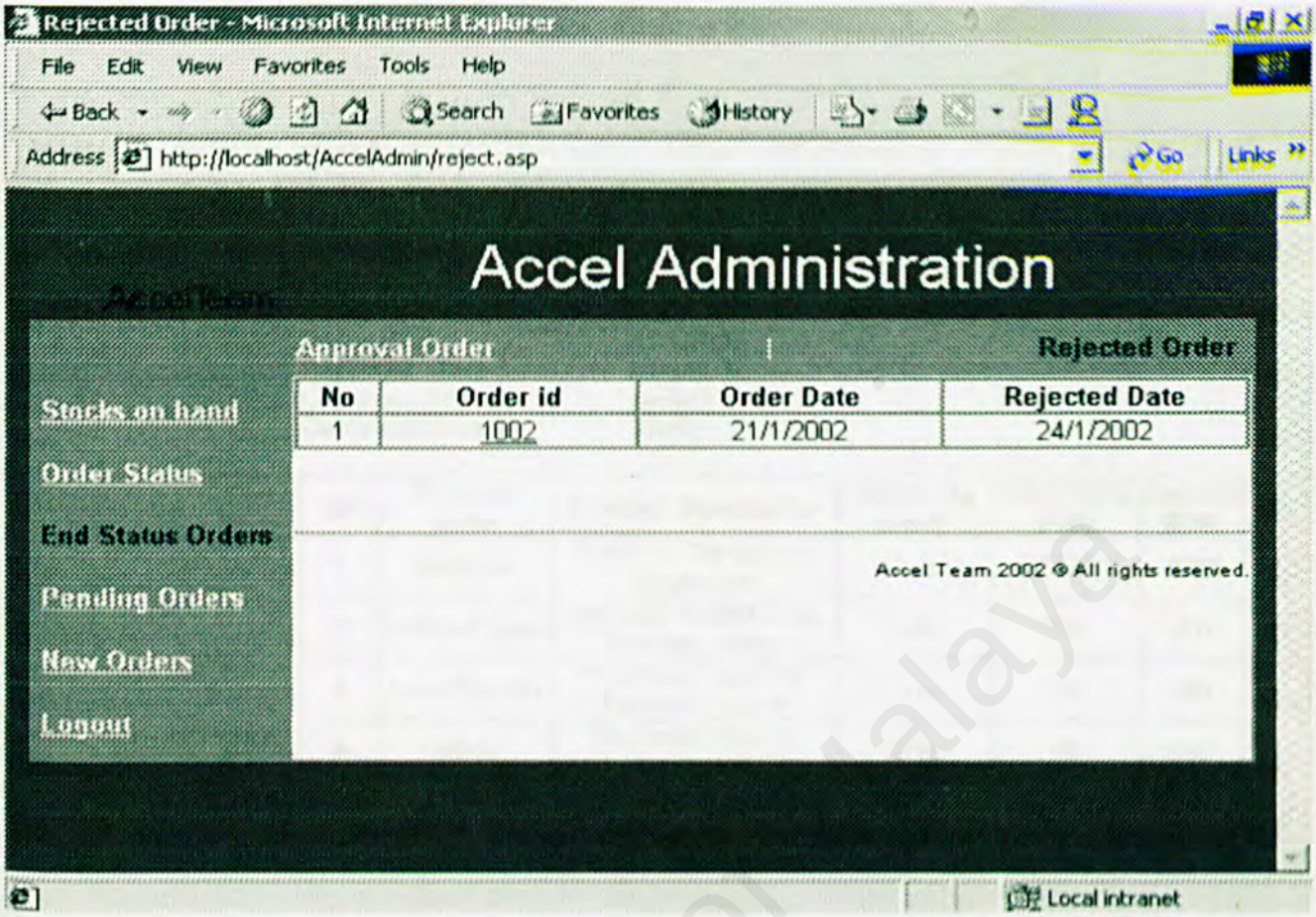
approval.asp

When the administrator clicks on the end status orders linking, the approved orders page is displayed. The page displays the list of approved order associated with the order date and the approval date. The order number is in a linking form that carries appropriate parameters to the approved order details page. To view the approved order details, follow the linking of order number.



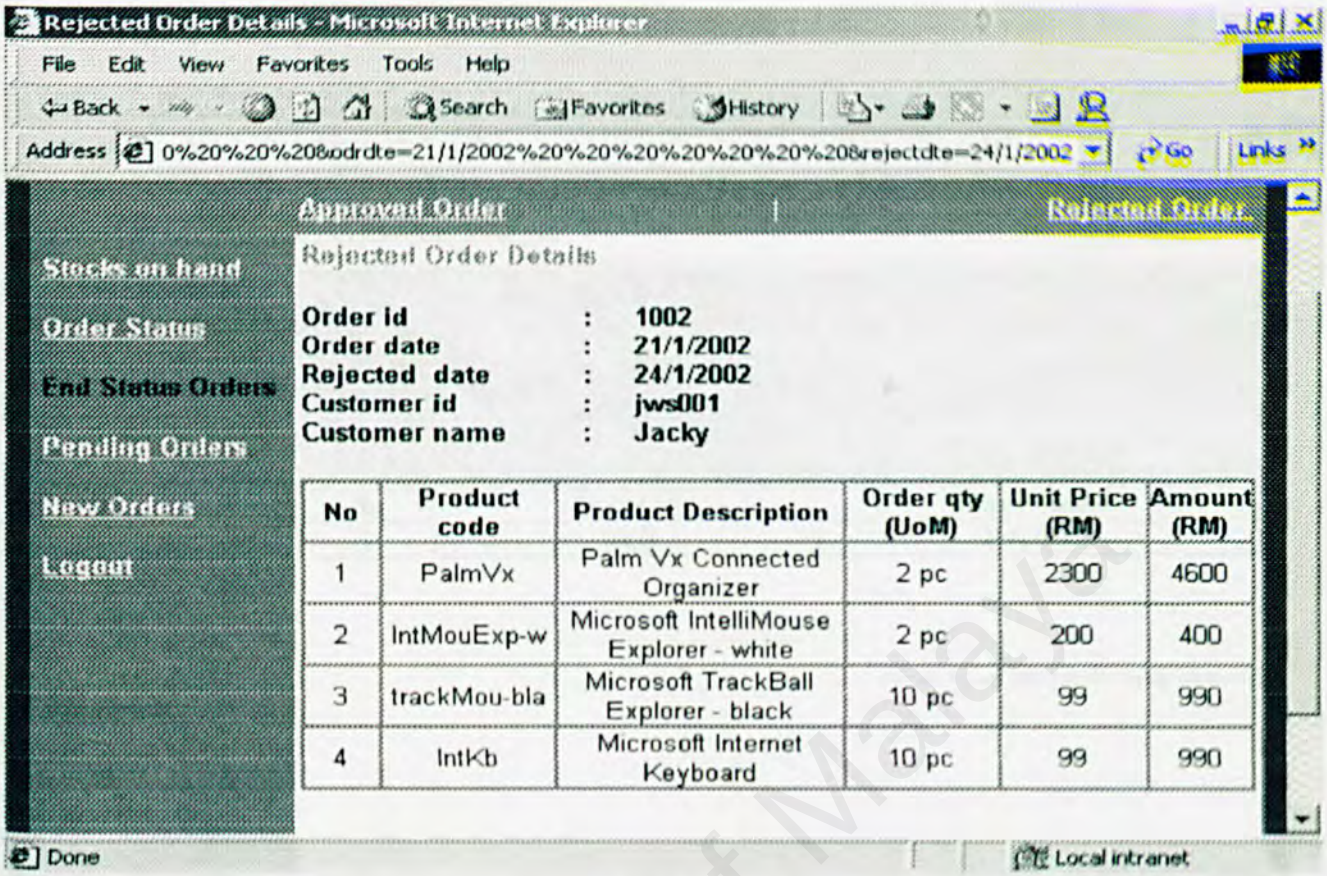
appdetail.asp

This is the approved order details page. The approved order details information included customer id and name that issued the order request, product code and description for the ordered products, ordered quantity with the unit of measurement, unit price of the product, and the purchase amount for each ordered product.



