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HUMAN RESOURCE MANAGEMENT SYSTEM

A Project

Presented to the

Faculty of

California State University,

San Bernardino

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

in

Computer Science

---

by

Saurabh Dixit

June 2009

HUMAN RESOURCE MANAGEMENT SYSTEM

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Saurabh Dixit

June 2009

Approved by:

[redacted] 6/12/09

Dr. Ernesto Gomez, Chair, Computer Science — Date

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Dr. Yasha Karant

[redacted]

Dr. Kerstin Voigt

ABSTRACT

Online Human Resource Management System (HRMS) is a web-based system that can be used to track the employees' personal information, skills, academic achievements, last employer information and calculates the number of allowances in the W4-form of the State Of California. It has an internal email contact system and it automatically does all calculations for W4-form. The project has two main sections (administrator and employee) guided by user access rules. The system is made secure by using sessions and SQL server login securities. Human Resource Management System minimizes the paperwork between the Human Resources Department and an employee of an organization. It also helps the employee to fill the W4-form in minimum amount of time. One of the immediate enhancements includes incorporating the ability to print filled W4-Form and web interfaces.

ACKNOWLEDGMENTS

I thank the faculty of Computer Science and Engineering Department for giving me an opportunity to pursue my M.S. in Computer Science at California State University, San Bernardino. I express my sincere gratitude to my advisor, Dr. Ernesto Gomez who guided me through this project. I also thank my other committee members, Dr. Kerstin Voigt and Dr. Yasha Karant for their valuable input and other members of Computer Science and Engineering Department at California State University, San Bernardino. Last but not least I thank my wife, family and friends for supporting me in completing this project.

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CHAPTER ONE

INTRODUCTION

Online Human Resource Management System (HRMS) is a web-based system that can be used to track the employees experience and calculate the number of allowances in the W4-form for the State Of California. The system is capable of keeping track of the employee personal information, skills, academic achievements and last employer. The system also calculates the W4-form for the employee who saves a lot of time and resources. It also has the ability to query questions from the administrator and the system has to be updated whenever the new tax tables are released by the Internal Revenue Services for California. New employees will get a random ticket number by email to register first time, which will ensure only the trusted employees are registered with the system

1.1 Purpose of Project

The purpose of this project is to design and create a human resource system that can be used by a wide variety of groups who deal with the employee. This system is specially designed for the medium-level company who has employees in

different locations. The system also tracks the duration of work, experience in different fields and it eliminates a lot of manual paper work between the employee and the human resource department. The important feature of this product is to calculate the W4-form for California employers.

1.2 Project Products

This project led to the following products:

- Online Human Resource Management System: a working website with ASP.NET pages as front end and SQL Server 2005 as back end.
- Systems Manual: a project report (this report) with design details and user specifications.

CHAPTER TWO

HUMAN RESOURCE MANAGEMENT SYSTEM

This is a web-based system where ASP.NET pages have been used as a front end. The database has been created using Microsoft SQL Server 2005. Microsoft Active Data Objects (ADO) has been used to access the SQL Server. Various clients-based scripts include Java and C# scripts; they have been integrated for better efficiency and faster client side computations. The whole application was developed using the academic version of Visual Web Developer 2005. The system can be hosted on IIS with .NET on it. Also HTML, DHTML and XML have been used to display pages. The integration diagram among various components is shown below.

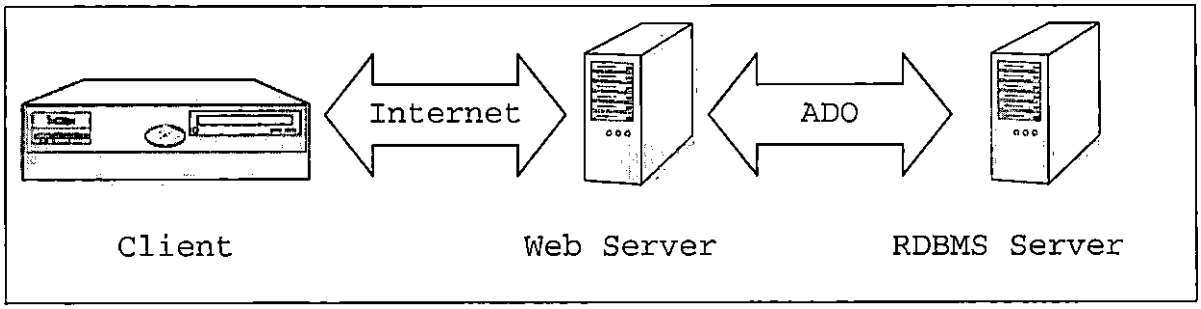


Figure 1. Interaction Diagram among Components

The components chosen for the system were based on

- Efficiency and Compatibility
- User friendly.

The user interface is built using ASP.NET web components and HTML. Scripts including Java and C# Scripts were used to enhance the efficiency of the system by doing most of the processing on the client side. ASP.net was chosen because it can be used to design user-friendly applications and a wide range of libraries is available for its enhancements. ASP.net has built in compatible components, which can be used to run ADO, and hence provide an efficient gateway with the database server. Also it runs seamlessly on IIS server.

IIS has been used to host the system. This decision was made as it comes with all the components to process ASP.net pages and C# scripts. Also, it's free with the purchase of latest windows operating systems.

The database used for the system is SQL server 2005. Since the application should have the ability to process large amount of critical data, a server was chosen that has a proven track record in the market and is compatible with Transact-SQL. Also, SQL server is compatible with a wide

range of database drivers, which can be accessed using ADO and ASP.net.

2.1 Software Interfaces

- Language: HTML / C# / JavaScript / SQL
- Compiler : Visual Web Developer 2005 compiler for C#.Net
- Database: SQL Server 2005
- Web Server : IIS (Internet Information Server)
- Internet Browser: Netscape or Internet Explorer.
- Operating System: Windows XP/W2K/2K/2003

CHAPTER THREE

DATABASE DESIGN

3.1 Data Analysis

The project is data intensive. The system requires an extensive data structure because of its nature. The whole project is made of forms and reports, which are driven by data. There are three distinct parts of the data.
The first part is the user information. It saves the login information for each user including their username, password, personal information, skills, last employer data and academic achievements. The system saves the information on each user including their name, address, city, state, zip, phone, email etc.

The second part is the computation of W2-Form and save the data to revise some other time. It saves the user input data and calculates and updates the maximum number of allowance with the help of different tax tables and formulas to compute the final total number of allowances.

