

Design and Implementation of An Accounting Database Assistance System

GRADUATE PROJECT TECHNICAL REPORT

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ABSTRACT

This project is the design and implementation of an accounting database assistance system to serve as an on-line education tool for college teachers to help students to learn basic database accounting concepts. The system provides a complete accounting database system for a typing service company. The teachers are able to show the students a real world accounting and finance environment, and the students receive a thorough review of the entire major accounting database concepts. This system also provides an interactive, Web-based database so that teachers can easily provide information for a detailed analysis of business operations by searching, inserting and deleting data, and the students can obtain hands-on experience by practicing their skills from writing queries to forming accounting reports.

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1. Introduction and Background

The Accounting Database Assistance System can be used as a suggested teaching tool for accounting information systems courses. It is a self-paced, interactive tutorial system that teaches accounting procedures from information system perspectives. It has supports for many engaging interactive activities and practices that make learning fun! The system covers theoretical foundations of relational and object-relational database management systems in the context of accounting systems. The system also gives students an opportunity to experiment with a relational database as a part of the accounting system for a typing service company.

For many years, double-entry bookkeeping has provided an excellent method for recording transactions. It satisfies accountants' need to capture the essence of each transaction. When double-entry bookkeeping was first developed over five hundred years ago, the costs of gathering and storing information was very high. Recording transactions with pen and paper is a time-consuming task. Computerized transaction processing has released accountants from limitations and drudgery of manual accounting systems. However, its implementations of double-entry bookkeeping use a flat file processing design, which has some serious disadvantages, such as [Perry 2000]:

- Data redundancy
- Data inconsistency
- Duplication of processes

- Difficult to add, delete, and update data
- Data dependent application

A file system is also inefficient and serves no real control purposes.

With today's quest for information, and critical time constraints, accounting professionals require the ability to easily drill down through accounting data for answers. The accounting database is developed to accomplish this objective. The accounting database utilizes a relational database, which supports creating reports based on ad-hoc queries. The system offers greater flexibility in extracting data than does a double-entry bookkeeping system. It can [Perry 2000]:

- Reduce data storage costs
- Eliminate data redundancy
- Eliminate data inconsistencies
- Avoid duplicate processing
- Easily add, delete, and update data for maintenance tasks
- Make data independent of applications
- Centralize data management

There are many commercial software packages that support database management environment. Microsoft Access is one of the most powerful among them. It is a software application that allows accountants and other users to easily change the structure and format of their reports by providing intuitive, GUI (Graphical User Interface)-based report generators. Because it is easy to learn and is user friendly, many teachers choose it as a teaching tool. However, most students who know how to use this software application, but do not know much of the database

theory essential for creating complex applications such as accounting systems.

Moreover, it does not provide exactly what a faculty needs for teaching an accounting information course. Specifically, it does not create finance statements – one of the most important accounting concepts.

The Accounting Database Assistance System has been designed to meet these needs. As a Web application, the system enables users to access and explore business and financial information about real companies on-line. The screens of the system have been designed for easy reading. “All-in-one” makes it as one of the most convenient tool for teaching accounting concepts.

2. Accounting Database Assistance System

2.1 Overview

In this project, an online accounting database assistance system has been designed to help students develop their understanding of the theory and practice of relational database management systems in accounting settings. The system works through a Web site, which is accessible through most of the commonly used Web browsers that support HTML (Hyper Text Markup Language) 4 and JavaScript. It is easy to use as its Web pages have bi-directional links to navigate through its Web pages. The system incorporates a database to support business and financing activities of a typing service company, named as Honda Company. By using the database to keep track of the business of Honda Company, it provides students valuable hands-on experience in constructing accounting systems.

The system is written for a multi-user environment and implemented with user-friendly features. This includes navigating with a mouse to select a button or link that initiates an action to lead to a new page or retrieve data from the database. The links and buttons direct users to view the desired properties, choose what page they would like to view, or choose the option to exit the site at any time. Figure 2.1 is the Map of the Major Components for the Accounting Database Assistant System.

2.2 Login Page

The **Login Page** (Figure 2.2) is the first page a user receives when the Web site is accessed. It gives a message, and requires a security login and password. The user must provide a user ID and password before getting into the system. If the login

information is valid, the system **Home Page** is displayed. Otherwise the user is led to an **Error Page**. If the new user selects to register, the system displays a **Register Page**. If the user wants to change the password, he or she can select the **Change Password link**.

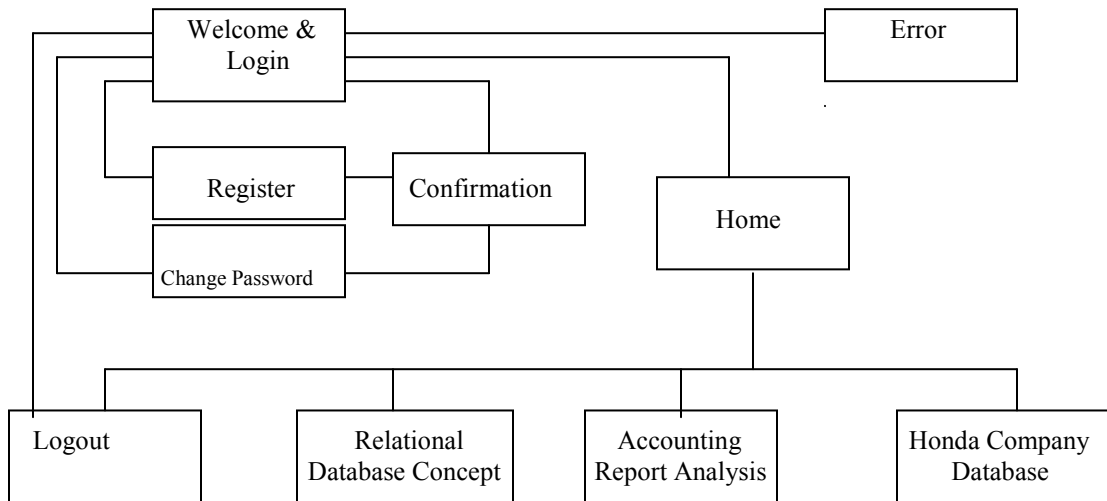


Figure 2.1. Map of the Major Components

2.2.1 Error Page

If the user clicks the **Login** button without entering a valid User ID or Password, an **Error Page** will be displayed. A **Try again** link will allow the user to go back to the **Login Page** to complete all the required fields, or the user may simply choose to exit the system.

2.2.2 Register Page

In the **Register Page** (Figure 2.3), a user must fill all the requested fields. Once the information has been validated and accepted, the user receives the **Confirmation Page**.

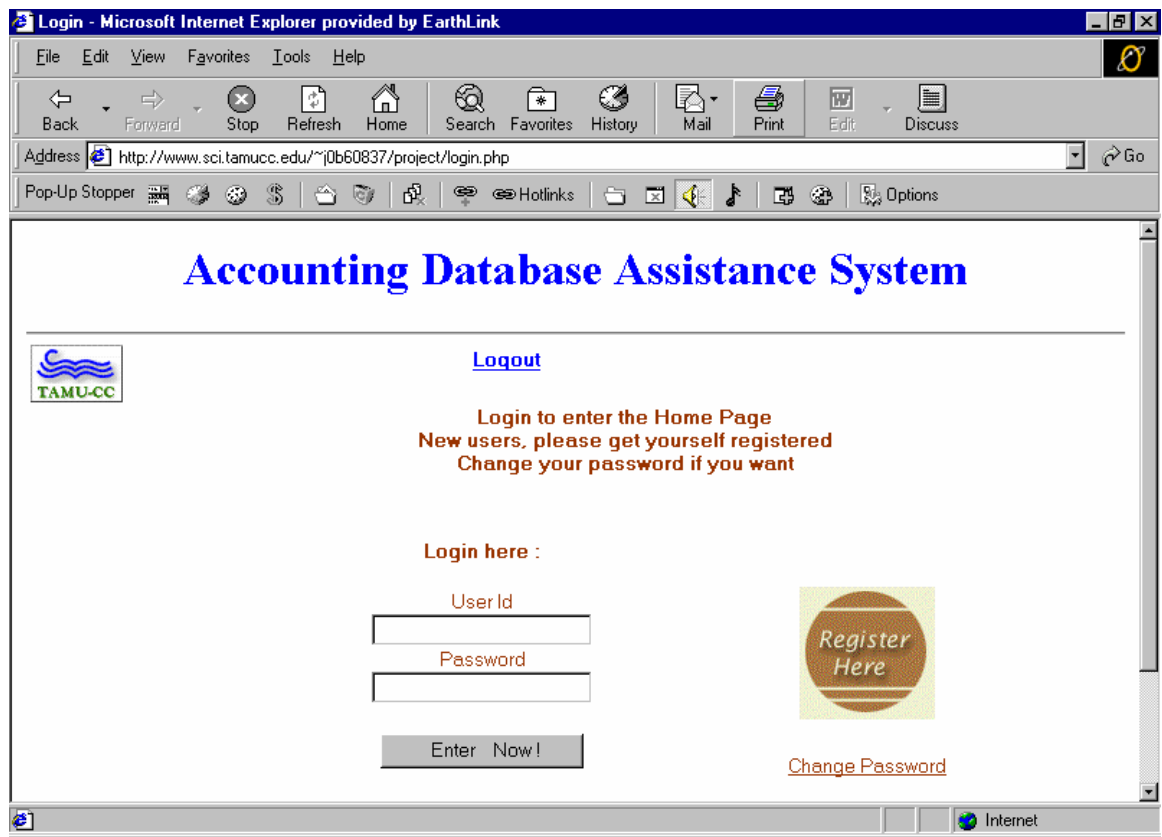


Figure 2.2. Login Page

2.2.3 Confirmation Page

This page gives a new user a confirmation message. The new user can get in the system through the **Back Login Page** link.