reject.asp

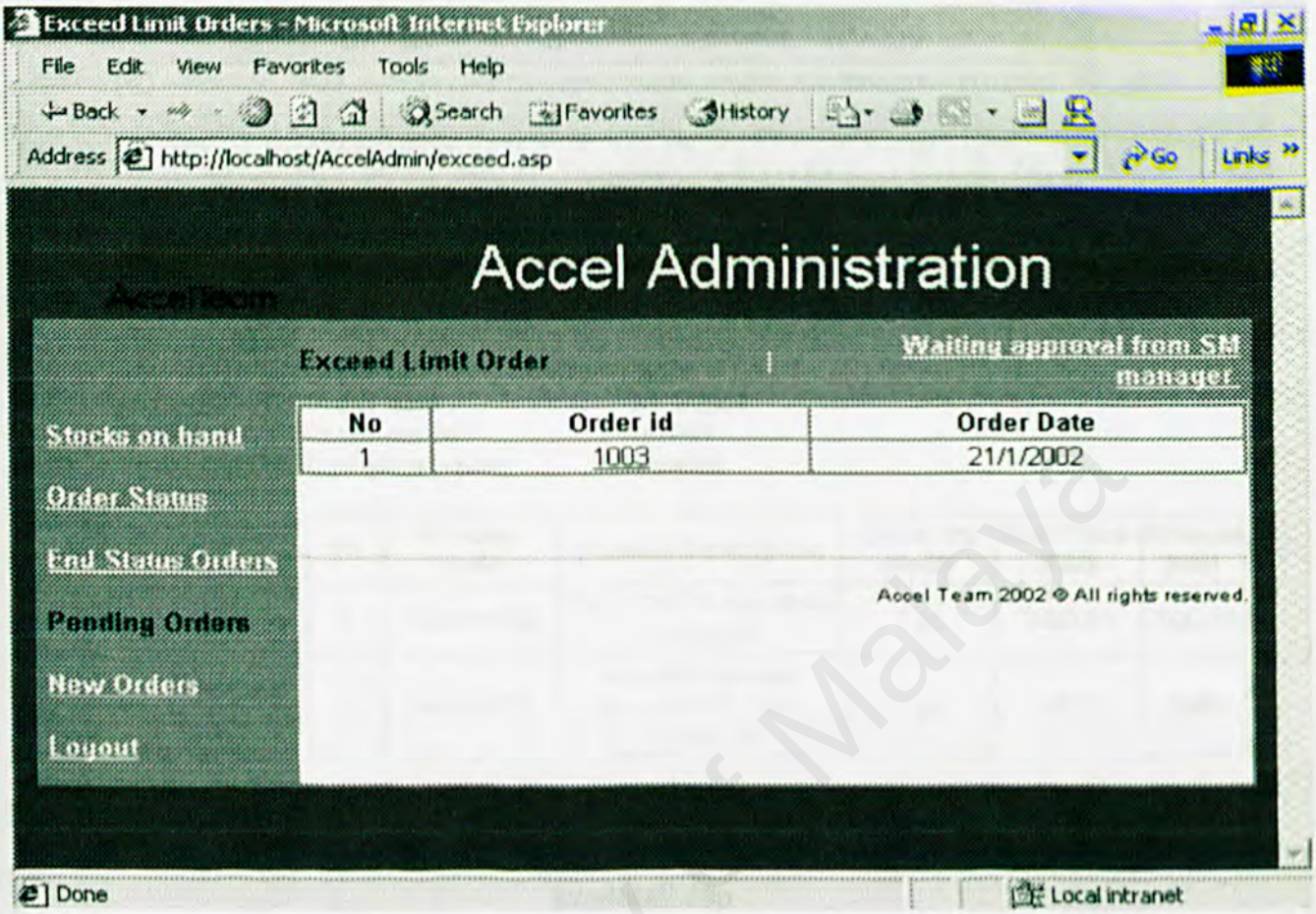
When the administrator clicks on the rejected order linking, the rejected orders page is displayed. The page displays the list of rejected order associated with the order date and the rejected date. The order number is in a linking form that carries appropriate parameters to the rejected order details page. To view the rejected order details, follow the linking of order number.



rejdetail.asp

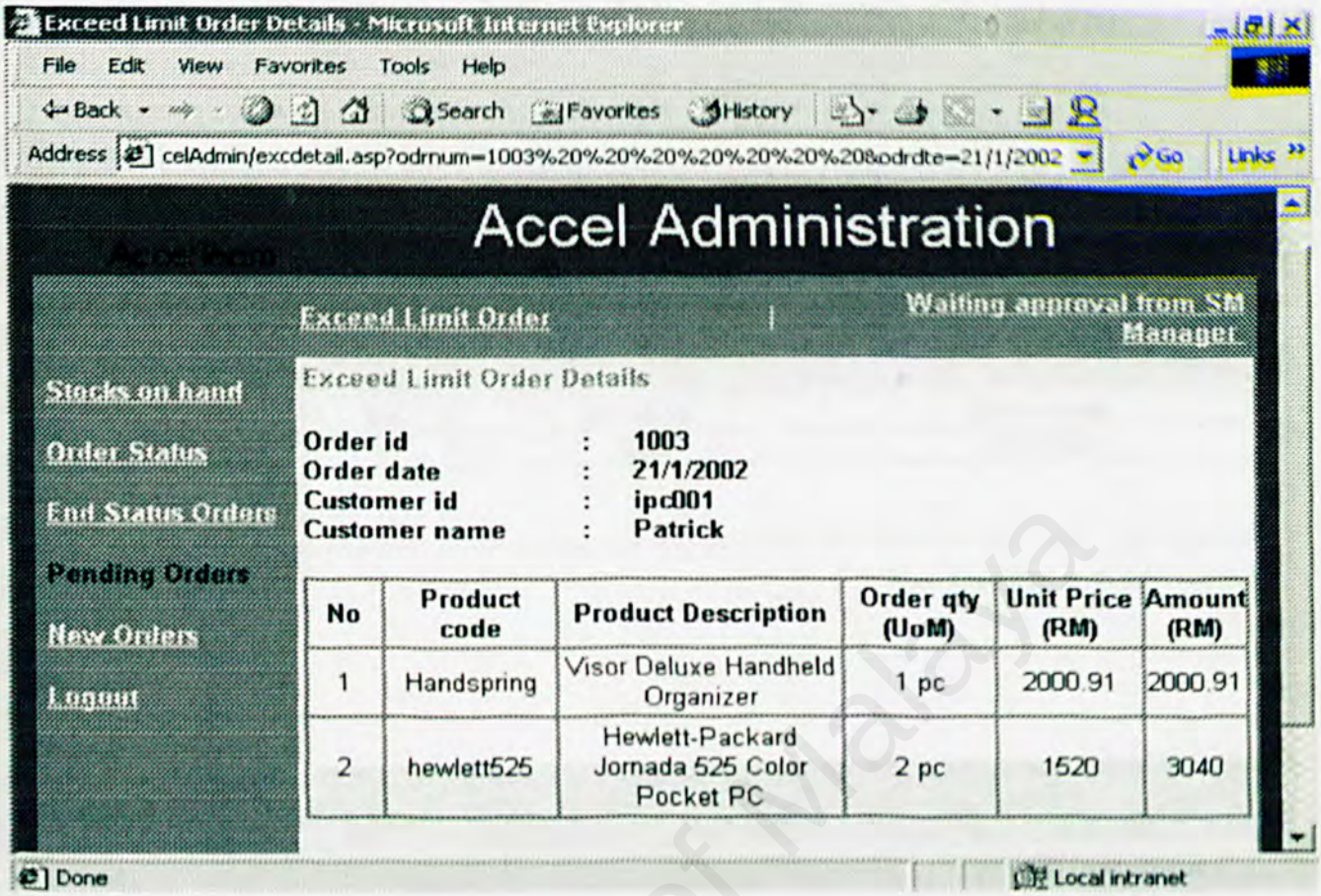
This is the rejected order details page. The rejected order details information included customer id and name that issued the order request, product code and description for the ordered products, ordered quantity with the unit of measurement, unit price of the product, and the purchase amount for each ordered product.

(v) View pending orders



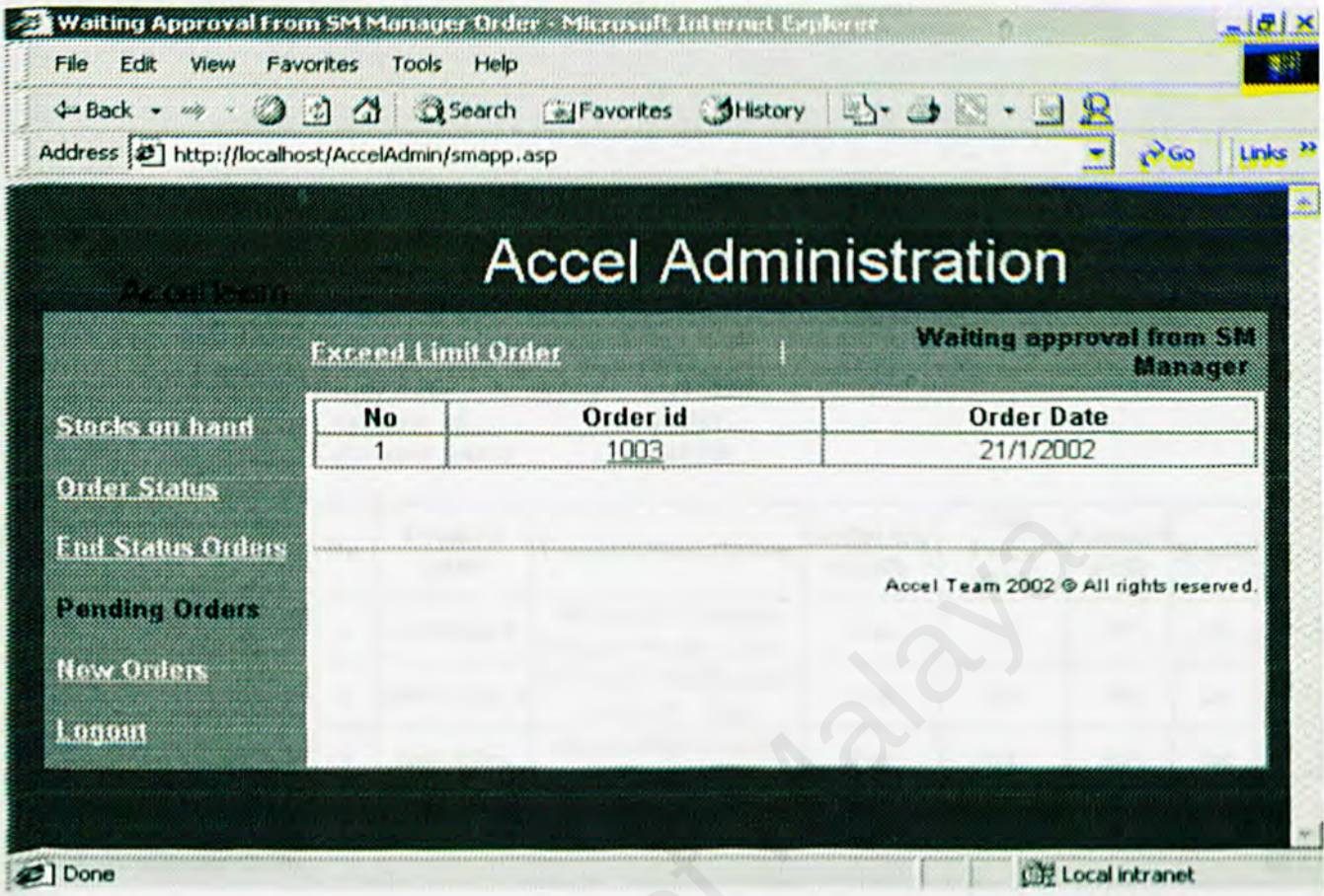
exceed.asp

When the administrator clicks on the pending order linking, the exceed limit orders page is displayed. The page displays the lists of exceed limit order associated with the order date. The order number is in a linking form that carries appropriate parameters to the exceed limit order details page. To view the exceed limit order details, follow the linking of order number.