3.2 Database Entity Relationship Diagram

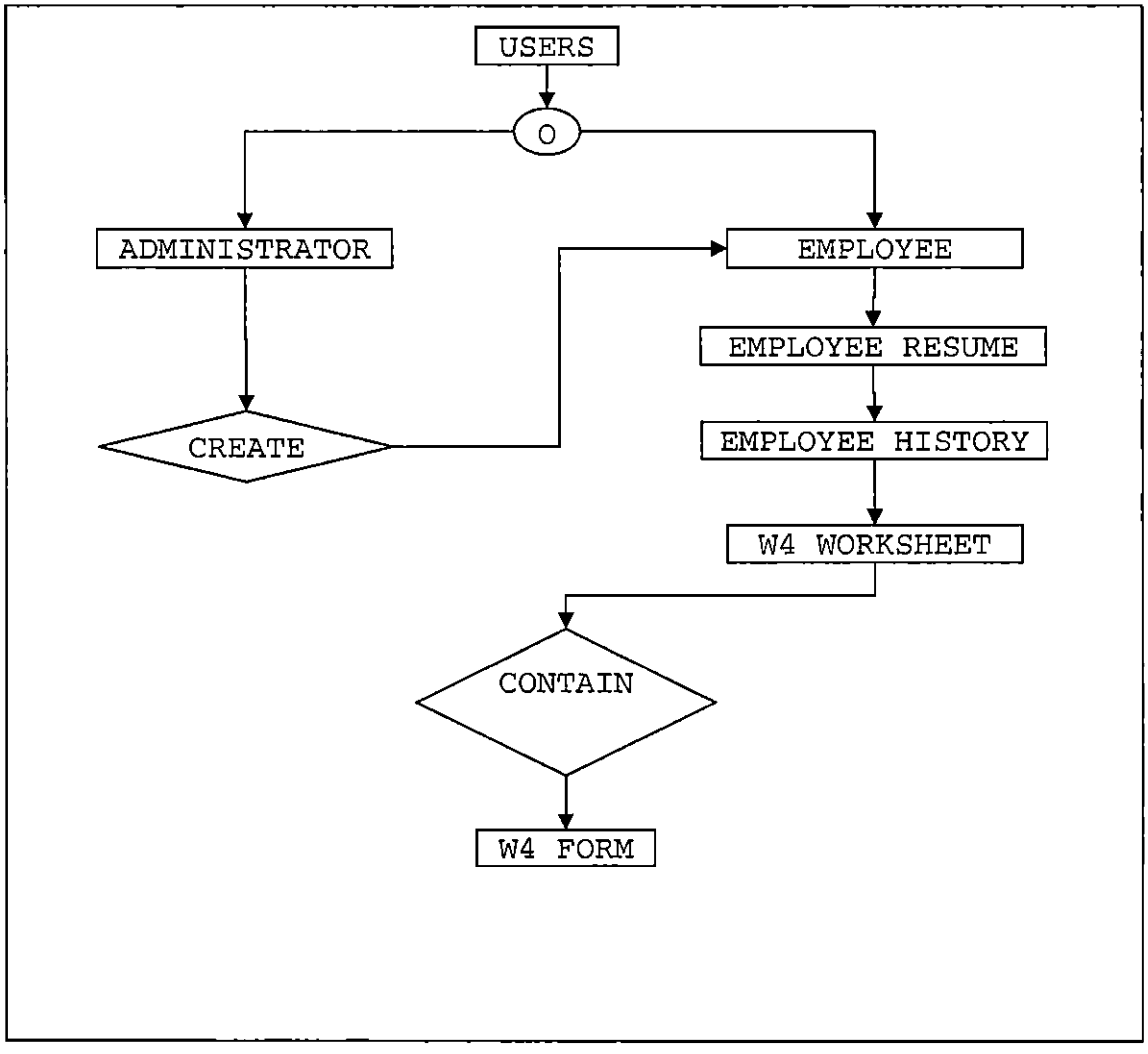


Figure 2. Entity-Relationship Diagram

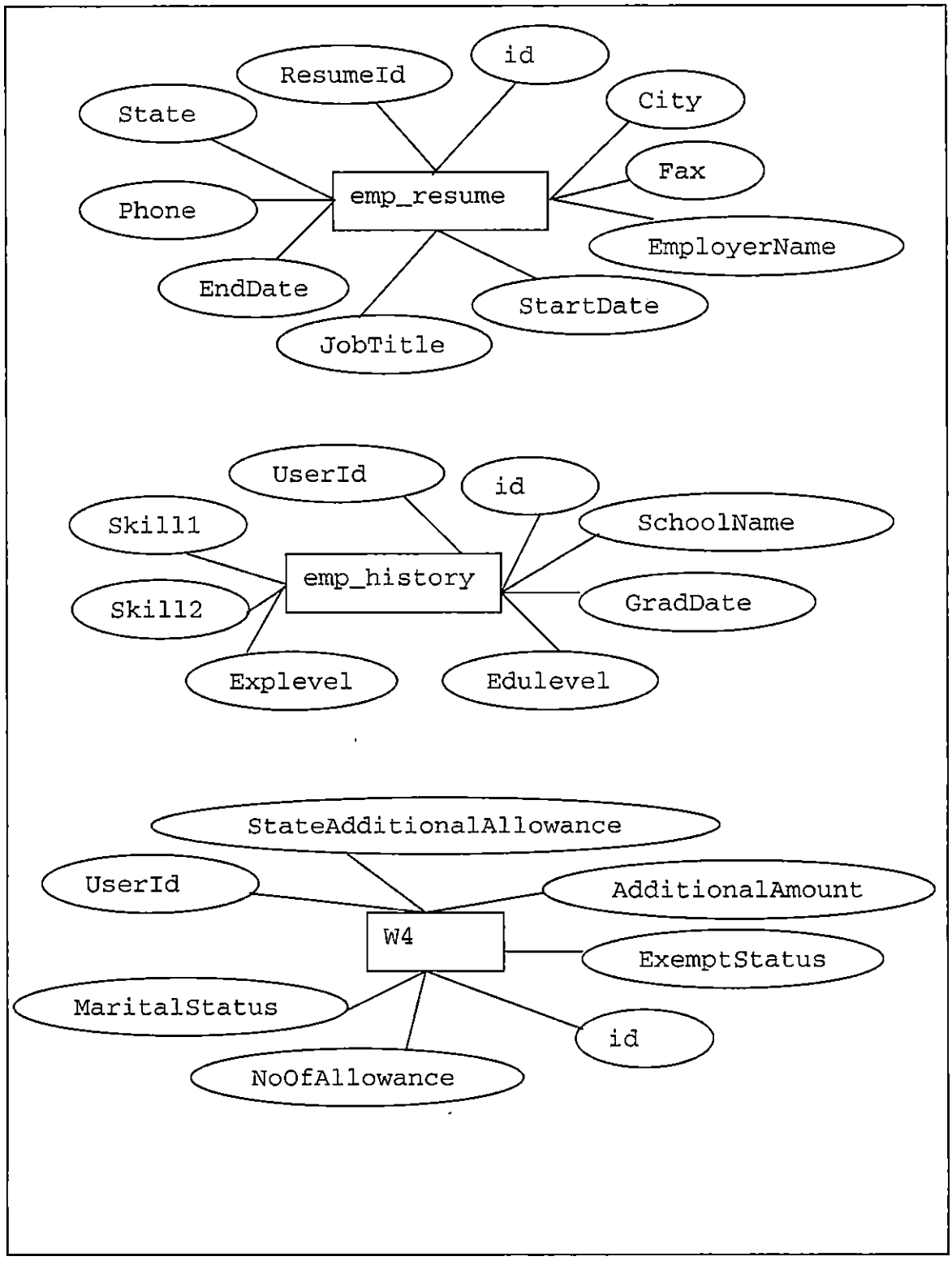


Figure 3. Entity-Relationship Diagram with Details

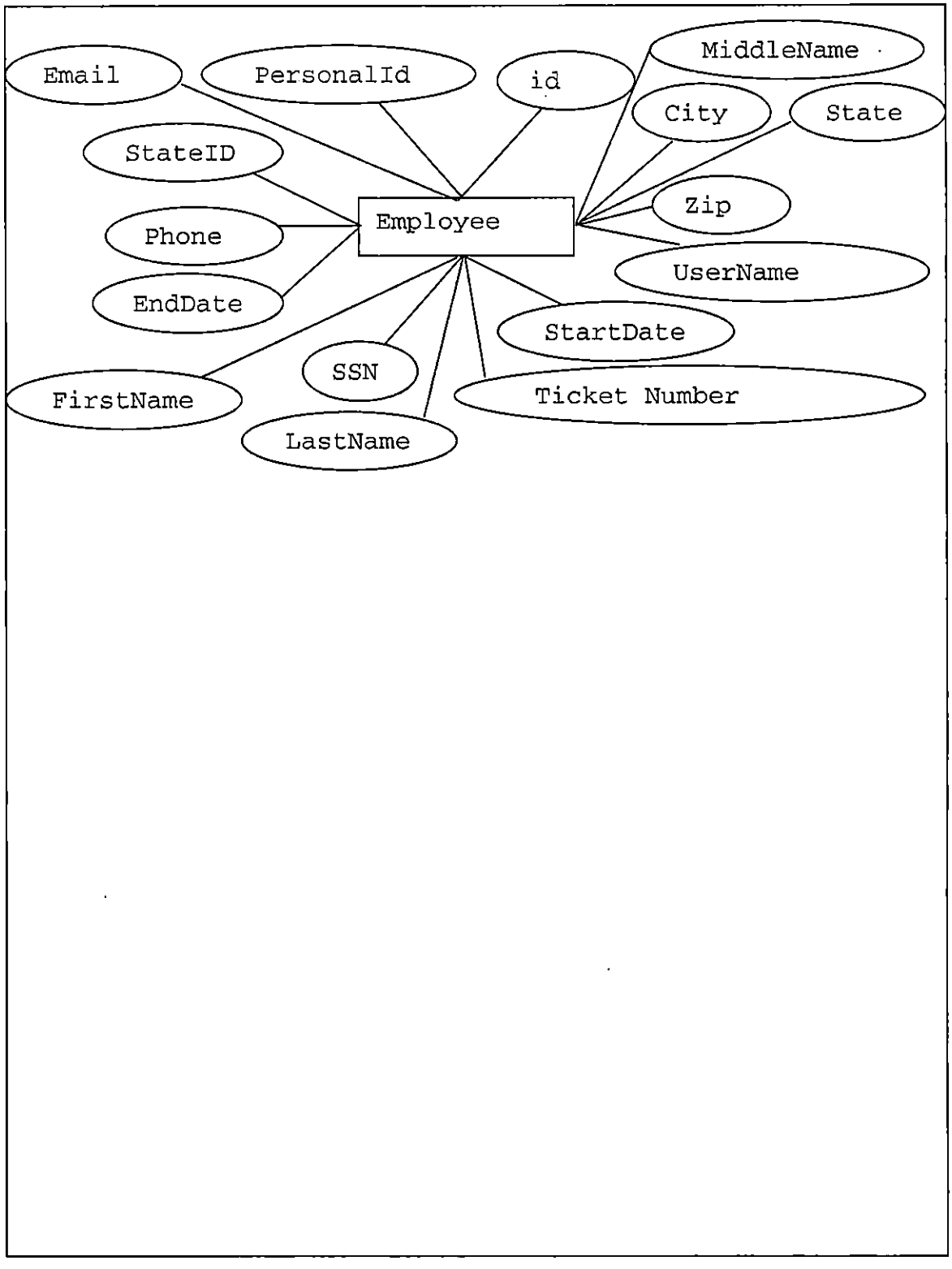


Figure 3. Entity-Relationship Diagram with Details

3.3 Data Type and Details

Ten tables were created following the logical model. The details of each entity name, data type, length and null or non-null keys.

Table 1. Structure of Table Employee

Field	Type	Description	Null
Id	Int	Internal id	
PersonalID	Int	Personal id	NO
SSN	Varchar(50)	Social Security	No
FirstName	Varchar(50)	Employee First Name	No
MiddleName	Varchar(50)	Employee Middle Name	
LastName	Varchar(50)	Employee Last Name	No
StateID	Varchar(50)	State Identification	No
TicketNumber	Varchar(50)	Random Number for New Employee Login Setup	
Email	Varchar(50)	Employee Email Address	
StartDate	Datetime	Employee Start Date	
EndDate	Datetime	Employee End Date	

Address1	Varchar(50)	Employee Address	
City	Varchar(50)	Employee City	
State	Varchar(50)	Employee State	
Zip	Varchar(50)	Employee zipcode	
WorkPhone	Varchar(50)	Employee work phone	
HomePhone	Varchar(50)	Employee home phone	
UserName	Varchar(50)	Employee UserName	

Table 2. Structure of Table Employee Resume

Field	Type	Description	Null
Id	Int	Internal id	No
ResumeId	Int	Resume Id	
EmployerName	Varchar(50)	Last Employer Name	
JobTitle	Varchar(50)	Last Job Title	
StartDate	Datetime	Last Job start Date	
EndDate	Datetime	Last Job end date	
City	Varchar(50)	Last Job city	
State	Varchar(50)	Last Job State	
Phone	Varchar(50)	Last Job Phone	
Fax	Varchar(50)	Last Job Fax	