2.2.4 Change Password Page

In this page, a user must fill all the fields. Once the information has been validated and accepted, the user receives a message to confirm that his or her password has been changed.

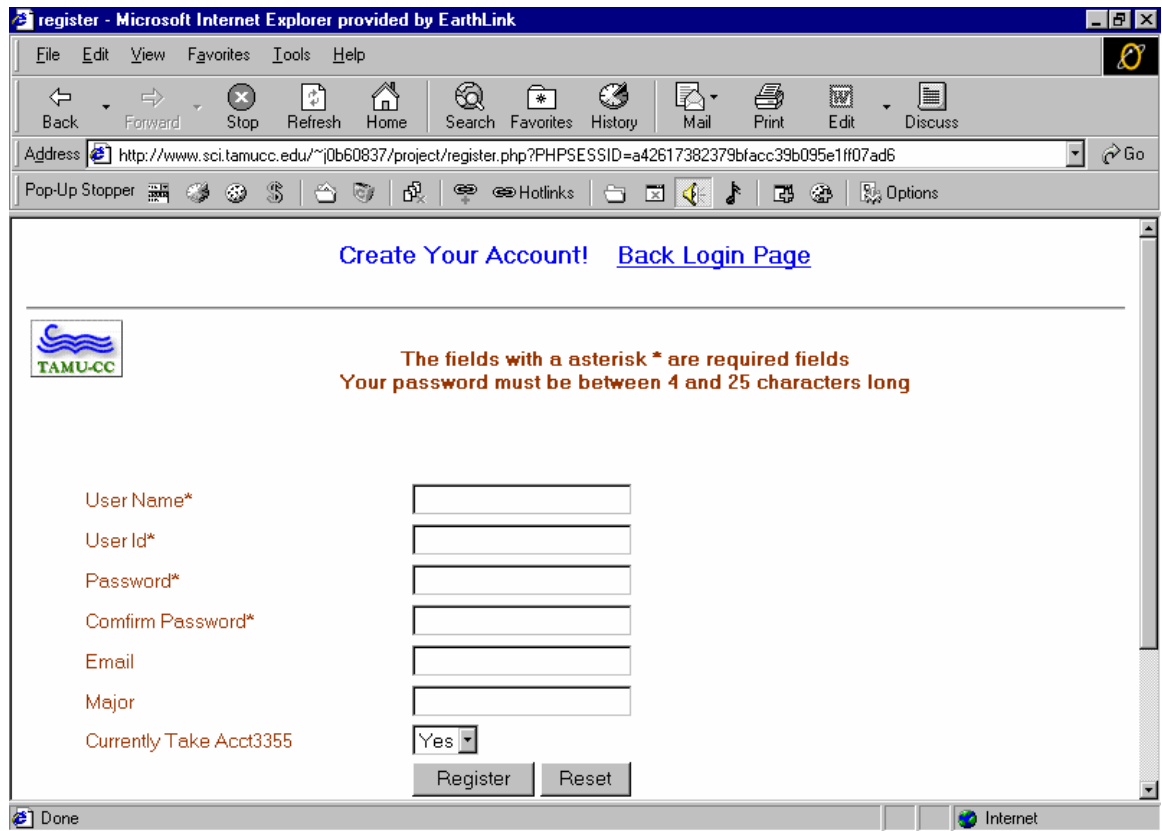


Figure 2.3. Register Page

2.3 Home Page

After a successful login, the user is shown the **Home Page** (Figure 2.4). The **Home Page** includes major components of this system. The user can go to these pages by selecting the appropriate links.

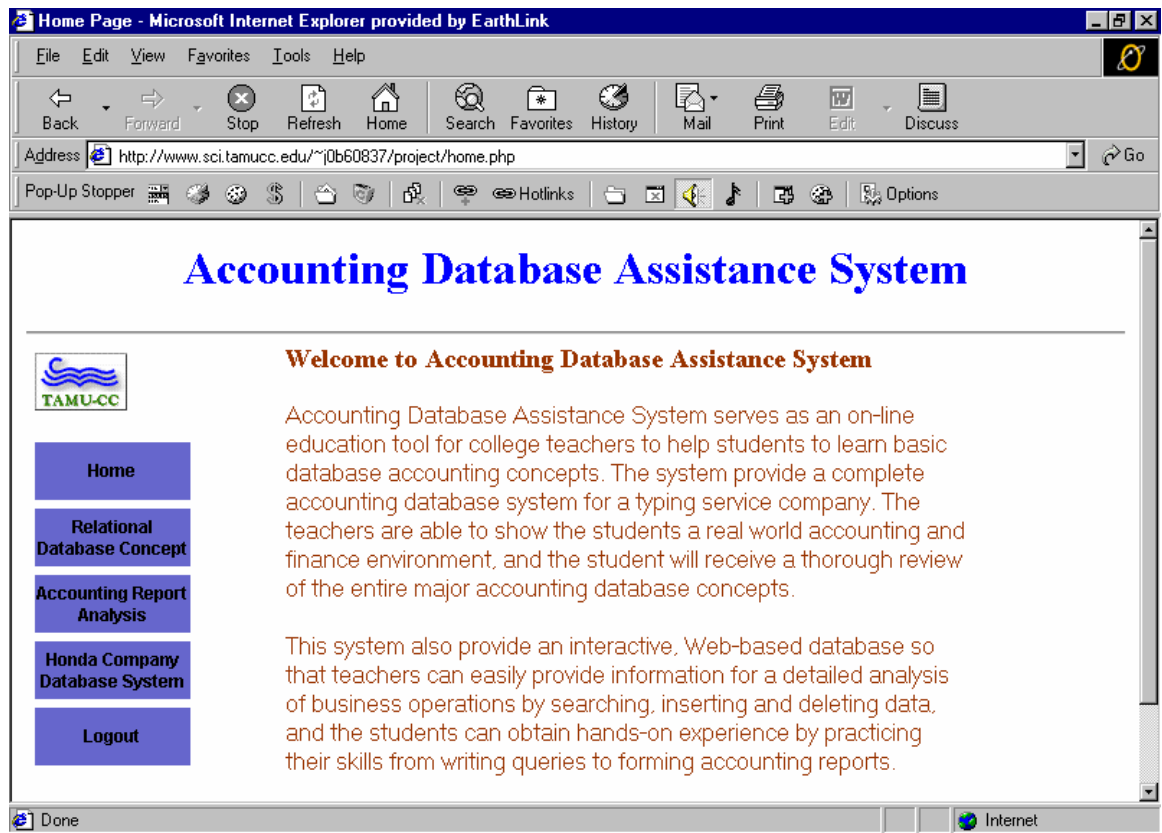


Figure 2.4. Home Page

2.4 Logout Page

This page is used to logout from the system. It also gives a “thank you” message to the user. The user can be back to the system by selecting the **Login Again** link.

2.5 Relational Database Concept Page

Upon entry into the **Relational Database Concept Page** (Figure 2.5), the user can review any database concept by clicking the appropriate link. Also the user can practice and check his or her understanding on any database concept by selecting the

Review Question link. The user can exit the system by selecting the **Logout** link, or continue to any other part of the system by clicking the corresponding link.

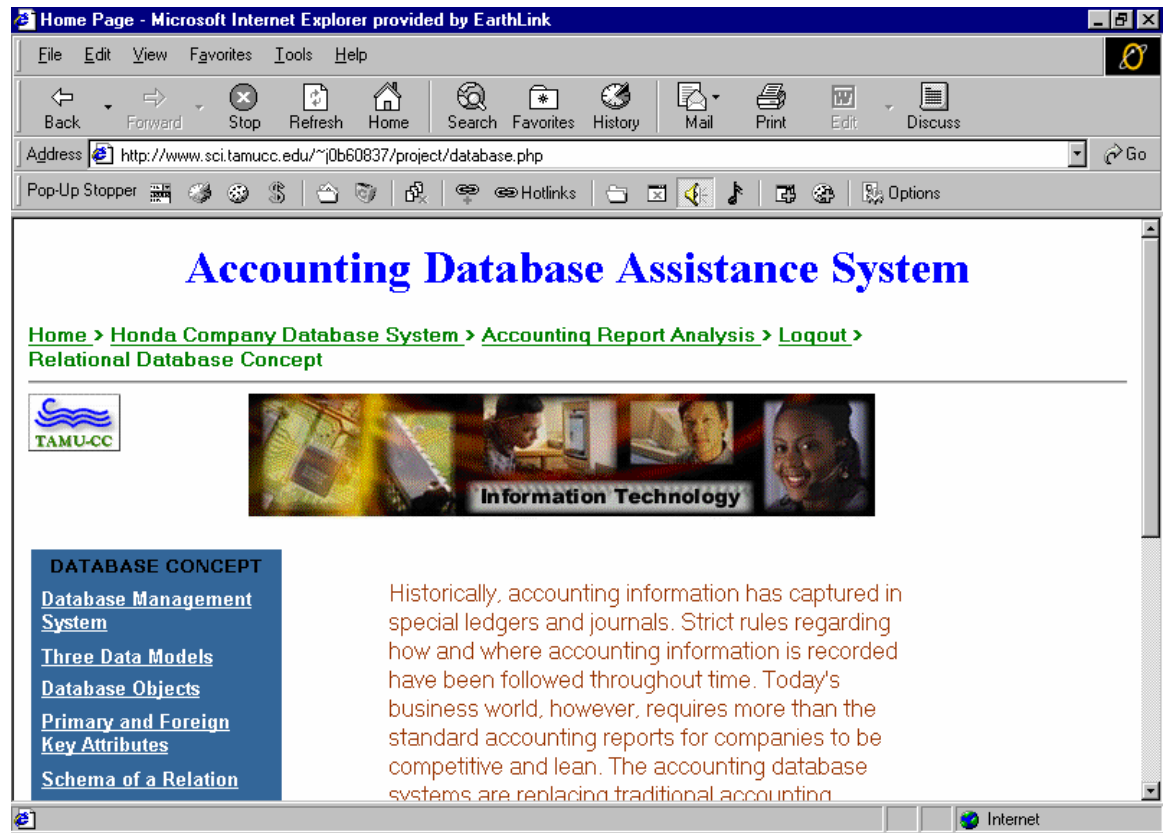


Figure 2.5. Relational Database Concept Page

Each **database concept** page gives an explanation of a concept, some examples and exercises about the concept. The **Review Question** page includes the multiple choice and true/false questions. After a user chooses an answer, the system automatically checks the answer. If the answer is wrong, the user can try again.