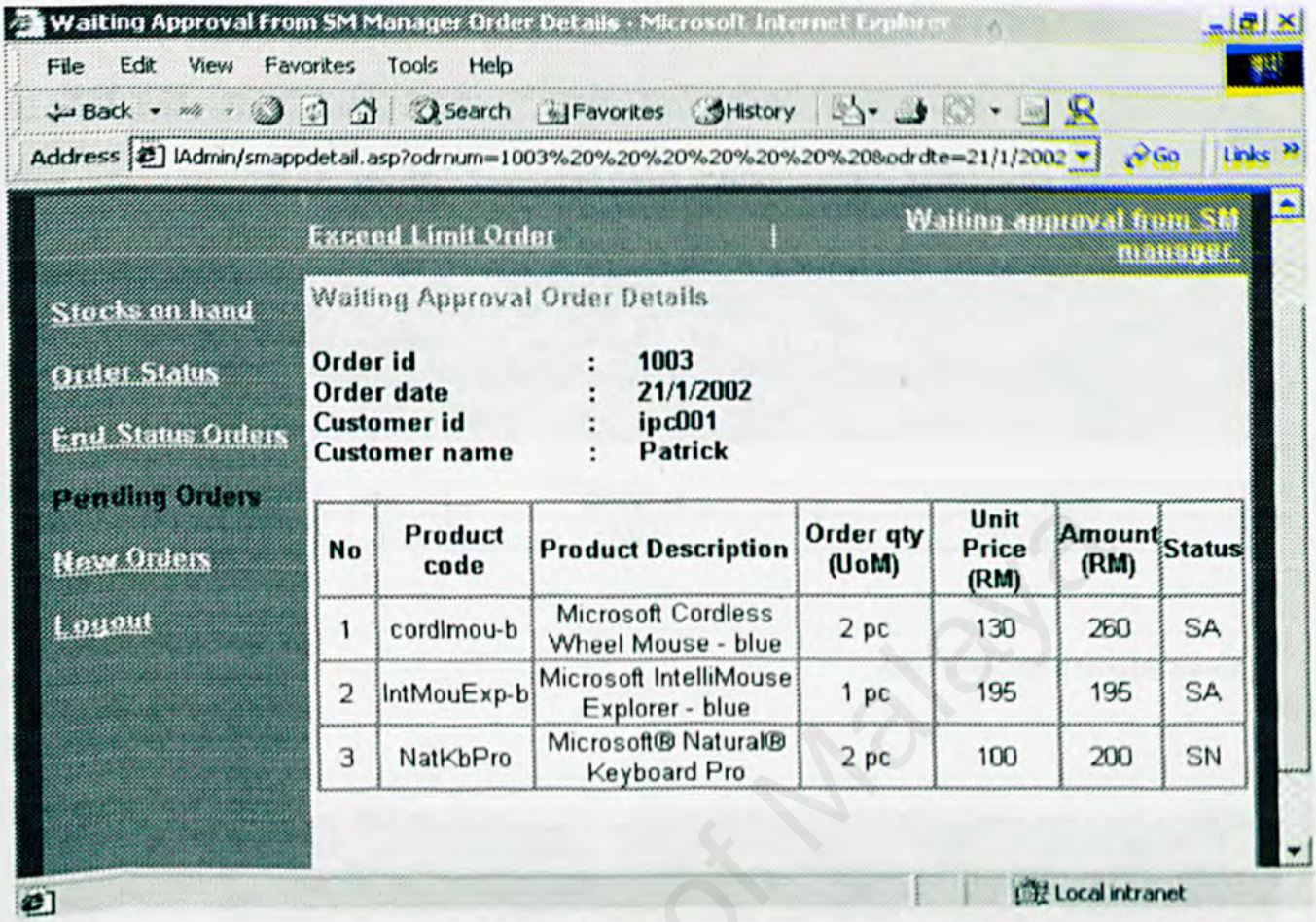
excdetail.asp

This is the exceed limit order details page. The exceed limit order details information included customer id and name that issued the order request, product code and description for the ordered products, ordered quantity with the unit of measurement, unit price of the product, and the purchase amount for each ordered product.



smapp.asp

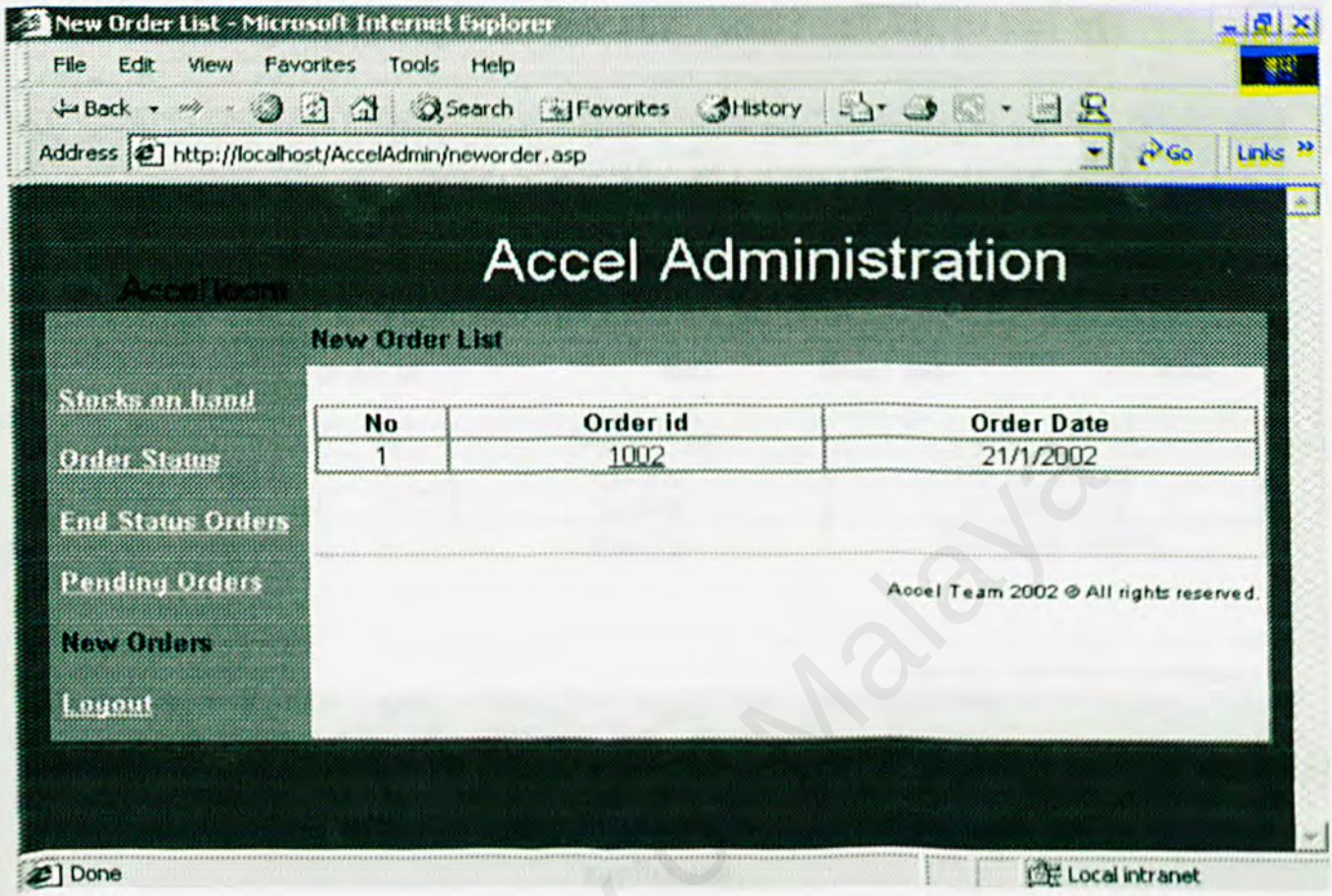
When the administrator clicks on the waiting approval from SM manager linking, the waiting approval from SM manager orders page is displayed. The page displays the lists of waiting approval order associated with the order date. The order number is in a linking form that carries appropriate parameters to the waiting approval order details page. To view the waiting approval order details, follow the linking of order number.