Description	Varchar(MAX)	Last Job Description	

Table 3. Structure of Employee History

Field	Type	Description	Null
Id	Int	Internal id	No
UserId	Int	User Id	
Skill1	Varchar(50)	Employee Skills	
Skill2	Varchar(50)	Employee Skills	
Explevel	Varchar(50)	Employee Experience Level	
Edulevel	Varchar(50)	Employee Education Level	
SchoolName	Varchar(50)	Employee School Name	
GradDate	Datetime	Employee Graduation Date	

Table 4. Structure of W4 Form

Field	Type	Description	Null
Id	Int	Internal id	No
UserId	Int	UserId	No
MaritalStatus	Int	Employee Marital Status	No
NoOfAllowance	Int	Employee Number of allowance	
AdditionalAmount	Money	Employee Additional Amount	
ExemptStatus	Int	Employee Exempt or Non Exempt	No
StateAddionalAllowance	Int	Emloyee State Additional Allowance	

Table 5. Structure of W4 Worksheet

Field	Type	Description	Null
Id	Int	Internal id	No
UserId	Int	UserId	No
A	Int	Personal Allowance Workseet section A	
B	Int	Personal Allowance Workseet section B	
C	Int	Personal Allowance Workseet section C	
D	Int	Personal Allowance Workseet section D	
E	Int	Personal Allowance Workseet section E	
F	Int	Personal Allowance Workseet section F	
G	int	Personal	

		Allowance Workseet section G	
I1	Int	Deductions Adjustment Worksheet section 1	
I2	Int	Deductions Adjustment Worksheet section 2	
I3	Int	Deductions Adjustment Worksheet section 3	
I4	Int	Deductions Adjustment Worksheet section 4	
Salary1	Money	Employee Salary	
Salary2	Money	Spouse Salary	

CHAPTER FOUR

PROJECT IMPLEMENTATION

Online Human Resource Management System has been designed to perform 8 different functions for 2 different users. The following figure is the Use Case Diagram for the system.