2.6 Accounting Report Analysis Page

After getting into the **Accounting Report Analysis Page** (Figure 2.6), a user can choose a report from a set of reports for analysis. Each **Report Analysis Page** describes the purpose of the report, the data to be used to write the report, and the query to be used for the report. The user can exit the system by selecting the **Logout** link, or continue to any other part of the system by clicking the corresponding link.

2.7 Honda Company Database System Page

Honda Company Database System Page provides accesses to an entire database accounting system for Honda Company. It shows the user a real world accounting and finance environment. The page includes the following sections:

- Data Entry
- Revenue Cycle
- Purchase Cycle
- Payroll Cycle
- Financing Statement

The user can enter any of these components by activating the corresponding links on the page. The user also can choose to exit the system by clicking the **Logout** link, or go to any other part of the system by clicking the corresponding link.

2.7.1 Data Entry Page

This section is a secured area. Authorization is required to enter this section. The user must be an instructor or a database administrator. By activating the **Data Entry** link, the user will be able to access a form to enter the user id and password.

After the correct password is entered, the **Data Entry Page** is displayed to the user. In this page, the user can choose the different table to add data into the database, to delete data from the database, or to modify data in the database.

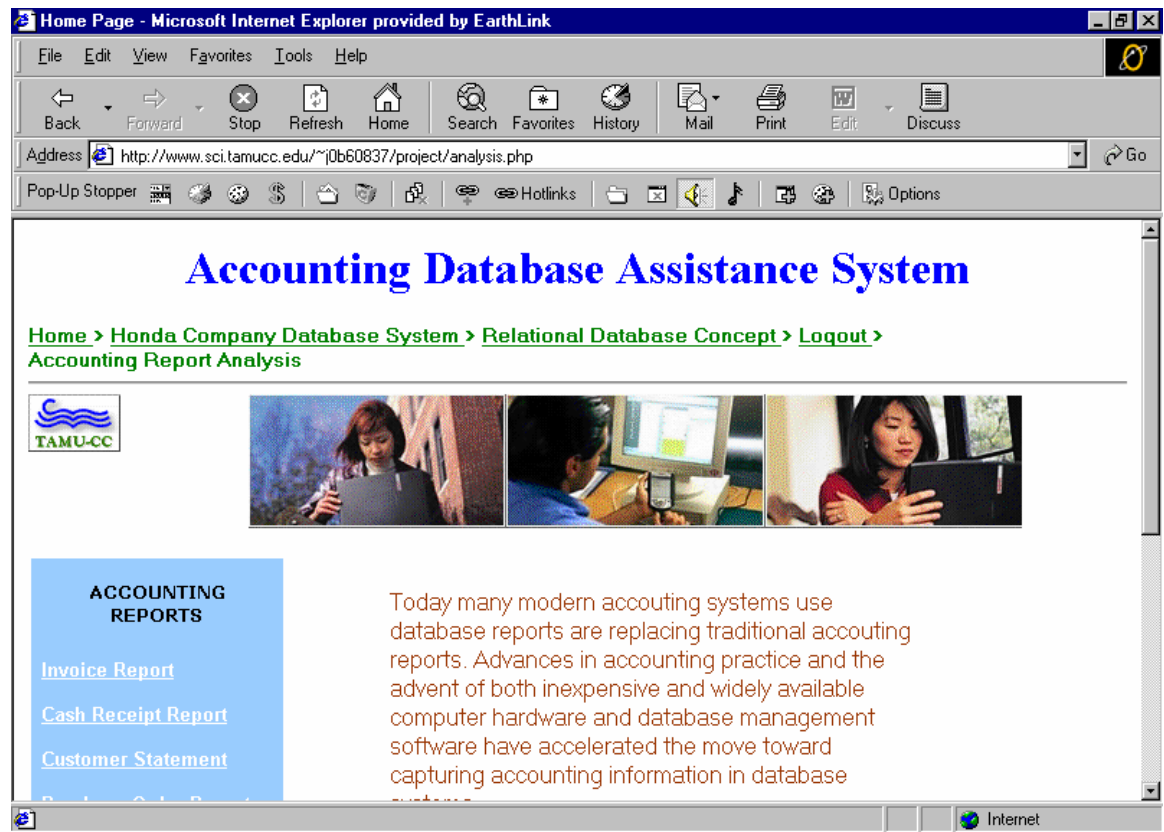


Figure 2.6. Accounting Report Analysis Page

Once the user chooses a table, he or she can access the **Add Page**. The **Add Form Page** (Figure 2.7) is shown to the user once the **Add** button is clicked. The user must fill all the requested fields and click the **Submit** button. After verifying all data entered by the user, the system gives a confirmation message to the user.

The **Delete Page** for this table is displayed to the user by clicking the **Delete** button. This page requires the user select the record that he or she wants to delete.

After clicking the **Submit** button, the user can see a message “Are you sure you want to delete this information” on the screen. If the user chooses “yes”, system gives a

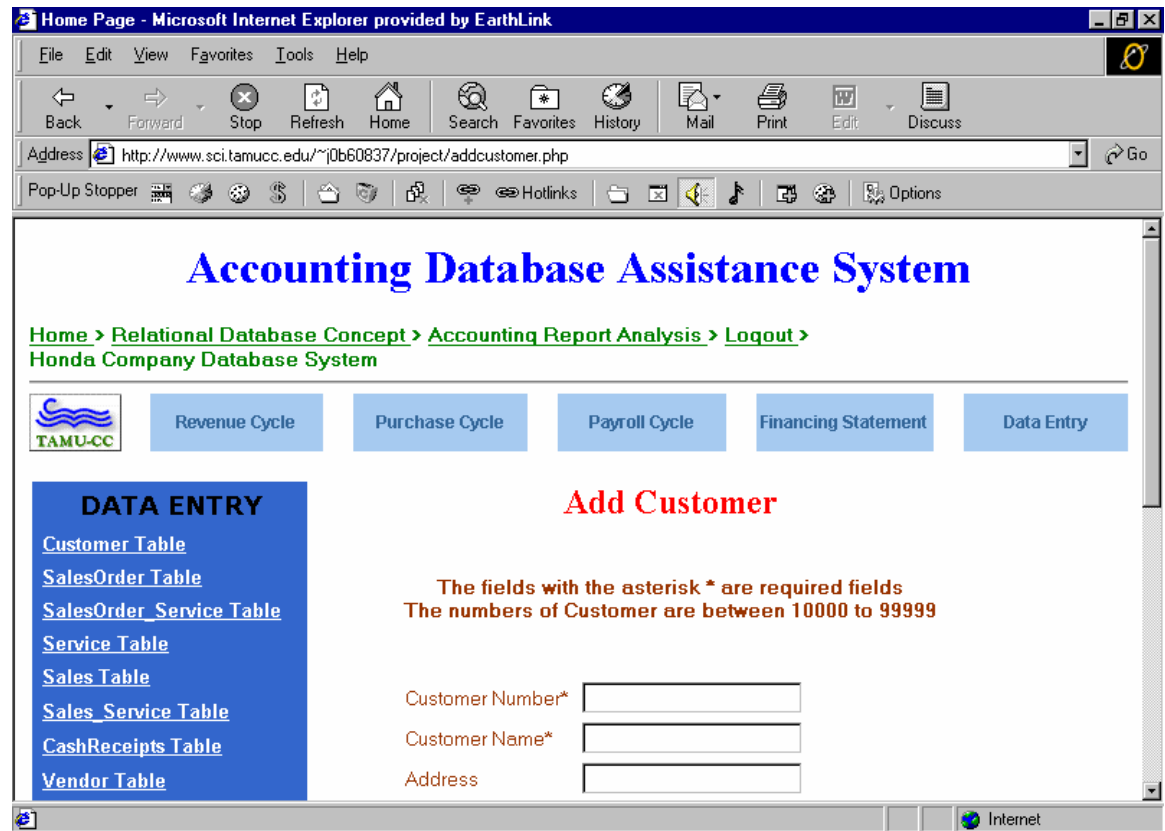


Figure 2.7. Add Form Page

confirmation message to the user. The **Confirmation Page** tells the user that this is a “successful delete” or this is an “invalid delete and try again”.