smappdetail.asp

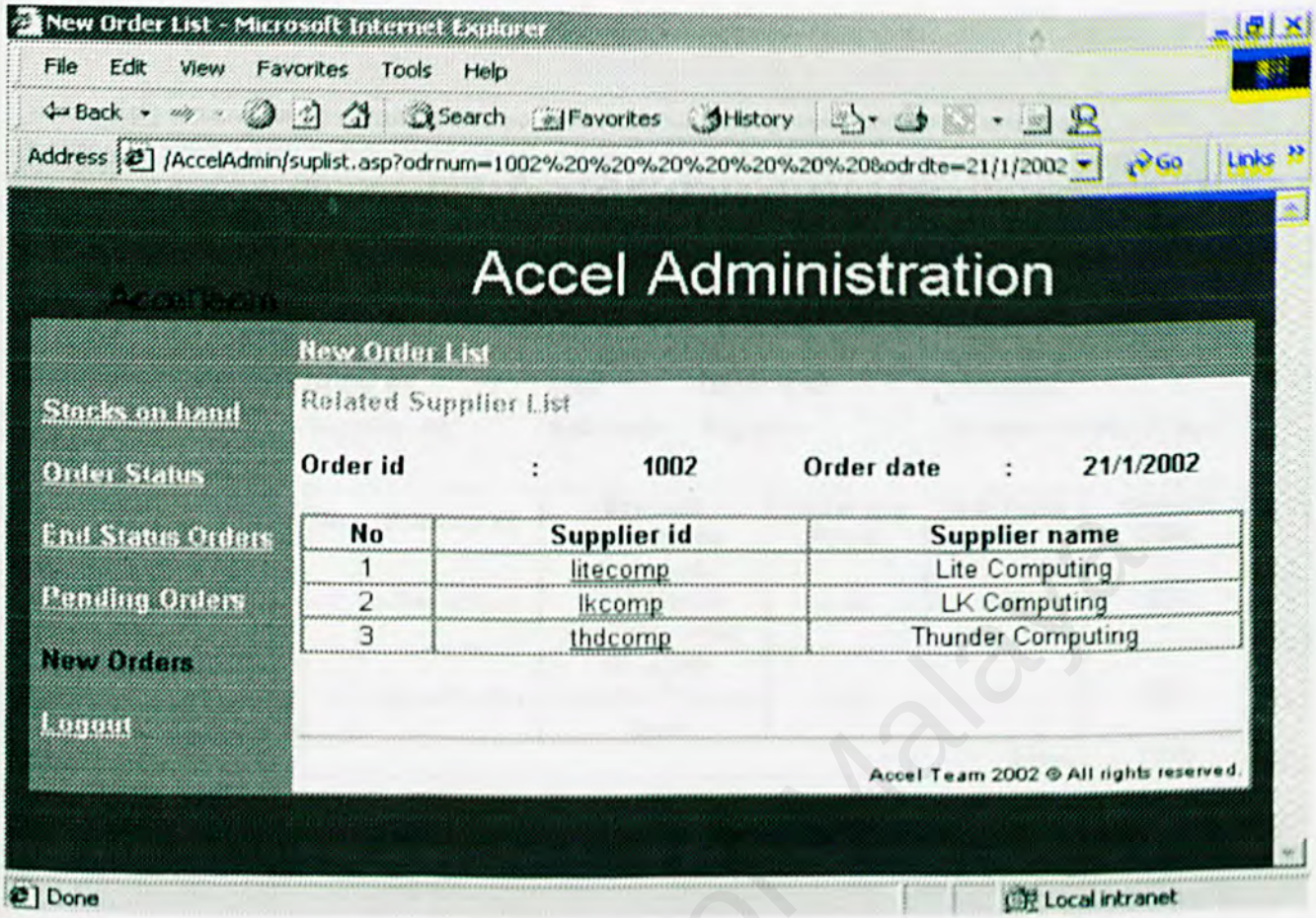
This is the waiting approval order details page. The waiting approval order details information included customer id and name that issued the order request, product code and description for the ordered products, ordered quantity with the unit of measurement, unit price of the product, the purchase amount for each ordered product, and the stock availability for each ordered product. The status 'SA' indicates stock available whereas the status 'SN' indicates stock not available.

(vi) Process new orders



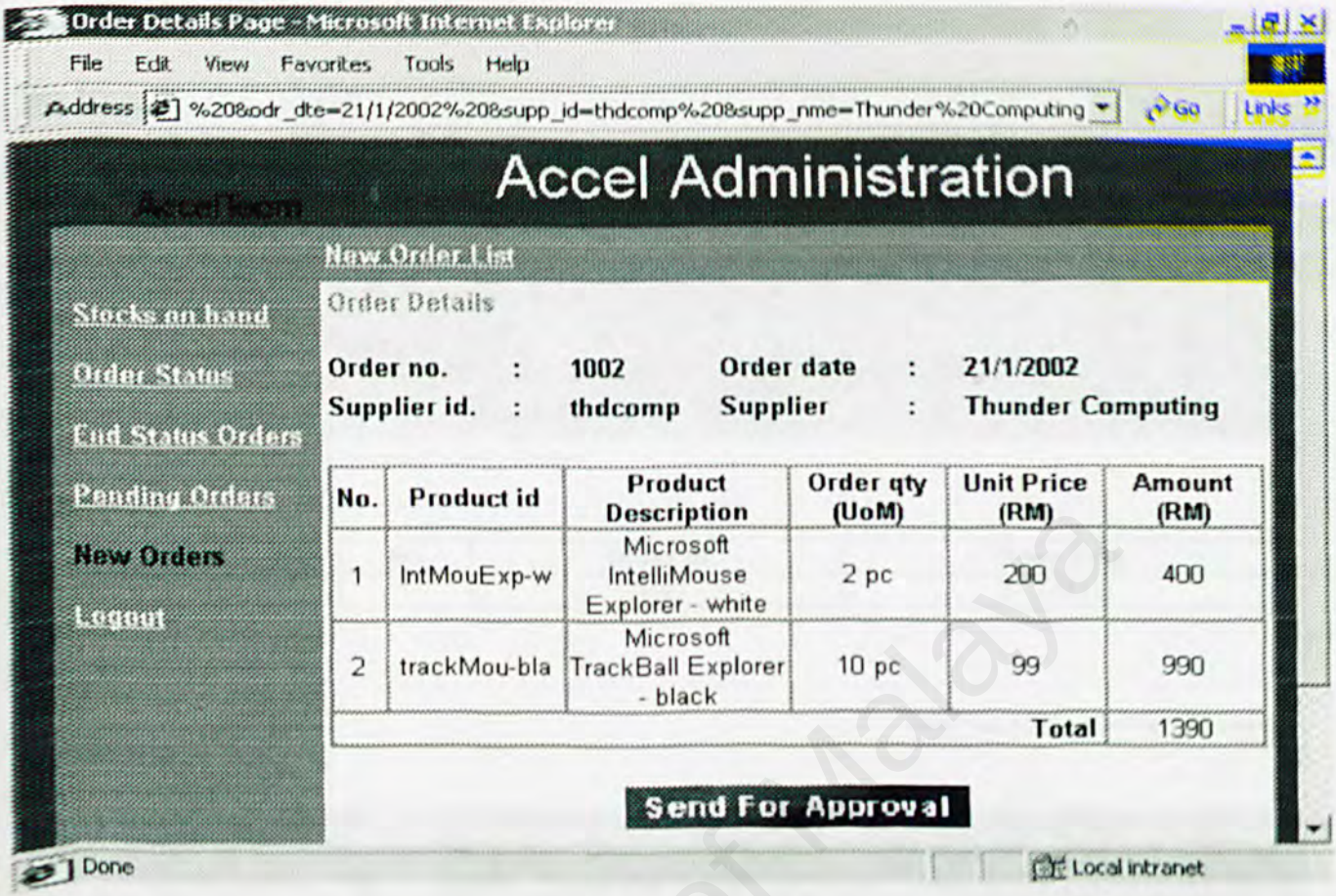
neworder.asp

When the administrator clicks on the new orders linking, the list of new orders page is displayed. The page displays the lists of new order associated with the order date. The order number is in a linking form that carries appropriate parameters to the list of related suppliers for a particular order page. To view the new order's information, follow the linking of order number.