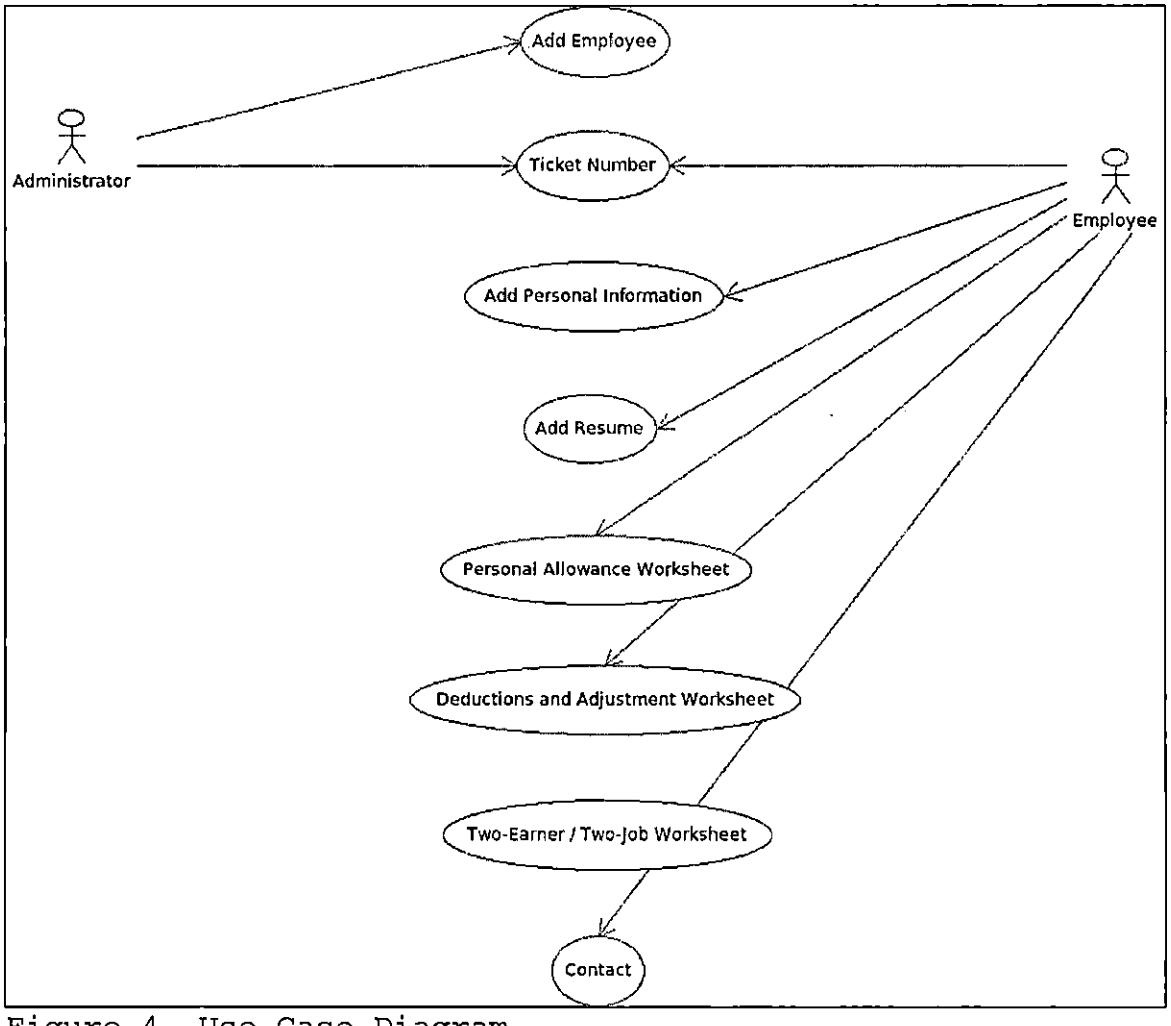


Figure 4. Use Case Diagram

4.1 Online Human Resource Management System

There is only one user interface in the system depending on the type of access the user has. The users will be guided to their interface via the login page, which will depend upon the type of registration which is New User or an Existing User. If the User is new then he/she has to click the new user tab and enter the ticket number which is generated by the system after the user give a minimum information required by administrator to create an initial user account setup. If the User login as an existing User then the system will redirect the user on the basis of their access rights. The interface is Windows point and click based and is easy to use.

4.1.1 Login Page

This form is also the home page of the system. The form checks the validity of the user by checking the username and password that the user enters with the one in the database. Once the user is authenticated, the page redirects his/her according to his/her predetermined access rights. If the username password combination is not valid, the page will display an error message.

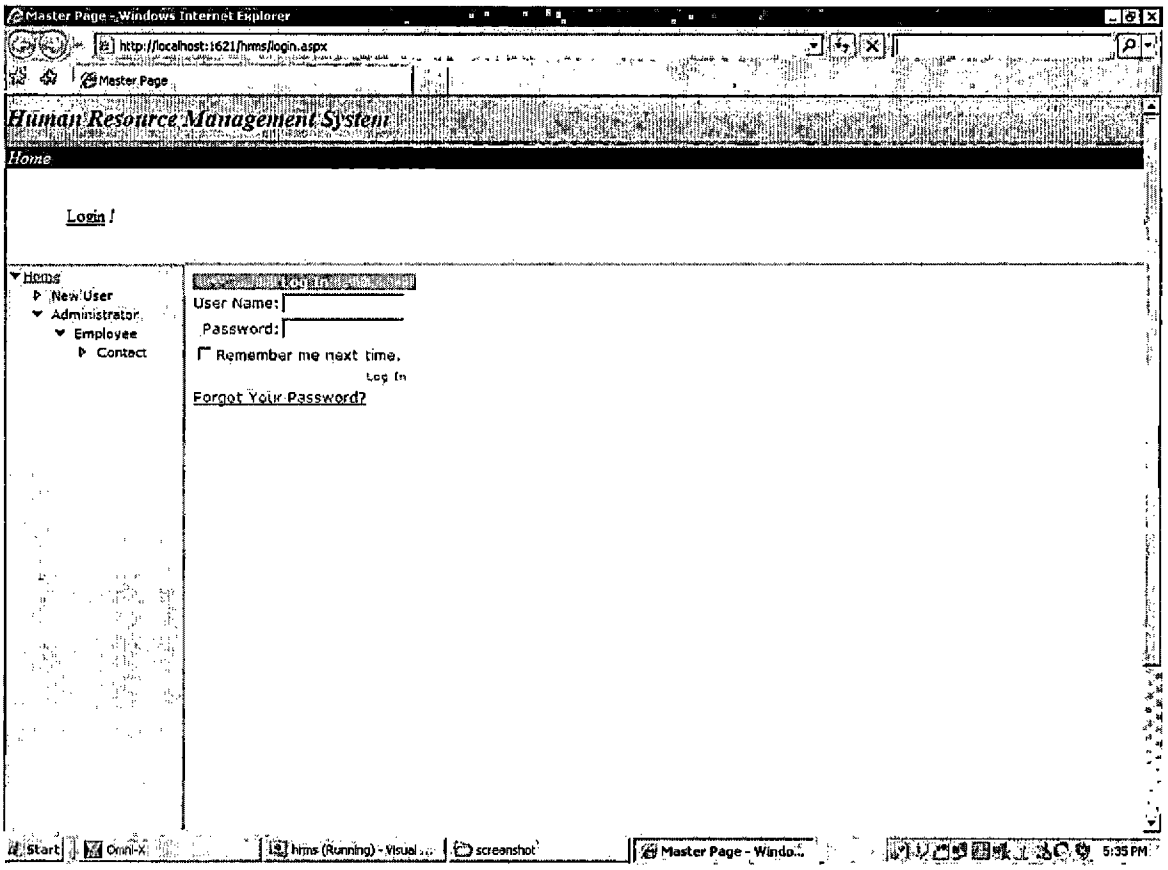


Figure 5. Login Page

4.1.2 Administrator Interface

The administrator interface is used to create new employee and update the tax tables for a new year. The Administrator will be responsible for all of the initial setup. The system is designed in a way that the administrator enters the new employee in the system and then a ticket number is emailed to employee, so an employee can further finish the registration process. The Second task is to update the tax table to maintain the accuracy of the system.

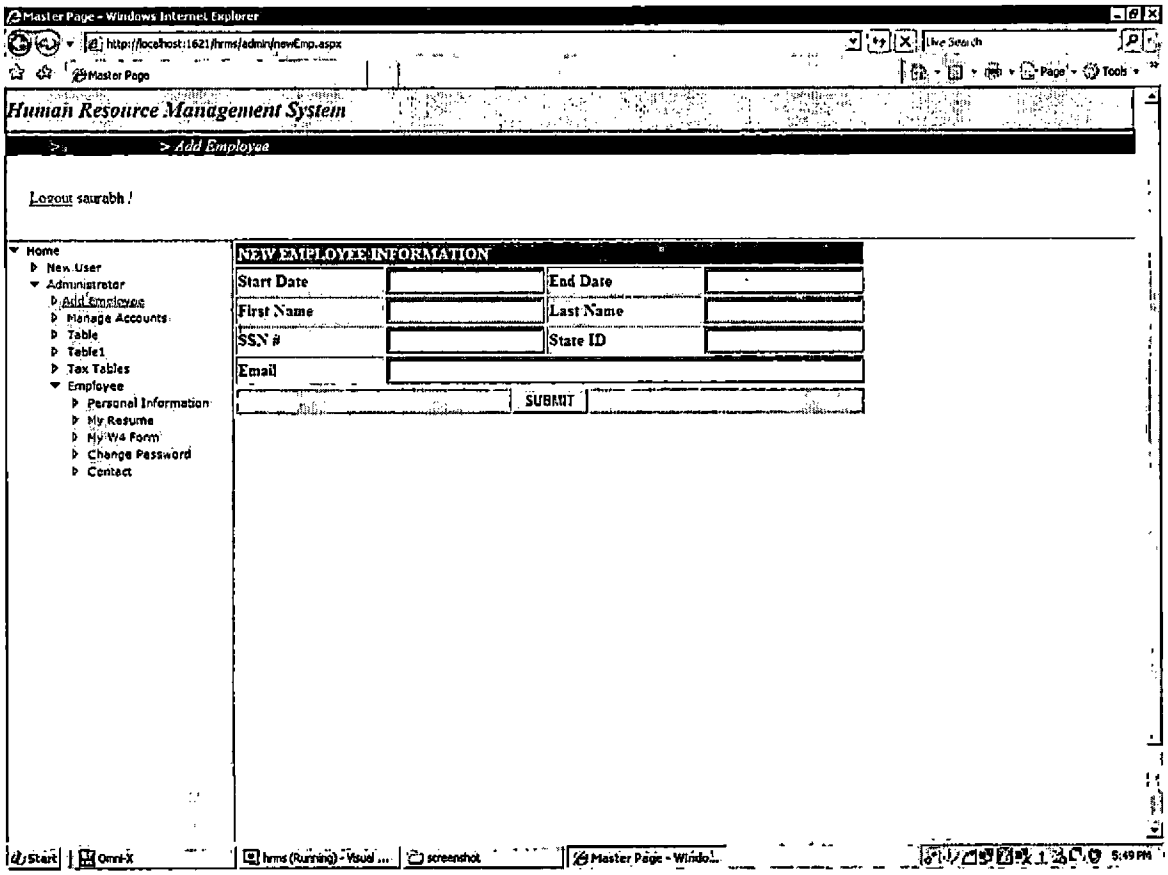


Figure 6. Administrator New Employee Interface

4.1.3 Employee Personal Information Form

This form is used to maintain the personal information of the employee. To create a new employee the administrator has to enter the employee in the system and the system will send the random ticket number to the employee email. The employee then goes the new employee form and enters the ticket number. The ticket number will be verified from the database and employee will go to the next page.