If the user chooses the **Modify** button, the **Modify Form** for this table is displayed to the user. The user can change some fields in the form and click the **Submit** button. The system gives a confirmation to the user after verifying the user data. The **Confirmation Page** tells the user that this is a successful “modify” or this is an “invalid modify and try again”.

2.7.2 Revenue Cycle Page

The section of the **Revenue Cycle** records all the sales and cash collection activities. It includes the following tables:

- **Customer Table** (Figure 2.8)
- **Sales Table**
- **Service Table**
- **SalesOrder Table**
- **Sales_Service Table**
- **SalesOrder_Service Table**
- **CashReceipts Table**

This section also includes the **Invoice Report** (Figure 2.9), the **Cash Receipt Report**, and the **Customer Statement**. The invoice report provides the information about invoice number, sales order number, and sold item number, quantity, price, description, and extension. The cash receipt report provides information about the cash receipt's date, customer number, customer check number, and amount. The customer statement provides the customer information about a beginning balance, lists each sale and cash receipt, and calculates an ending balance.

The user can review each of the tables or reports by clicking the corresponding link.

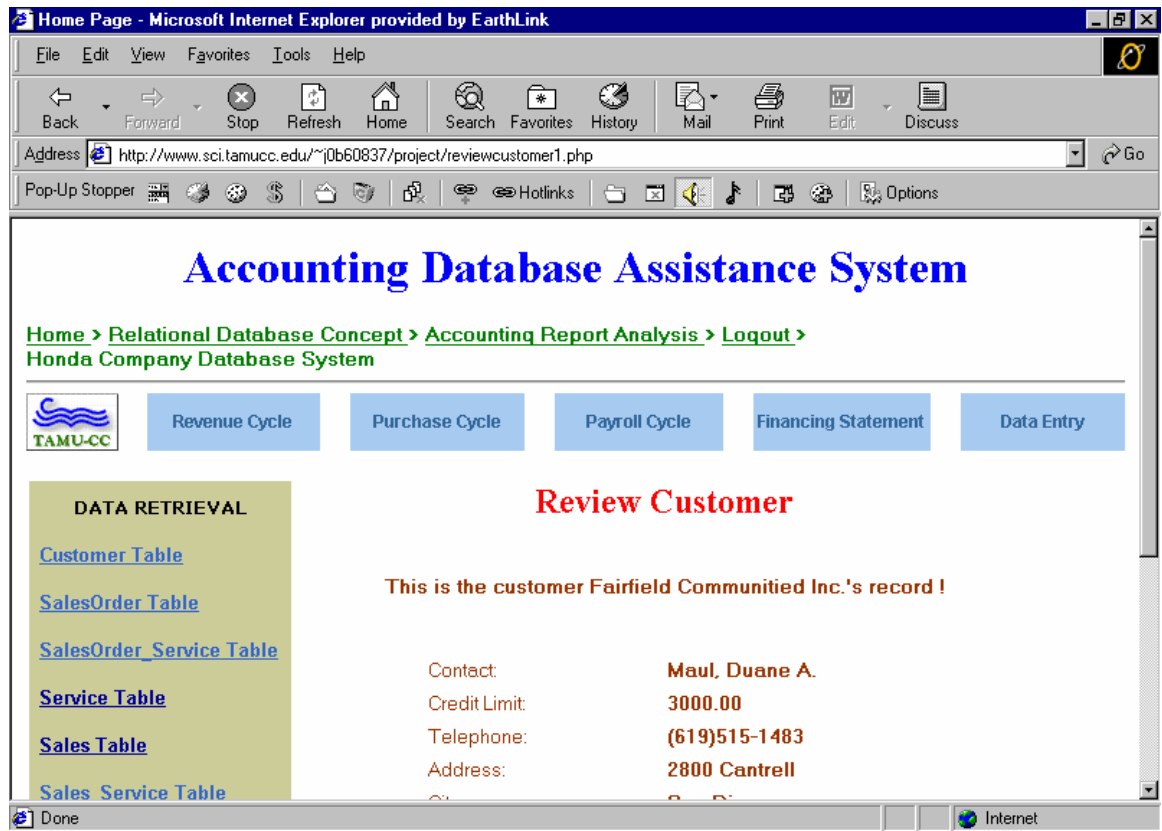


Figure 2.8. Customer Table Page

2.7.3 Purchase Cycle Page

The section of the **Purchase Cycle** records the purchase of materials incidental to providing services. It includes the following tables:

- **Vendor Table**
- **Supply Table**
- **PurchaseOrder Table**
- **SupplyReceipt Table**
- **CashDisbursement Table**

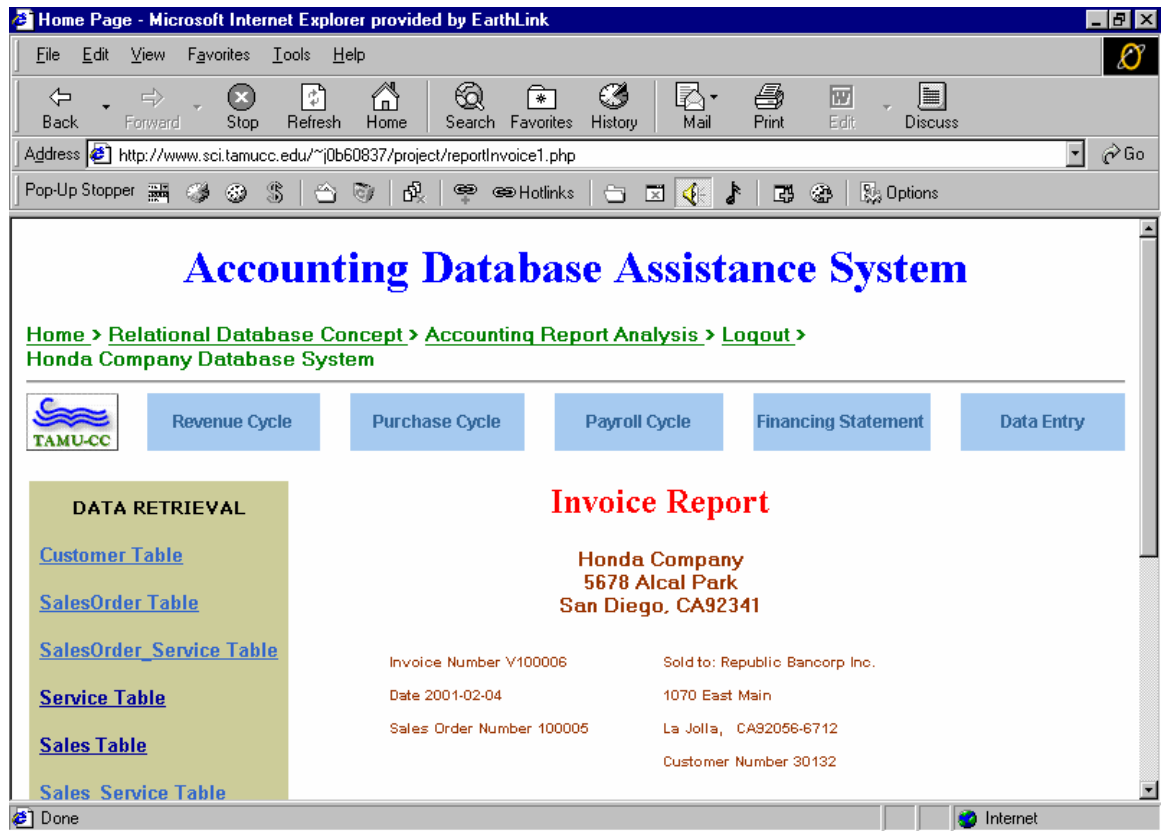


Figure 2.9. Invoice Report Page

- **PurchaseOrder_Supply Table** (Figure 2.10)
- **CashDisbursement_SupplyReceipt Table**

This section also includes the **Purchase Order Report**, the **Supply Receipt Report**, and the **Check Report** (Figure 2.11). The purchase order report provides the information about vendor number, expected ship date, item number, description, quantity, price, and extension. The supply receipt report provides the information about vendor number, purchase order number, supply receipt number, receipt date, stock number, quantity, price, and extension. The check report provides the