suplist.asp

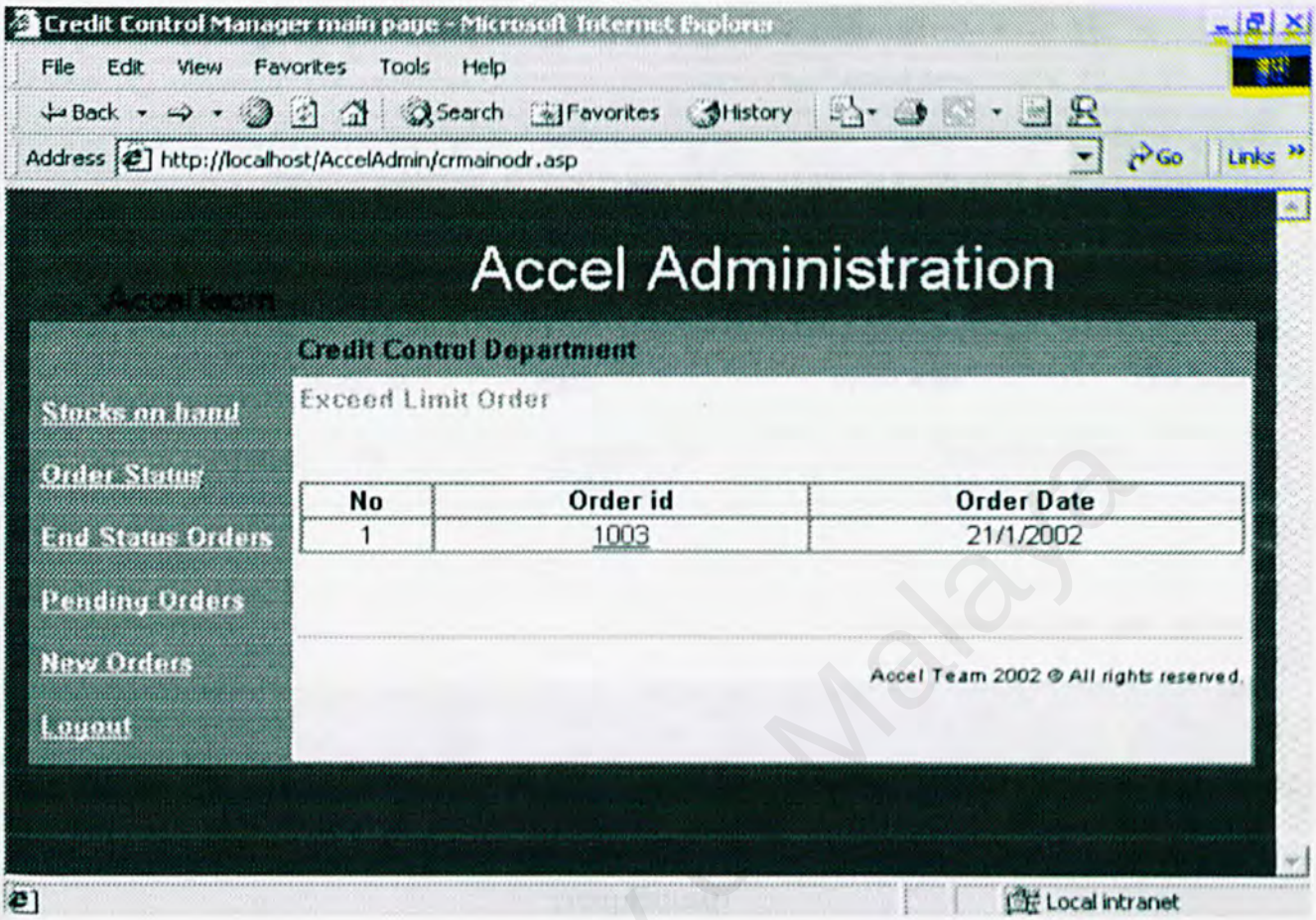
When the administrator clicks on the order number linking in new orders page, the list of related suppliers for that particular order is displayed in this page. The information of a particular new order that displayed in the page included order number, order date, list of supplier id associated with the supplier name that involved in that new order. The new order list linking at the left top enables the administrator to view the list of new orders. To view the order detail information under a particular supplier, follow the linking of supplier id.



odrdetail.asp

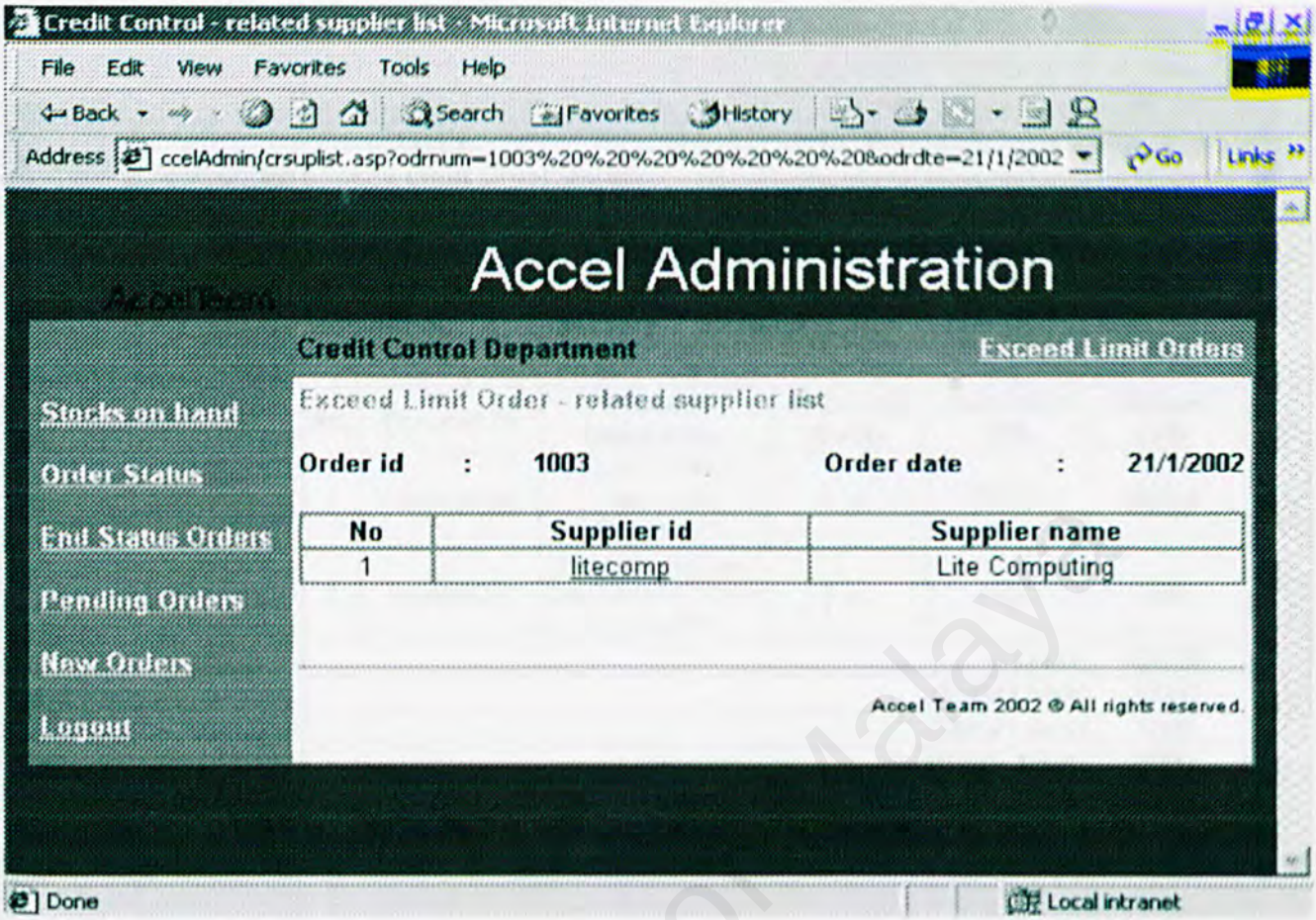
When the administrator clicks on the supplier id linking at list of related suppliers for a particular new order page, the order details under a particular supplier page is displayed. The order details information under a particular supplier included ordered product id with the description, ordered quantity with the unit of measurement, unit price of the product, purchase amount for each ordered product, and total purchase amount for a new order under the particular supplier. When the administrator clicks on the 'send for approval' button, the order details information is sent to check for credit limit and stock availability process while the page redirect the administrator to list of new orders page to enable further processing on new orders list.