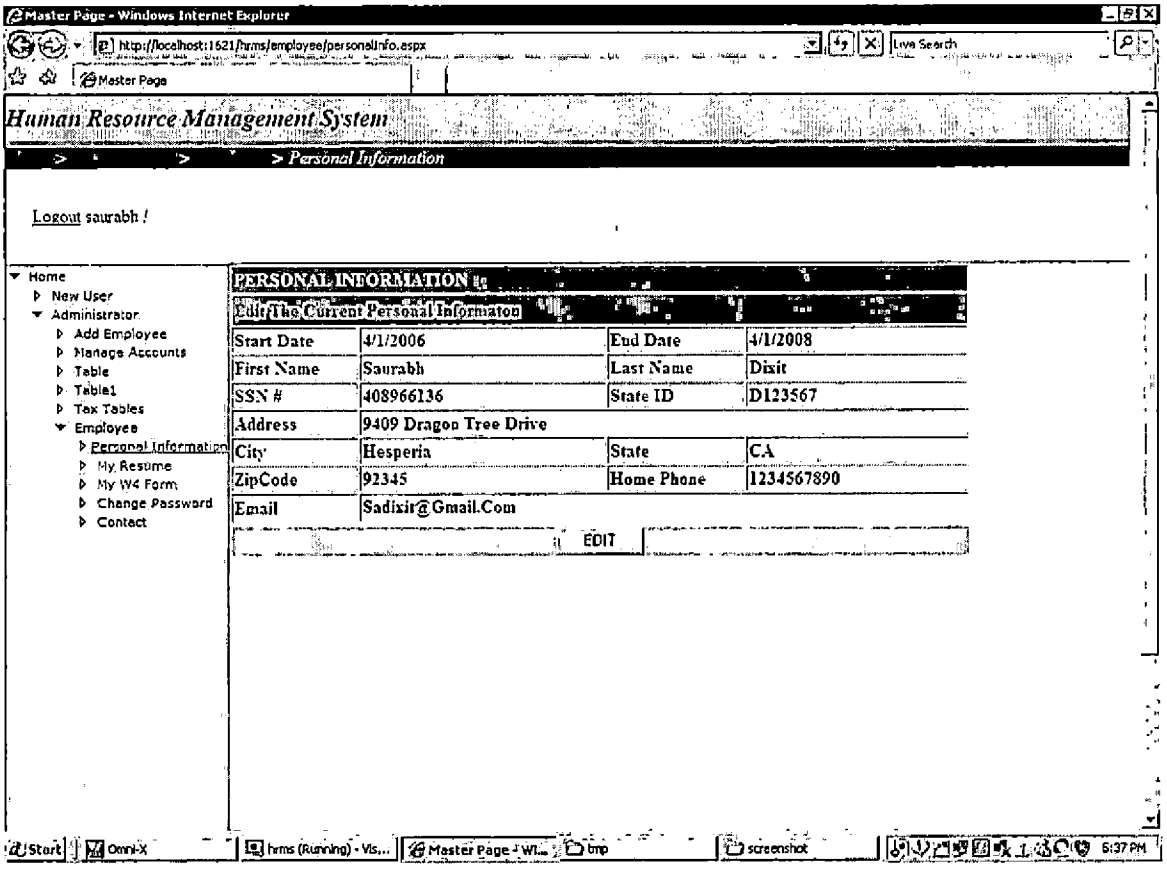


Figure 7. Employee Personal Information

4.1.4 Employee Resume Information

This form is used to maintain the last employer information and an education credentials which contains the employer name, start date, end date, address phone and description. The education credentials contain the skills, a drop-down menu to select the resent education credentials, accomplished and completion date. If the employee inserts the information first time then insert page will be displayed, otherwise data can be updated by update button.

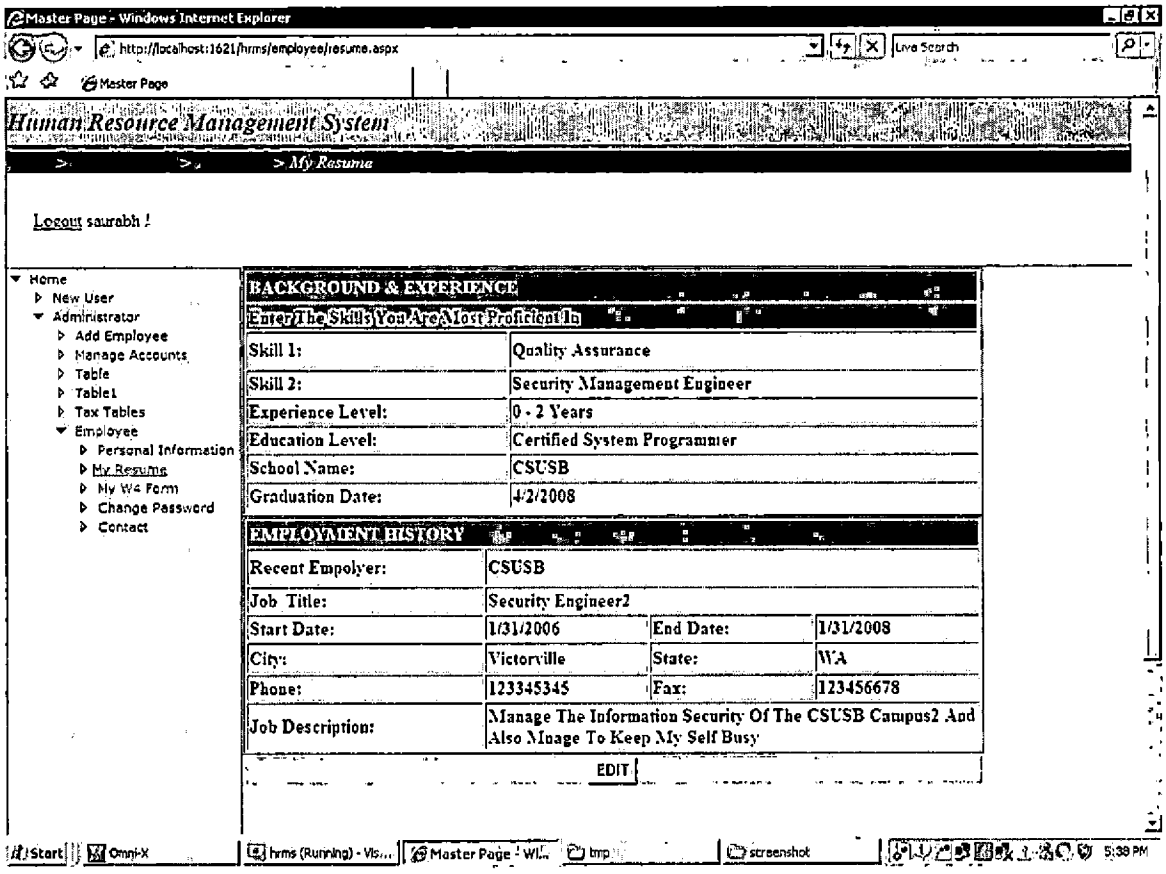


Figure 8. Employee Resume Information

4.1.5 W4 Form Withholding Allowance

This form will show you the final output of the W4 form. The output is calculated with the help of Personal Allowance Worksheet, W4B form and W4C form to get the total number of allowance and the total additional amount. The employee name, social security number and address displayed on this form with the help of database updated by the employee.