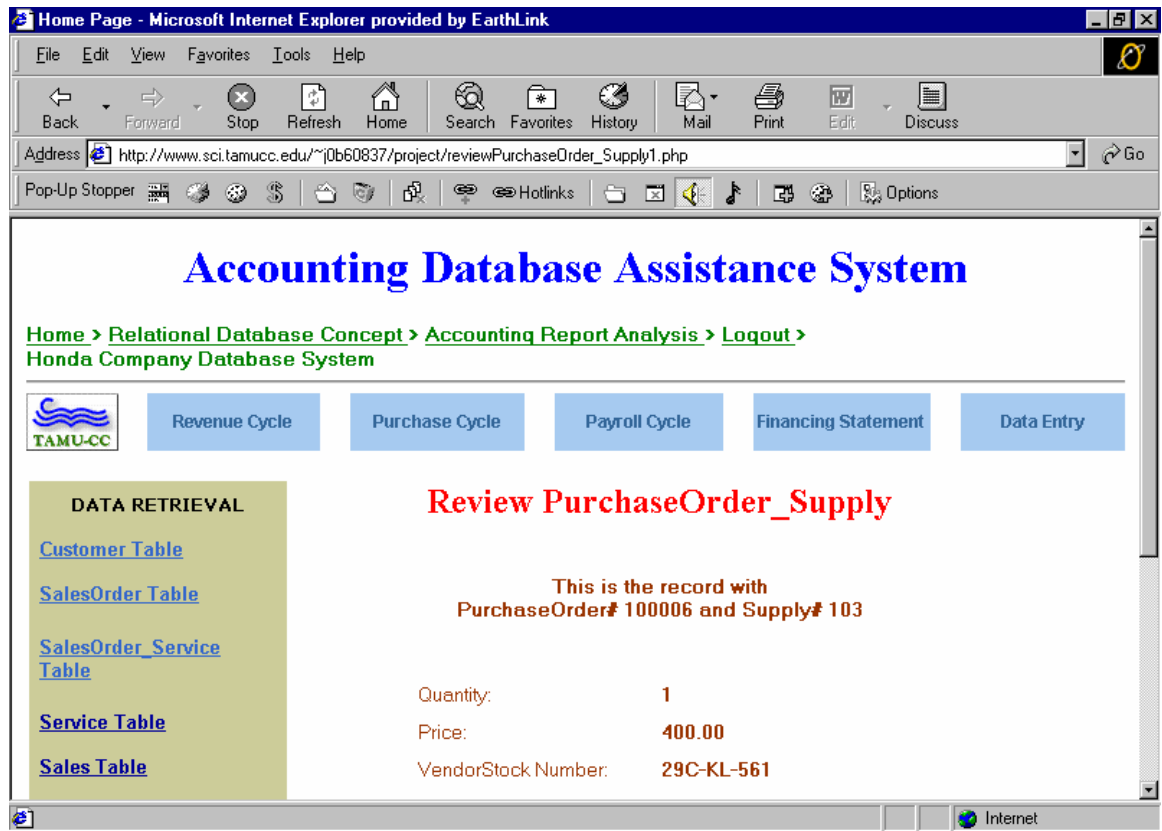


Figure 2.10. PurchaseOrder_Supply Table Page

information about check number, check date, amount, vendor name, supply receipt number, purchase order number, quantity, price, and extension.

The user can review each of the tables or reports by clicking the corresponding link.

2.7.4 Payroll Cycle Page

The section of the **Payroll Cycle** describes the elements needed to calculate an employee's gross pay, deductions, and net pay. It includes the following tables:

- **Employee Table**
- **MaritalStatus Table**

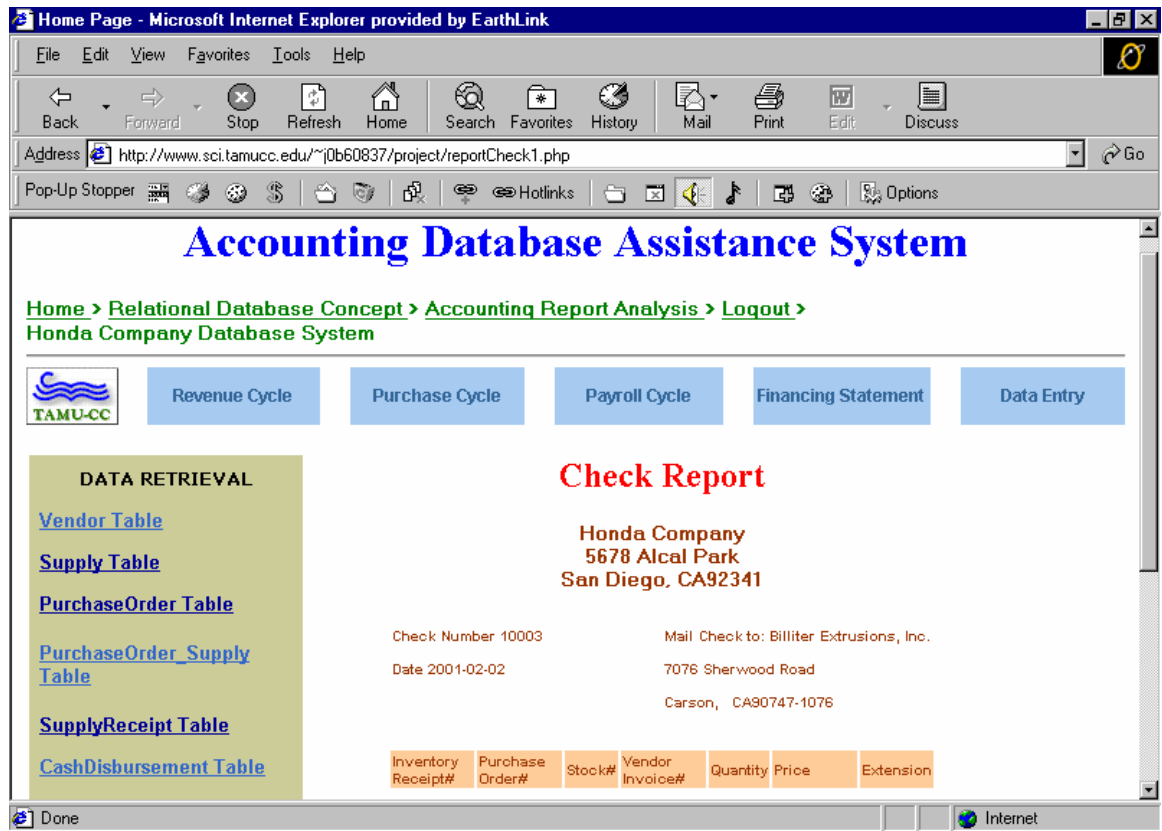


Figure 2.11. Check Report Page

- Exemption Table
- TimeWorked Table

This section also includes the **Employee Pay Report**, the **Time Worked Report** and the **Employee Earnings Report** (Figure 2.12). The employee pay report provides the information about employee number, name, start date, and pay rate. The time worked report provides the information about department name, regular hours, and overtime hours. The Employee Earnings Record provides the employee's payroll record for one year.

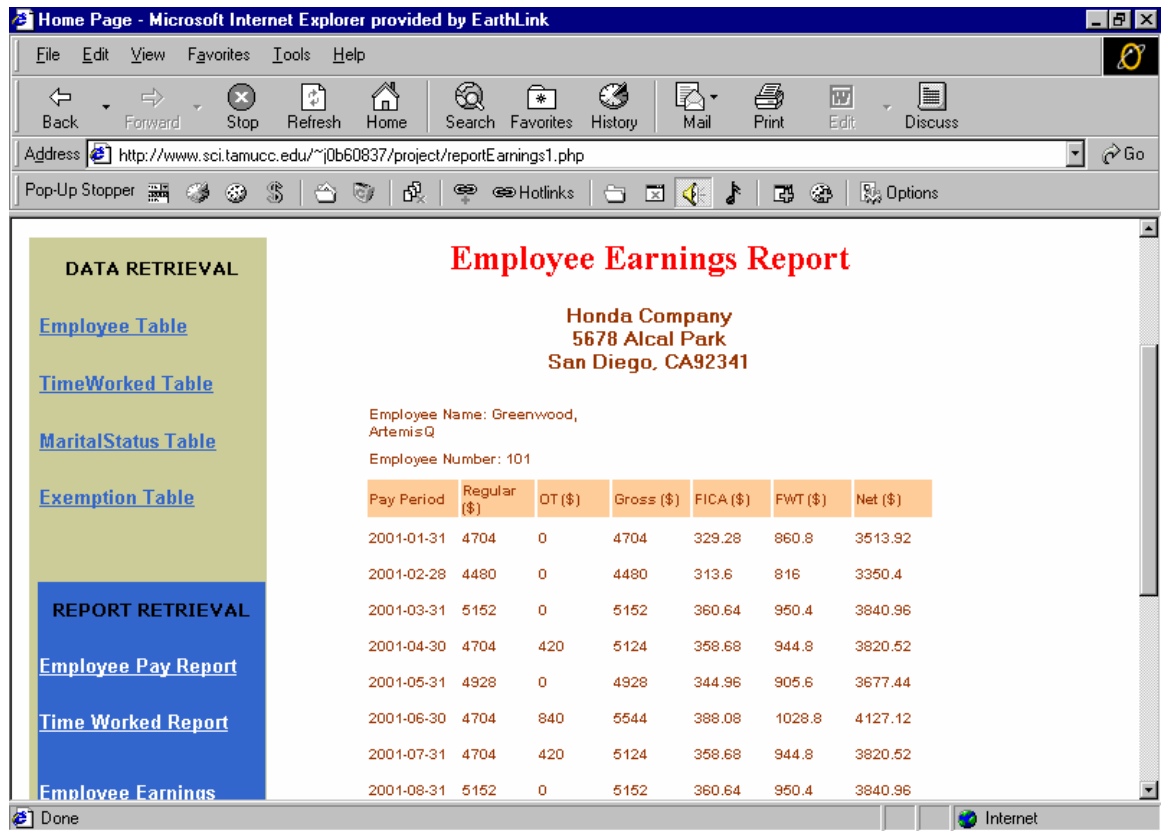


Figure 2.12. Employee Earnings Report Page

The user can review each of the tables or reports by clicking the corresponding link.

2.7.5 Financing Statements

In this section, the user can review the **Income Statement** (Figure 2.13), and the **Balance Sheet** (Figure 2.14). The financing statements are the major accounting reports. They provide much of the information to stakeholders about the economic activities and condition of a business. The income statement describes resource inflows and outflows from financing activities for a specific period of time. It lists revenues and expenses. It also reports the excess of the revenue over the expenses

incurred. This excess of the revenue over the expenses is called net income. If the expenses exceed the revenue, the excess is a net loss.