(vii) Credit Control Manager approval process



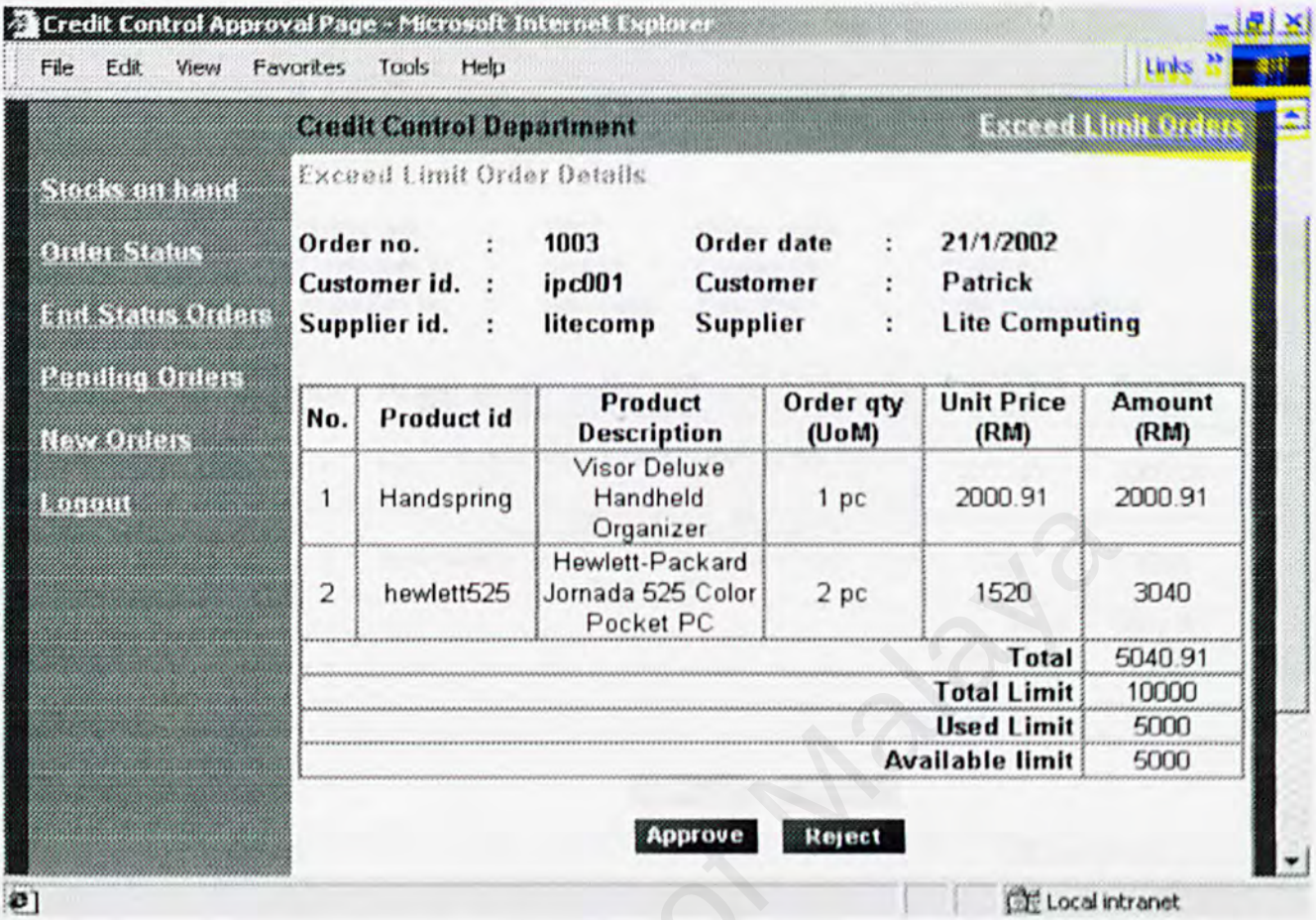
crmainodr.asp

When the Credit Control manager login success, the list of exceed limit orders page is displayed. The page displays the lists of exceed limit order associated with the order date. The order number is in a linking form that carries appropriate parameters to the list of related suppliers for a particular exceed limit order page. To view the exceed limit order's information, follow the linking of order number.



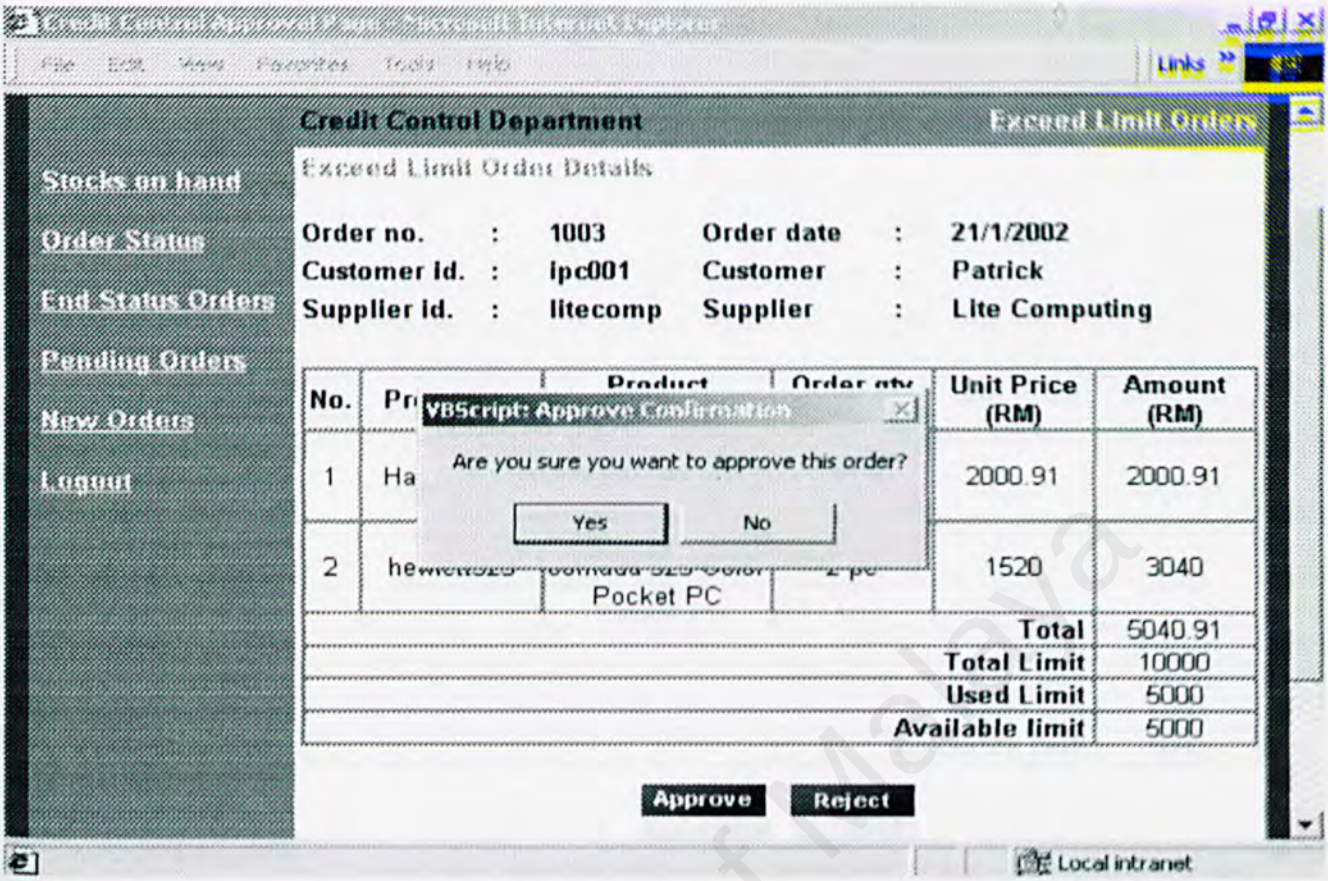
crsuplist.asp

When the Credit Control manager clicks on the order number linking in exceed limit orders page, the list of related suppliers for that particular order is displayed in this page. The information of a particular exceed limit order that displayed in the page included order number, order date, list of supplier id associated with the supplier name that involved in that exceed limit order. The exceed limit order list linking at the right top enables the user to view the list of exceed limit orders. To view the order details information under a particular supplier, follow the linking of supplier id.



crapprove.asp (1)

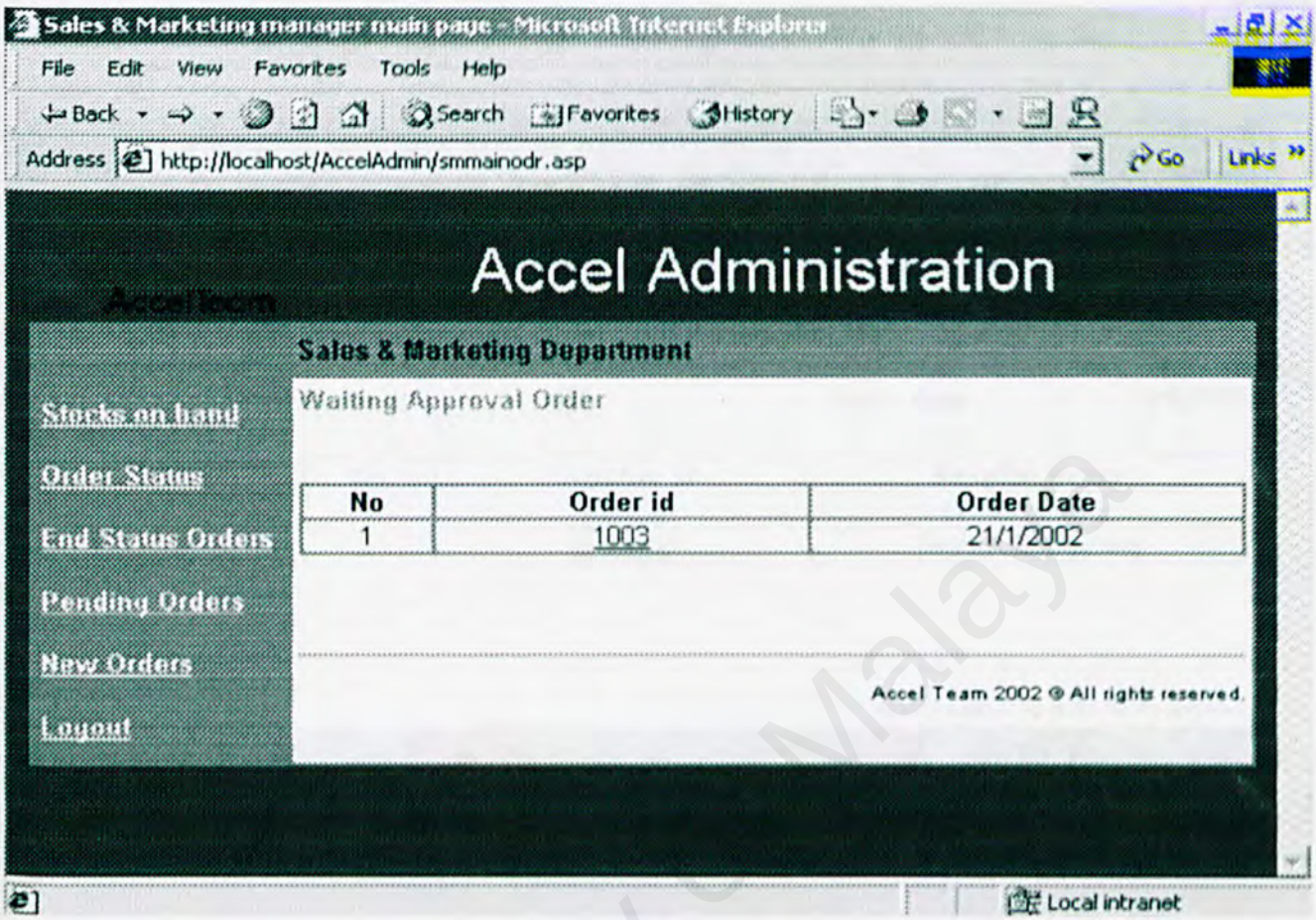
When the Credit Control manager clicks on the supplier id linking at list of related suppliers for a particular exceed limit order page, the order details under a particular supplier page is displayed. The order details information under a particular supplier included ordered product id with the description, ordered quantity with the unit of measurement, unit price of the product, purchase amount for each ordered product, total purchase amount for an exceed limit order under the particular supplier, total limit, used limit and available limit for the customer that provided by the related supplier. The Credit Control manager has to make decision whether or not to approve the exceed limit order by either clicks on 'approve' button or 'reject' button.