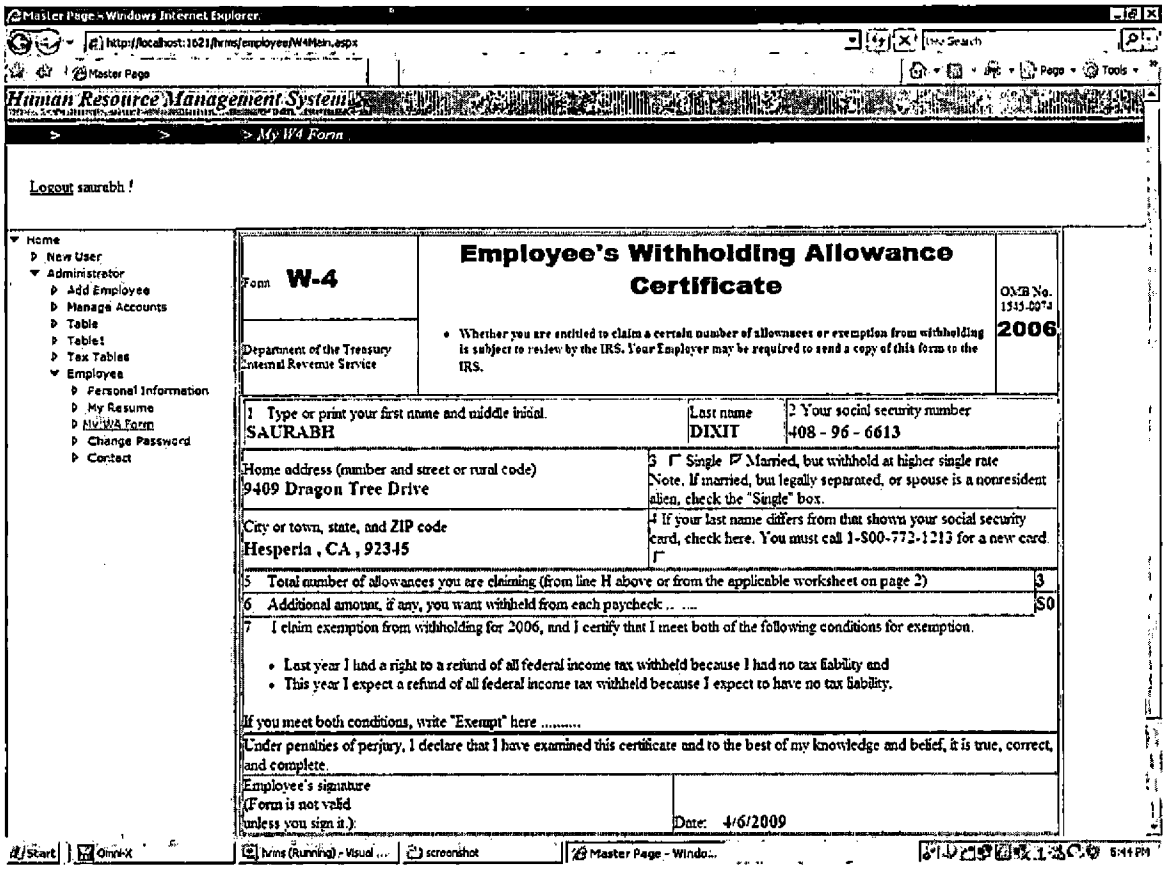


Figure 9. W4 Form - Withholding Allowance

4.1.6 W4 Form Personal Allowance

This form computes the total number of allowance. The total number of allowance will help in the computation of deduction and adjustment worksheet, two earners two job worksheet. It also helps to display the final values to fill the Employee Withholding Allowance Certificate.

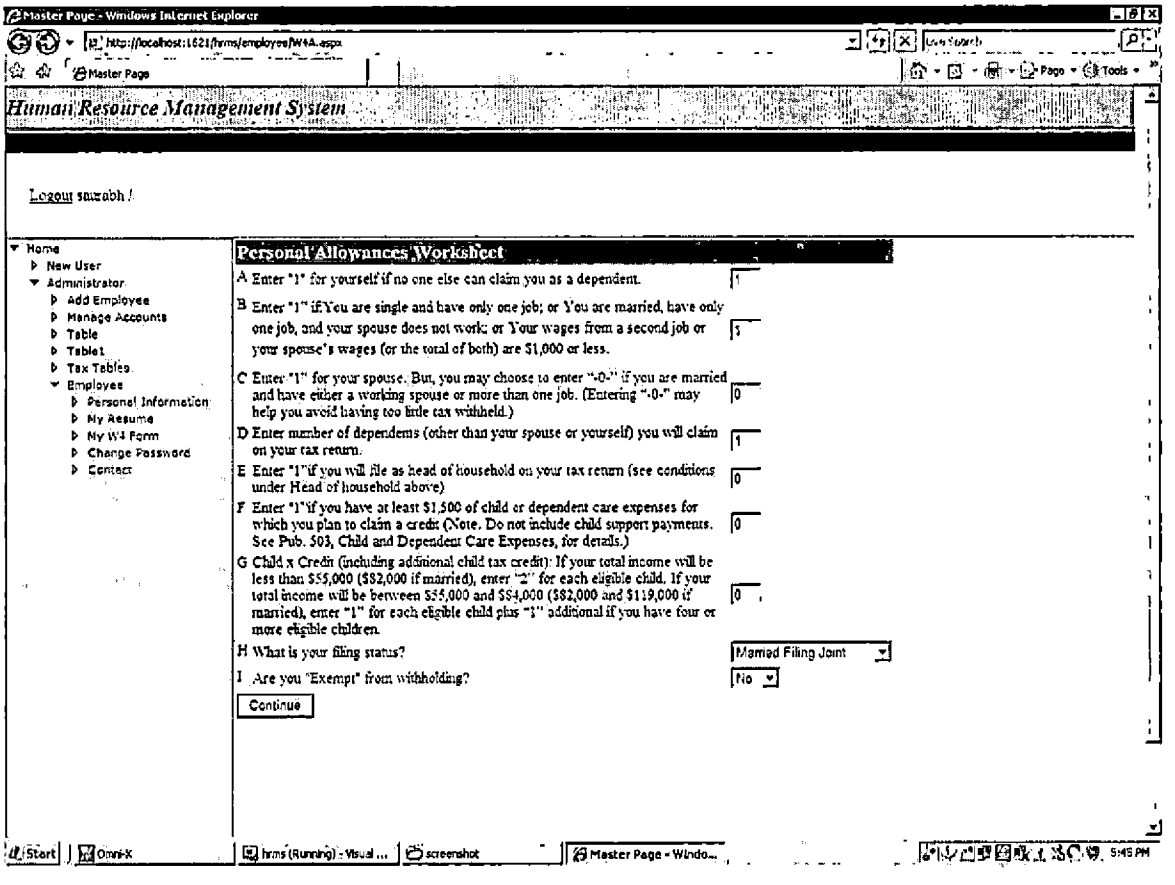


Figure 10. W4 Form - Personal Allowance

4.1.7 W4 Form Deduction and Adjustment

This form will help the employee to do itemized deductions. The itemized deduction help to do the computation of the deduction and adjustment worksheet, two earners two job worksheet and Personal Allowance Worksheet. It also helps to display the final values for the Employee Withholding Allowance Certificate.