The balance sheet describes the financial status on the last day of the year. It lists assets, liabilities, and owners' equity. The resources owned by a business are called assets. The rights of creditors represent debts of the business and called liabilities. The rights of the owners are called owner's equity. Since assets = liabilities + owner's equity, the two sides of the balance sheet must always be equal.

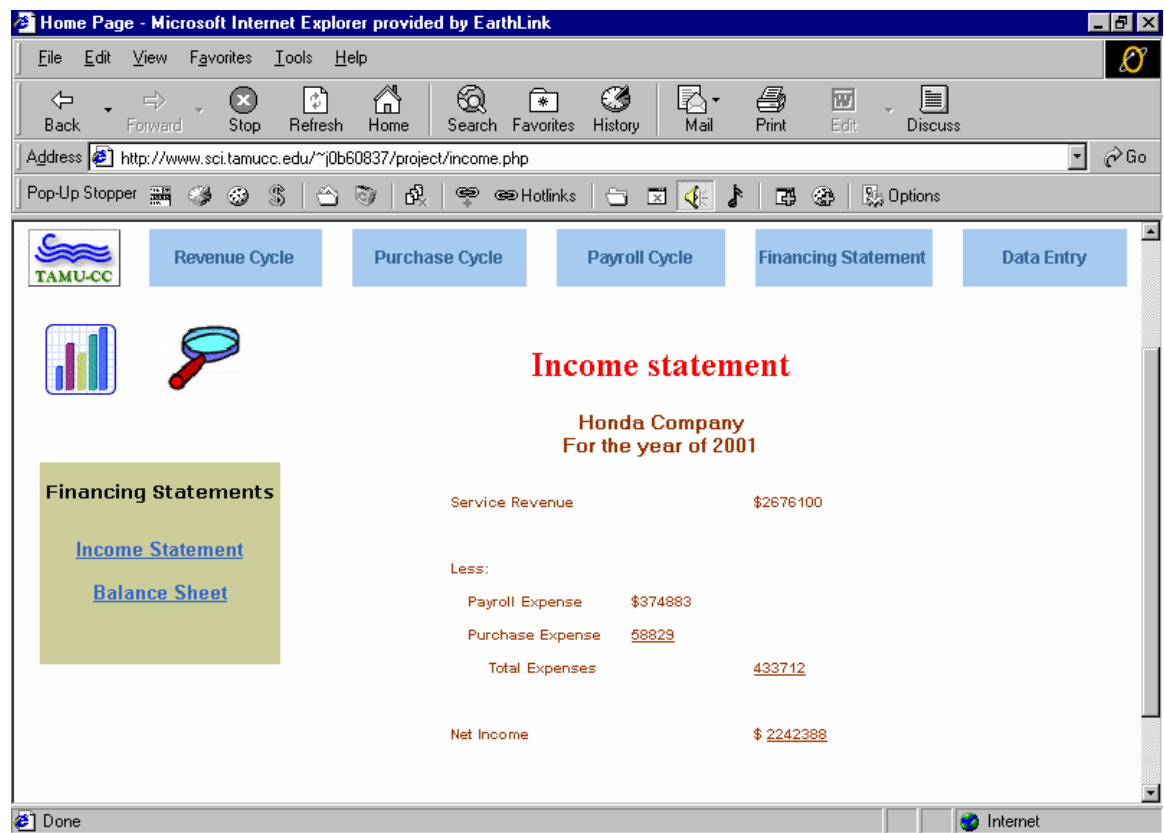


Figure 2.13. Income Statement Page

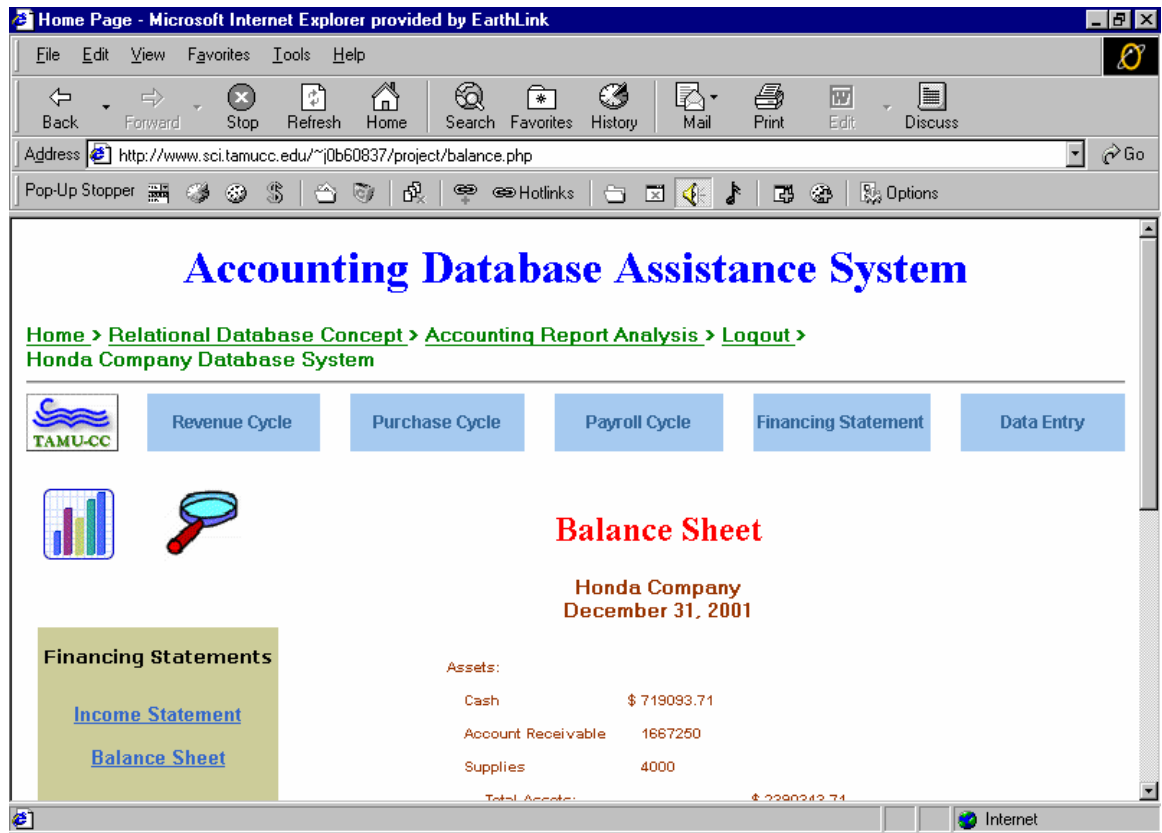


Figure 2.14. Balance Sheet Page

3. System Design

3.1 Environment

This project is a cross-platform Web application. It can be accessed using any major browser that supports HTML 4.0 and JavaScript. It is easy to use. Anyone who is computer literate can use this system without training. It is implemented on Windows 98 with Apache Server running. The MySQL relational database management system is used to store and manage data for the system. PHP (Hypertext Preprocessor) is used to query and access the MySQL database. HTML and JavaScript are applied for generating the Web user interface. One important advantage of the project is that all components of the system (Apache Server, PHP, MySQL) are free software available to public. Their source codes are freely available for anyone to download and customize or extend.

To run this project, a computer with a minimum of a 3.2 GB Hard Disk Drive and 32 MB RAM (Random Access Memory) memory is required.

3.1.1 System Components

As a Web application, the system includes three major components: a Web browser, a Web server, and a database. The Web browser supports HTML 4 and JavaScript. With it, the user can request data and use the functions of the system. The Web server processes the user requests, send data to the database or deliver the requested data back to the user. The system is implemented on Apache Web Server or can be implemented on any other Web server that runs PHP scripts. MySQL provides rich and useful functions for database creation, maintenance and management. It includes [MA 2001]:

- Multi-threading. This means it can easily use multiple CPUs (Central Processing Unit) if available.
- A very fast thread-based memory allocation system and very fast joins using an optimized one-sweep multi-join.
- Functions that are implemented through a highly optimized class library. Usually there is not any memory allocation at all after query initialization.
- A privilege and password system that is very flexible and secured, and allows host-based verification. Passwords are secured because all password traffic is encrypted when one connects to a server.

These important characteristics make MySQL highly suitable for accessing database on Internet. The system uses MySQL database to store and manage data. The data flow and interaction between the system's components are presented in Figure 3.1.

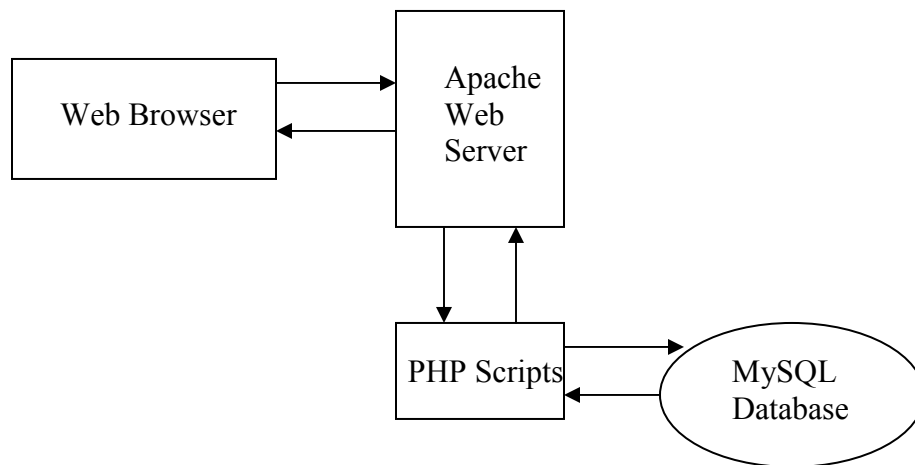


Figure 3.1. Data Flow of the System's Components

3.1.2 Programming Languages

In the project, HTML 4 is used to generate the static Web pages. JavaScript is chosen to create dynamic Web pages on the client side. JavaScript is very powerful in developing Web applications. It is a cross-platform scripting language supported by both Netscape and Internet Explorer.