crapprove.asp (2)

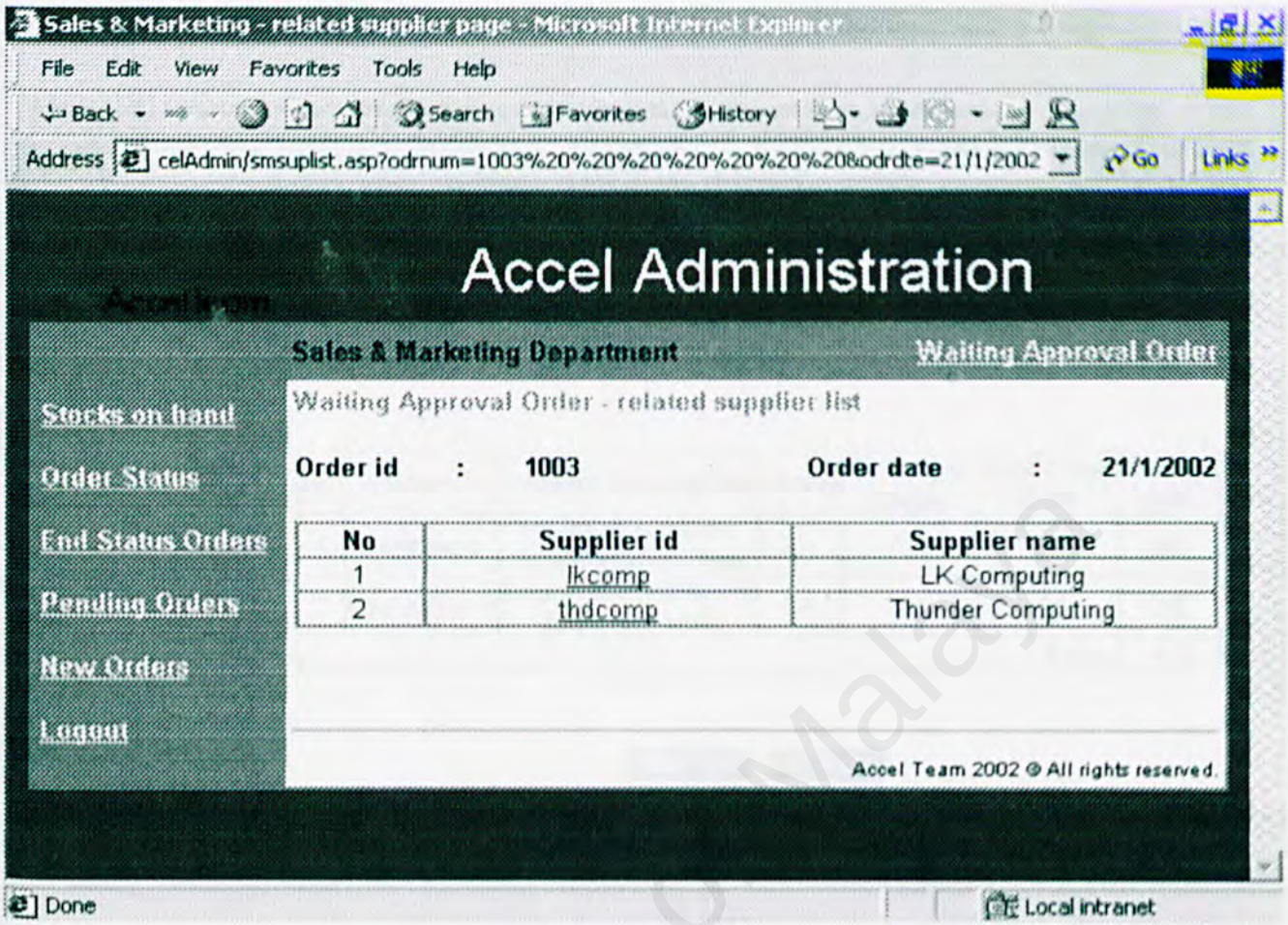
When the Credit Control manager clicks on the 'approve' button, the message box prompt out for approve confirmation. If the manager choose 'no' for approve confirmation, the page is remained for reference. If the manager choose 'yes' for approve confirmation, the order details information is sent to check for stock availability process while the page redirect the manager to list of exceed limit orders page to enable further processing on exceed limit orders list.

(vii) Sales and Marketing manager approval process



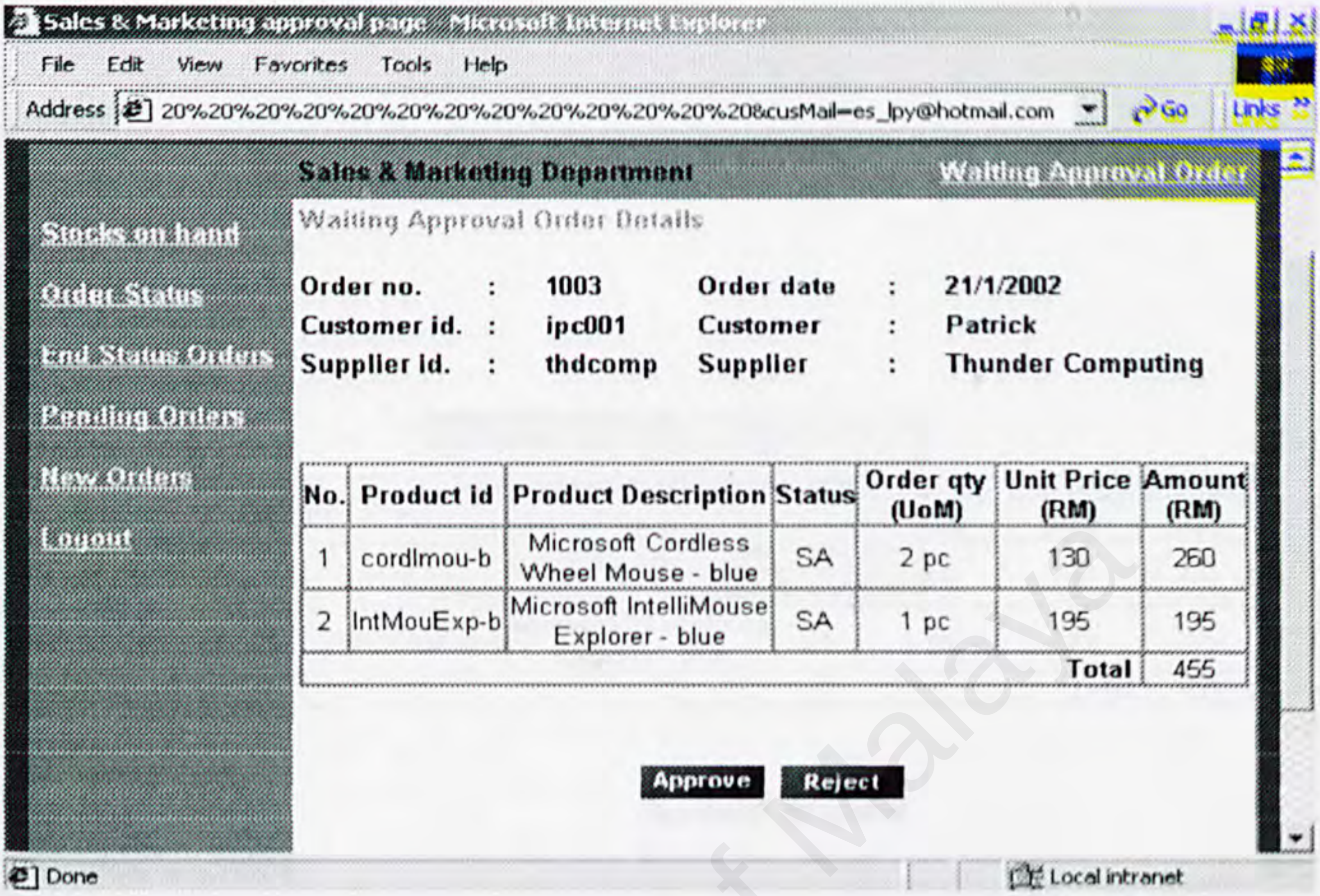
smmainodr.asp

When the Sales and Marketing manager login success, the list of waiting approval orders page is displayed. The page displays the lists of waiting approval order associated with the order date. The order number is in a linking form that carries appropriate parameters to the list of related suppliers for a particular waiting approval order page. To view the waiting approval order's information, follow the linking of order number.