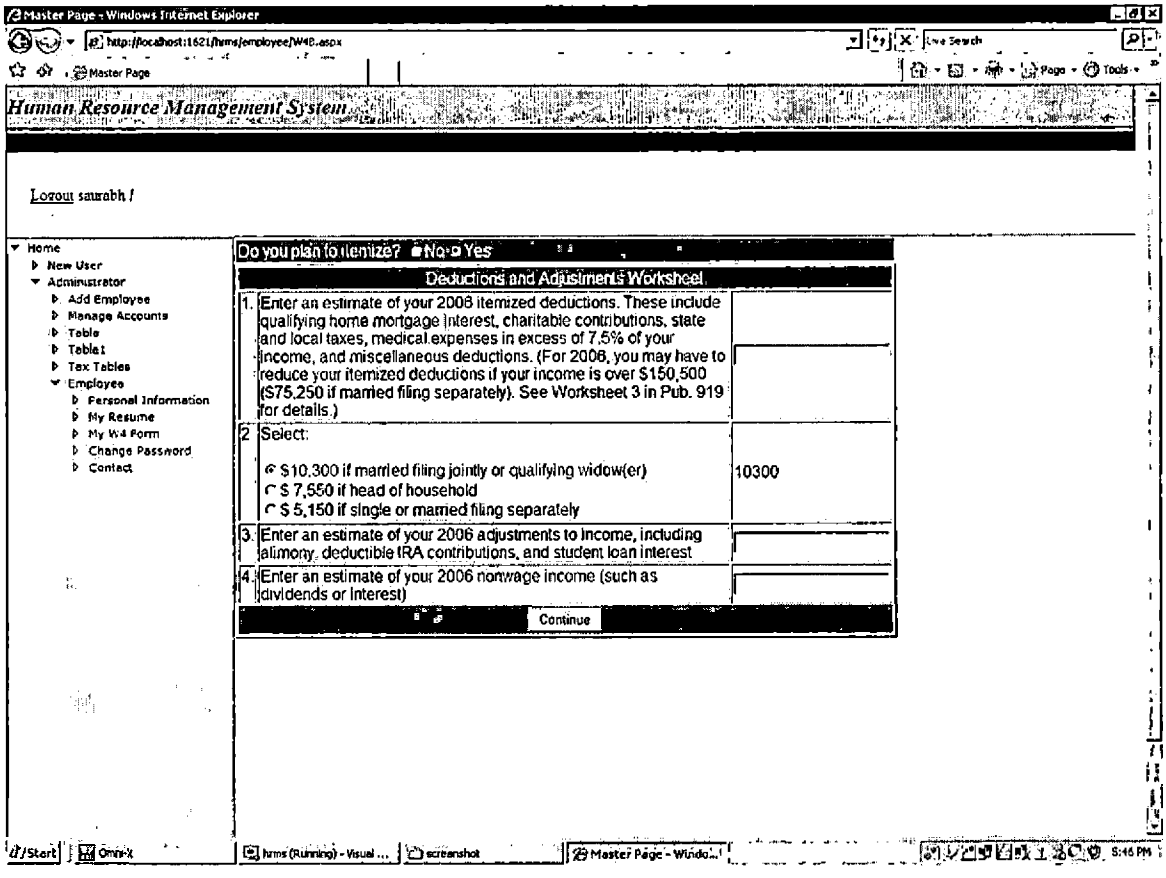


Figure 11. W4 Form - Deduction and Adjustment

4.1.8 W4 Form Two Earner Two Job

This form will be used if the employee and his/her spouse both are working. Then he/she can enter the high and the low salary to do the calculation to display the final values for the Employee Withholding Allowance Certificate.

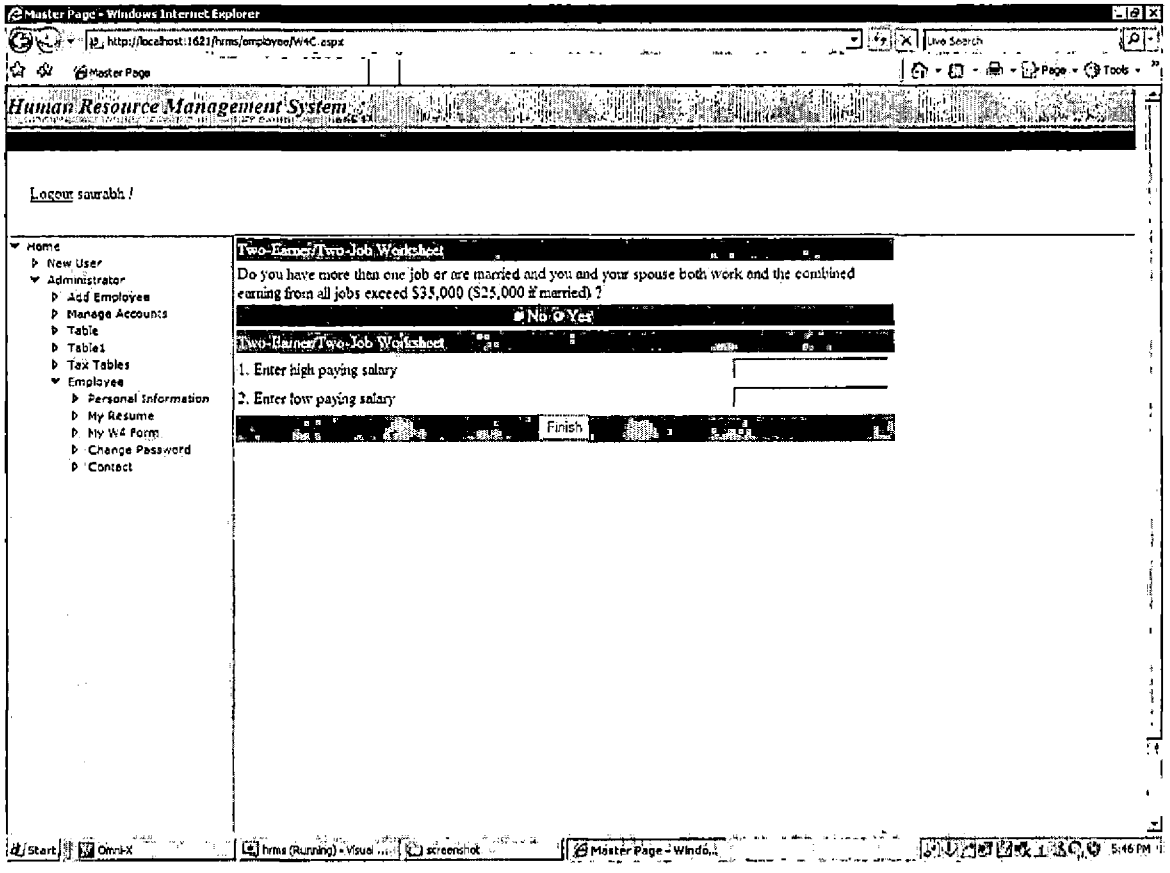


Figure 12. W4 Form - Two Earners and Two Job

4.1.9 Change Password Form

This form is used to change the employee login password. This form requires login to the employee account.

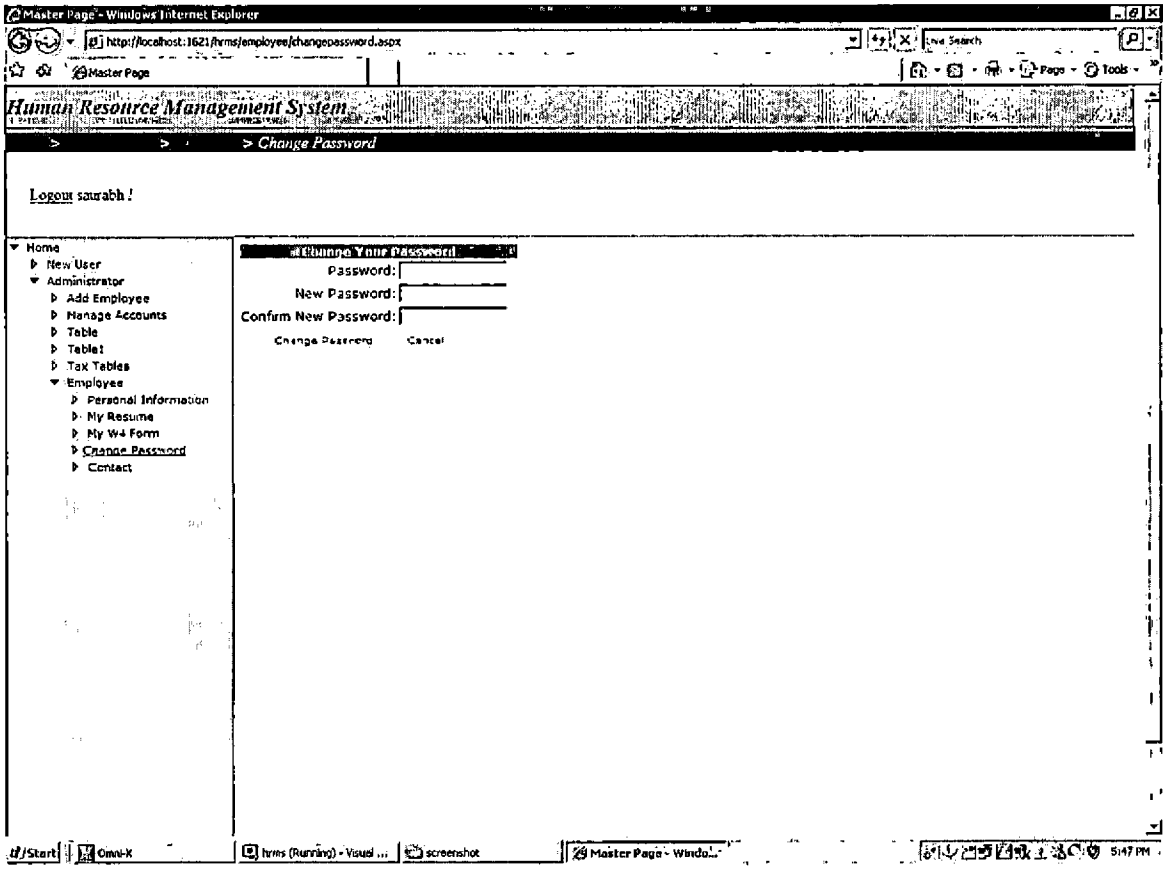


Figure 13. Change Password Form

4.1.10 Contact Form

This form is used to enter the name and email address to contact the administrator for questions and suggestions.