PHP is used to generate server-side scripts to communicate between the Web server and the database. Like any other CGI program, PHP [Meloni 2000] can access databases and generate content on the fly, or create a Web interface for adding, deleting, and modifying elements within the database. It can work with just about any combination of Web server, operating system, and database one can think of. PHP user authentication can restrict access to a Web site. The goal of the language is to allow Web developers to write dynamically generated Web pages quickly.

3.2 Database Design

The design of the database is based on the MySQL relational database management system. The data type includes varchar, char, int, decimal and date. The varchar data type is used for any variable length character data; the char data type is used for any fixed length character data; the int data type is used for any integer numeric data; the decimal data type is used for any decimal numeric data; the date is used for any date data.

Figure 3.2 is an E-R diagram with the detailed description of the system database. It is used to identify the data objects and their relationships. This is a database based on Honda Company-a typing service firm. It consists of three cycles: revenue cycle, purchase cycle, and payroll cycle.

3.2.1 Revenue Cycle

Revenue cycle activities include accepting orders from customers, recording sales, invoicing customers, recording cash received from customers, and maintaining records of these events. It includes the following tables:

Customer Table

This table provides a central location for storing all information about each customer. This makes adding, deleting, displaying, or changing customer information easy and efficient. It contains the attributes:

CustomerNumber	varchar (primary key, not null)
Name	varchar (not null)
Address	varchar
City	varchar
State	char
ZipCode	varchar
Telephone	varchar
CreditLimit	decimal
Contact	varchar

SalesOrder Table

When customers decide to buy services, they communicate their desire by sending a purchase order. The firm that receives the purchase order records it in its own records as a sales order. SalesOrder table contains the attributes:

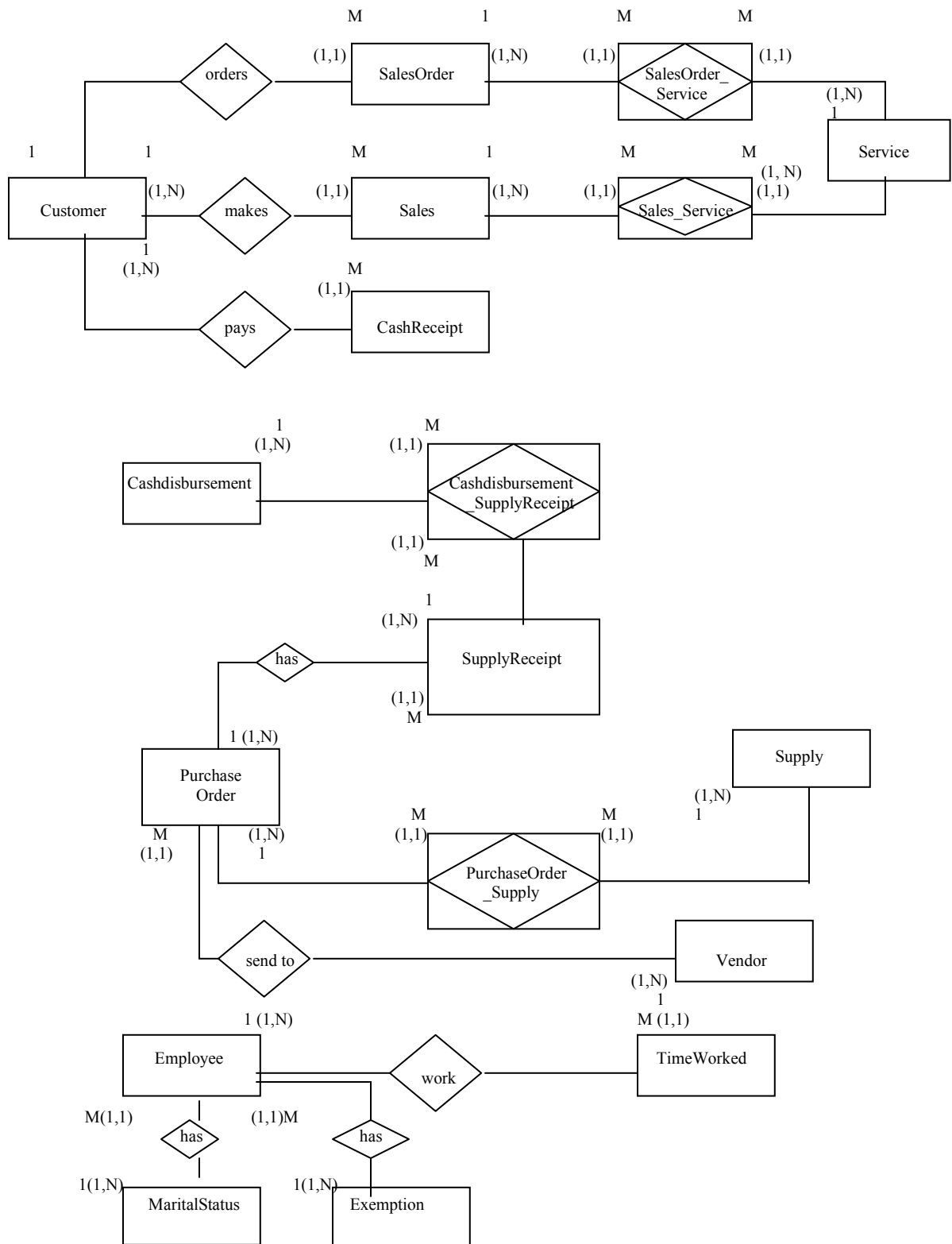


Figure 3.2. Honda Company Database E-R Diagram

SalesOrderNumber	varchar (primary key, not null)
SalesOrderDate	date
CustomerNumber	varchar
CustomerPONumber	varchar

SalesOrder_Service Table

The SalesOrder_Service table is a relationship table that records the many-to-many link between SalesOrder and Service. It contains the attributes:

SalesOrderNumber	varchar (primary key, not null)
ServiceItemCode	varchar (primary key, not null)
SOSerQuantity	int
SOSerPrice	decimal

Service Table

This table is used to provide service information that the firm has in the revenue cycle. It contains the attributes:

ServiceItemCode	varchar (primary key, not null)
Description	varchar

Sales Table

The Sales table is used to summarize each sales transaction for purpose of accounting. It also includes valuable marketing information. It contains the attributes:

InvoiceNumber	varchar (primary key, not null)
InvoiceDate	date
CustomerNumber	varchar
SalesOrderNumber	varchar

Sales_Service Table

This table provides the many-to-many link between Sales and Service and stores the quantity and price of each service item on each invoice. It contains the attributes:

InvoiceNumber	varchar (primary key, not null)
ServiceItemCode	varchar (primary key, not null)
SSerQuantity	int
SSerPrice	decimal

CashReceipts Table

This table provides information about payments received from customers. It contains the attributes:

RemittanceAdviceNumber	varchar (primary key, not null)
CashReceiptDate	date
CustomerCheckNumber	varchar
CustomerNumber	varchar
CashReceiptAmount	decimal

3.2.2 Purchase Cycle

Purchase cycle activities include placing orders with vendors, recording the supplies to purchase, recording payments made to vendors, and maintaining records of these activities. It includes the following tables:

Vendor Table

This table provides a central location for storing all information about each vendor. This makes adding, deleting, or changing vendor information easy and efficient. It contains the attributes:

VendorNumber	varchar (primary key, not null)
Name	varchar
Address	varchar
City	varchar
State	char
ZipCode	varchar
Telephone	varchar
Contact	varchar

Supply Table

This table is used to provide supply descriptions on purchase orders. It includes the three fields:

SupplyNumber	varchar (primary key, not null)
Category	varchar
Description	varchar

PurchaseOrder Table

This table is used to facilitate ordering supplies from vendors. It contains the attributes:

PurchaseOrderNumber	varchar (primary key, not null)
PurchaseOrderDate	date

VendorNumber	varchar
ExpectedShipDate	date

PurchaseOrder_Supply Table

This table is a relationship table that models many-to-many link between PurchaseOrder and Supply. It contains the attributes:

PurchaseOrderNumber	varchar (primary key, not null)
SupplyNumber	varchar (primary key, not null)
Quantity	int
Price	decimal
VendorStockNumber	varchar

SupplyReceipt Table

When supplies arrive on the receiving dock, the SupplyReceipt table is used to record the quantity and identity of each item on each shipment. It contains the attributes:

SupplyReceiptNumber	varchar (primary key, not null)
SupplyReceiptDate	date
PurchaseOrderNumber	varchar
SupplyStockNumber	varchar
VendorInvoiceNumber	varchar
ReceiptQuantity	int
ReceiptPrice	decimal

CashDisbursement Table

Once supply items are received, the firm needs to pay for the items. The CashDisbursement table is used to describe the payment. It includes the fields:

CheckNumber	varchar (primary key, not null)
CashDisbursementDate	date

CashDisbursement_SupplyReceipt Table

The CashDisbursement_SupplyReceipt table is used to model many-to-many link between the CashDisbursement table and SupplyReceipt table. It contains the attributes:

CheckNumber	varchar (primary key, not null)
SupplyReceiptNumber	varchar (primary key, not null)

3.2.3 Payroll Cycle

The payroll cycle calculates employee earnings, records payments to employees, and maintains payroll records. These records must satisfy a complex array of government regulations pertaining to time and pay records. It includes the following tables:

Employee Table

This table provides a central location for storing all information about each employee. This makes the human resources job of adding, deleting, and updating employee information easy and efficient. It contains the attributes:

EmployeeNumber	varchar (primary key, not null)
LastName	varchar
FirstName	varchar

MiddleInitial	varchar
SSN	varchar
Address	varchar
City	varchar
State	varchar
ZipCode	varchar
Telephone	varchar
MaritalStatus	char
ExemptionNumber	int
PayRate	decimal
Department	varchar
StartDate	date

TimeWorked Table

This table stores regular and overtime hours worked by each employee for each pay period. In Honda Company, all employee pay is calculated on an hourly basis, and all pay is paid once each month. This table contains the attributes:

EmployeeNumber	varchar (primary key, not null)
PayPeriodEnded	date (primary key, not null)
RegularTime	int
OverTime	int

MaritalStatus Table

This table stores the percentages to use to calculate federal withholding tax for Honda Company. It includes the two fields:

MaritalStatus	char (primary key, not null)
FWTRate	decimal

Exemption Table

This table is used to calculate employee's federal income tax withholding amounts. It includes the two fields:

ExemptionNumber	int (primary key, not null)
ExemptionAmount	int

3.3 Major Page Design

3.3.1 Login Page (Figure 2.2)

This page displays a message and a login form. The system uses the password protection handles that a user uses during login process. It checks the information provided by the user with the account information in the database on the server side.

Input: User ID, Password

Output: If the user submits invalid information, the message “ this is an invalid login, please try again” is displayed. If the user fills the correct User ID and the Password, the system **Home Page** is displayed.

A new user must first register to create the user account before login to the system.

3.3.2 Home Page (Figure 2.4)

This page links to the **Relational Database Concept Page**, the **Accounting Report Analysis Page**, the **Honda Company Database System Page**, and the **Logout Page**.

Input: Activating the link

Output: The corresponding page

3.3.3 Logout Page

This page is used to logout from the system. It also thanks the user to visit the system.

Input: Activating the **Logout** link

Output: **Logout Page**

3.3.4 Relational Database Concept Page (Figure 2.5)

This page links to the **Database Management System Page**, the **Three Data Models Page**, the **Database Objects Page**, the **Primary and Foreign Key Attributes Page**, the **Schema of a Relation Page**, the **Data Dictionary Page**, the **Normalization Page**, the **Table Relationships Page**, the **Relational Database Operations Page**, the **Database Design Page**, the **SQL command Page**, the **Review Question 1 Page**, the **Review Question 2 Page**, and the **Review Question 3 Page**.

Input: Activating the link

Output: The corresponding page

3.3.5 Accounting Report Analysis Page (Figure 2.6)

This page links to different pages of the report analysis. They are the **Invoice Report Page**, the **Cash Receipt Report Page**, the **Customer Statement Page**, the **Purchase Order Report Page**, the **Supply Receipt Report Page**, the **Check Report Page**, the **Employ Pay Report Page**, the **Time Worked Report Page**, the **Payroll Register Report Page**, the **Income Statement Page**, and the **Balance Sheet Page**.

Each of them defines the content of each report and shows how to create each report.

Input: Activating the link

Output: The corresponding page

3.3.6 Honda Company Database System Page (Figure 2.7)

HTML, PHP, and MySQL languages are used to implement this part of the system. MySQL is used to construct a relational database and store data. It utilizes the Standard Query Language to construct the tables, relationship constraints and the user privileges. PHP is used to communicate with the database. The **Data Entry Page**, the **Revenue Cycle Page**, the **Purchase Cycle Page**, the **Payroll Cycle Page**, and **Financing Statement Page** are linked via HTML tags. The **Data Entry Page** includes the **Add Page**, the **Delete Page**, and the **Modify Page**. The **Revenue Cycle Page** includes all the tables and reports from the revenue cycle. The **Purchase Cycle Page** includes all the tables and reports from the purchase cycle. The **Payroll Cycle Page** includes all the tables and reports from the payroll cycle. The **Financing Statement Page** includes **Income Statement** and **Balance Sheet**.

Input: Activating the **Data Entry Page**, the **Revenue Cycle Page**, the **Purchase Cycle Page**, the **Payroll Cycle Page**, or the **Financing Statement Page**

Output: The corresponding page

4. Evaluation and Results

A comprehensive evaluation of a Web-based system can identify potentially major problems during the development phase for a new site; determine what level of accessibility a Web site meets; and/or provide assurance that a Web site meets a required level of accessibility. It can also determine whether a system meets the needs of users.

After conducting a comprehensive evaluation, the conclusion is that the Accounting Database Assistance System is a successful Web application. This system is a valuable tool that will engage the learners in the process of constructing coherent accounting database system. By comparison with earlier application [Donnelly 2001] that causes frustration, irritation and annoyance, this system's overall security, performance, and robustness are unquestionable. This system helps the users achieve their goal quickly and efficiently. It is designed and implemented to achieve the following objectives:

- It addresses needs of the user by helping the user to learn the accounting database concepts. It provides an interactive database, so that the user can obtain hands-on experience by implementing data.
- It is easy to use. Everyone with different disabilities, different levels of technical expertise, and different levels of familiarity with a Web site can use this system easily without training. All pages of the Web site are clearly explained and disclosed on the Web site. The system can also be used from different graphical user interface browsers (Internet Explorer, Netscape), in

different versions (latest, older) running on different platforms (Windows, Linux, Mac).

- It delivers content that is correct, complete and current. The user can review page selection and explore freely across the entire Web site. There is no area where it is difficult or impossible to use the Web site.
- It can be maintained easily. The system does not need to follow any special maintenance procedures. Also, the system costs less because all the components of the system (Apache Web Server, PHP Scripts, and MySQL) are free publicly available software.

5. Conclusion

The result of this project is a Web-based Accounting Database Assistance System that incorporates security, reliability, and many other outstanding performance features. The system provides an educational tool for college teachers to help students learn how to build an accounting database system. The system is supported by a relational database that manages the business for Honda, a typing service company. The Honda Company Database System is built on the three accounting cycles. They are the revenue cycle, the purchase cycle and the payroll cycle. From the Honda Company Database System, students can learn about a real world accounting and finance environment.

Also the Accounting Database Assistance System provides a consistent and friendly Web interface to allow users view desired information, perform exercises, query the database, and generate accounting reports.

6. Future Work

Future work on this project can be incorporation of many other features. For example, a test and quiz feature can be added to help students review and evaluate their knowledge on the accounting database system. Also an instructor's interface can be added, so the instructor can always add or update some review questions.

Moreover, the system can build a database system based on a complex type of manufacturing firm (not just a simple type of service firm). So the students can learn not only the service firm activities of purchasing and selling, but also manufacturing firm activities as well. Typical activities of a manufacturing firm that can be included in the system are:

- Purchasing raw materials and labor
- Incurring other manufacturing costs
- Processing the raw materials, labor, and other manufacturing costs into finished goods
- Selling the finished goods

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Appendix A. USER MANUAL

Accounting Database Assistance System is a Web-based education tool. Its users are the college teachers, the students, and anyone who wants to learn accounting database concepts. The major pages of the system include the **Login Page**, the **Home Page**, the **Logout Page**, the **Relational Database Concept Page**, the **Accounting Report Analysis Page**, and the **Honda Company Database Page**. The User Manual consists of the basic steps to be followed in order to perform the system.

1. The address of the Accounting Database Assistance System is:
<http://www.sci.tamucc.edu/~j0b60837/login.php>
2. Login to the system is provided by the valid userid and password. The new user must register first before he or she can login the system. The option of **Change Password** provides the user the facility of changing password.
3. In the **Home Page**, the user can select the **Logout Page**, the **Relational Database Concept Page**, the **Accounting Report Analysis Page**, or the **Honda Company Database System Page** by clicking corresponding links.
4. In the **Relational Database Concept Page**, the user can select the different **Concept Page** to review the different database concepts. Also the user can select the **Review Question** to practice. The system automatically checks answers for the user.
5. In the **Accounting Report Analysis Page**, the user can select the different **Report Analysis Page** to learn how to write the different accounting report.

6. In the **Honda Company Database System Page**, the user can go to the **Revenue Cycle Page**, the **Purchase Cycle Page**, the **Payroll Cycle Page**, the **Financing Statement Page**, or the **Data Entry Page** by clicking the corresponding links.
7. In the **Revenue Cycle Page**, the user can review any tables or reports in the revenue cycle by selecting the corresponding links.
8. In the **Purchase Cycle Page**, the user can review any tables or reports in the purchase cycle by selecting the corresponding links.
9. In the **Payroll Cycle Page**, the user can review any tables or reports in the payroll cycle by selecting the corresponding links.
10. In the **Financing Statement Page**, the user can review the **Income Statement** or the **Balance Sheet** by selecting it.
11. The **Data Entry Page** is a secure page. For authorization to enter this section, the user must be an instructor or a database administrator. After the correct userid and password is entered, the user can login the **Data Entry Page**. In this page, the user can first select a table, and select the **add button** to add data into the database, select the **modify button** to modify data in the database, or select the **delete button** to delete data from the database.
12. After finishing to use this system, the user can logout of the system by selecting the **Logout** link.

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