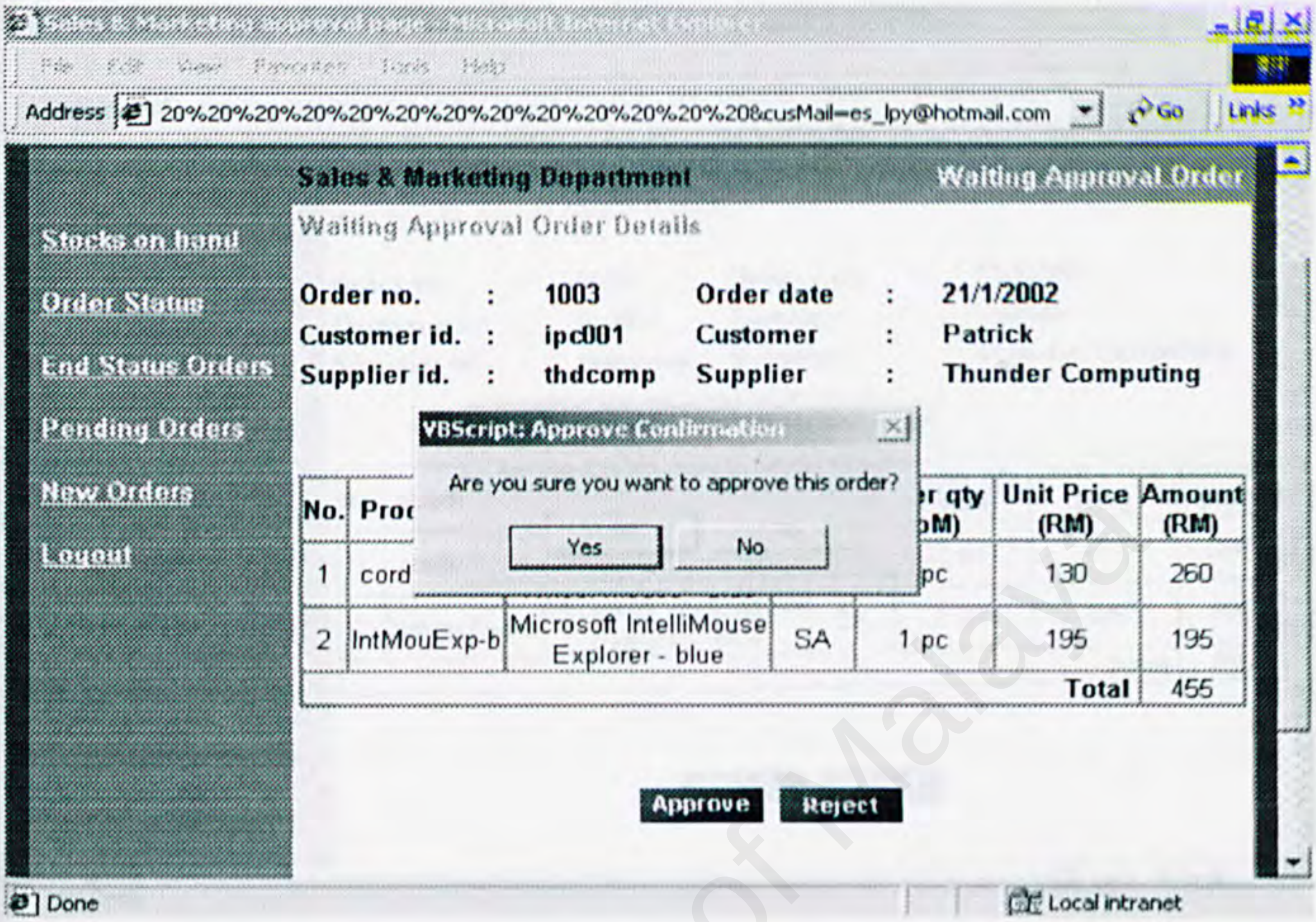
smsuplist.asp

When the Sales and Marketing manager clicks on the order number linking in waiting approval orders page, the list of related suppliers for that particular order is displayed in this page. The information of a particular waiting approval order that displayed in the page included order number, order date, list of supplier id associated with the supplier name that involved in that waiting approval order. The waiting approval order list linking at the right top enables the user to view the list of waiting approval orders. To view the order details information under a particular supplier, follow the linking of supplier id.



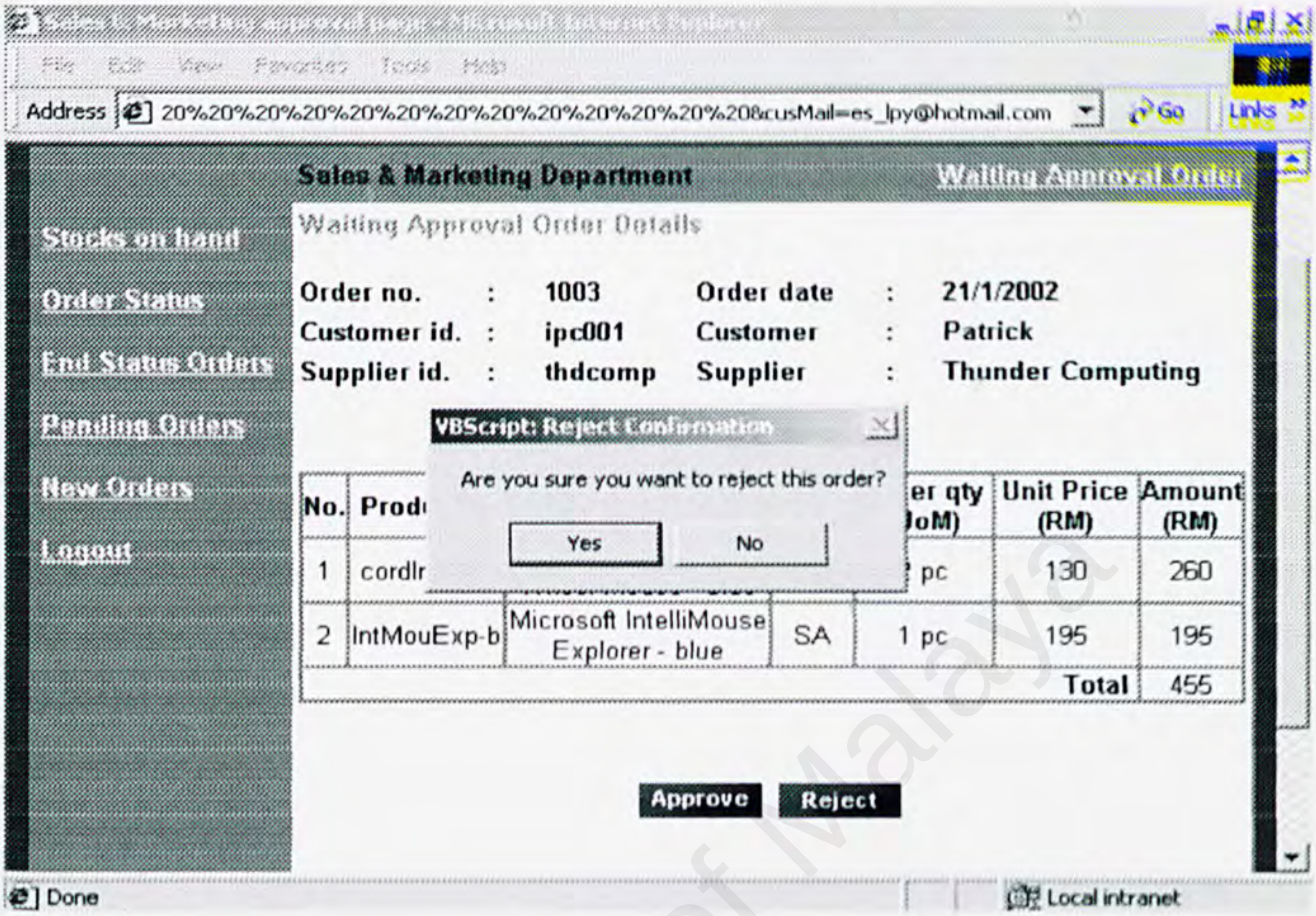
smapprove.asp (1)

When the Sales and Marketing manager clicks on the supplier id linking at list of related suppliers for a particular waiting approval order page, the order details under a particular supplier page is displayed. The order details information under a particular supplier included ordered product id with the description, the stock availability status for the ordered product, ordered quantity with the unit of measurement, unit price of the product, purchase amount for each ordered product, and total purchase amount for an waiting approval order under the particular supplier. The Sales and Marketing manager has to make decision whether or not to approve the waiting approval order by either clicks on 'approve' button or 'reject' button.



smapprove.asp (2)

When the Sales and Marketing manager clicks on the 'approve' button, the message box prompt out for approve confirmation. If the manager choose 'no' for approve confirmation, the page is remained for reference. If the manager choose 'yes' for approve confirmation, the approved mail is sent to the customer for notification while the page redirect the manager to list of waiting approval orders page to enable further processing on waiting approval orders list.



smapprove.asp (3)

When the Sales and Marketing manager clicks on the 'reject' button, the message box prompt out for reject confirmation. If the manager chooses 'no' for reject confirmation, the page is remained for reference. If the manager choose 'yes' for reject confirmation, the rejected mail is sent to the customer for notification while the page redirect the manager to list of waiting approval orders page to enable further processing on waiting approval orders list.