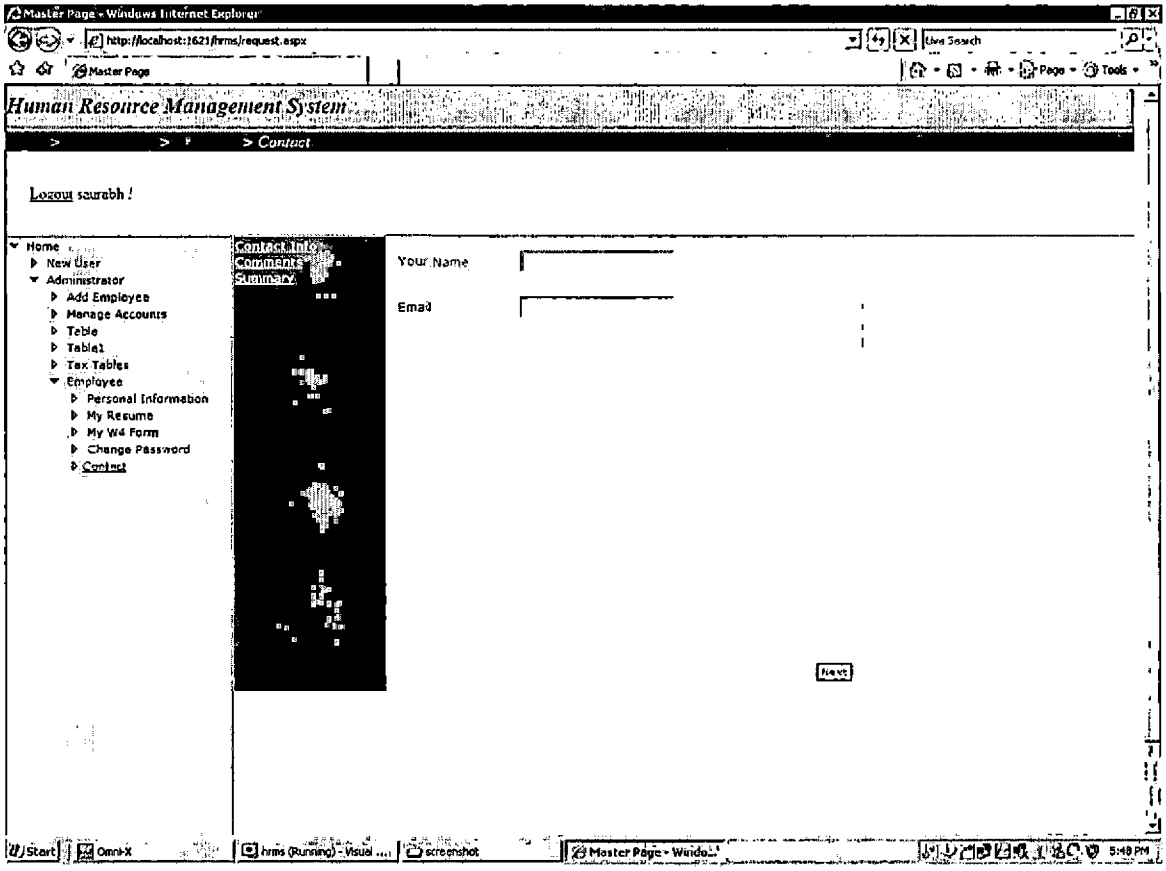


Figure 14. Contact Form

CHAPTER FIVE

SYSTEM VALIDATION

Various unit and system test were performed to check the performance and accuracy of the system. The system was found to be highly reliable and efficient

5.1 Unit Test

These tests were performed to validate the functionality of each form in the system. It was made sure that the form process and save the data correctly. The Output was checked for their consistency with the sample data. The detailed results of the test has been depicted in Table 6 and Table 7

Table 6. Unit Test Results (Forms)

Login Page	Check all the buttons work properly Check session is created Check error message are displayed Check form is redirecting to proper page	Pass
Personal	Verify data is saved correctly	Pass

Informatio n	Check links are working Check scripts Check error messages are displayed	
Resume Informatio n	Verify data is saved correctly Check links are working Check drop-down menu is populated correctly. Check error messages are displayed	Pass
W4 Form	Verify data is saved correctly Check links are working Check scripts Check error messages are displayed	Pass
W4A	Verify data is saved correctly Check links are working Check scripts for calculation Check error messages are displayed	Pass
W4B	Verify data is saved correctly Check links are working Check scripts for calculation Check error messages are displayed	Pass
W4C	Verify data is saved correctly Check links are working	Pass

	Check scripts for calculation Check error messages are displayed	
W4Main	Verify data is saved correctly Check links are working Check scripts for calculation Check error messages are displayed Verify the output calculation are correct	Pass
Contact Information	Administrator should receive email Check links are working Check error messages are displayed	Pass
Administrator Page	Verify data is saved correctly Check links are working Email should be sent to new employee Check error messages are displayed	Pass
Tax Tables	Verify data is saved correctly Check links are working Validate list Check error messages are displayed	Pass

Table 7. System Test Results

Installation of the system on IIS	PASS
Running of system on NETSCAPE browser	PASS
Running of system on EXPLORER browser	PASS
Startup database on SQL Server	PASS
Real data test on all forms	PASS

CHAPTER SIX

MAINTENANCE MANUAL

Like any good system, Human Resource Management System requires particular maintenance. The organization that uses it must appoint an administrator who can be made responsible for this. This chapter can guide the administrator on installation of the system and the data backup.

6.1 Installation

6.1.1 Installing System on Web Server

To install the system on IIS, the following steps must be performed.

- Install the IIS on the machine using the IIS documentation.
- Make sure that the .Net platform is installed on the machine.
- Copy all the ASPX files into the root directory.
- Copy the application DLL and PDB files into the root directory.
- Go to IIS administrator tools and change the properties of the HRMS project to "application."

- Test for the login page using the browser.

6.1.2 Installing Database

The following steps should be performed to create a database on the Structured Query Language Server 2005.

- Create a new database in the using SQL Manager (use the manual that comes with SQL server 2005). Name the database "DBNAME."
- Import all the data definitions from the existing database.
- Open the web.config file and point the data source to the required server.
- Test the connection using the login Page.

6.2 Backup

6.2.1 Database Backup

The data must be backed up onto the external media periodically, so that it can be recovered in case something happens to the main database. To backup the database, follow the instructions given in the SQL manual. If required, data can be then restored from this location at a later stage.

6.2.2 System Backup

It is quite important to have a backup copy of the whole system. To do so, the administrator must make a copy of all the ASPX files, ALL and PDL files and save them in the external media. In case something happens to the existing system, the admin can be easily restore the system from the backup.

CHAPTER SEVEN

CONCLUSION AND FUTURE DIRECTIONS

7.1 Conclusion

Human Resource Management System is a very good tool for medium to large scale organization. Using this tool, organizations can keep better track of their employees. The ability to perform W4 calculations will minimize the tremendous time of an employee to calculate the number of allowance in the W4 Form. This can also be used to track the employees for internal hiring and match the required skills.

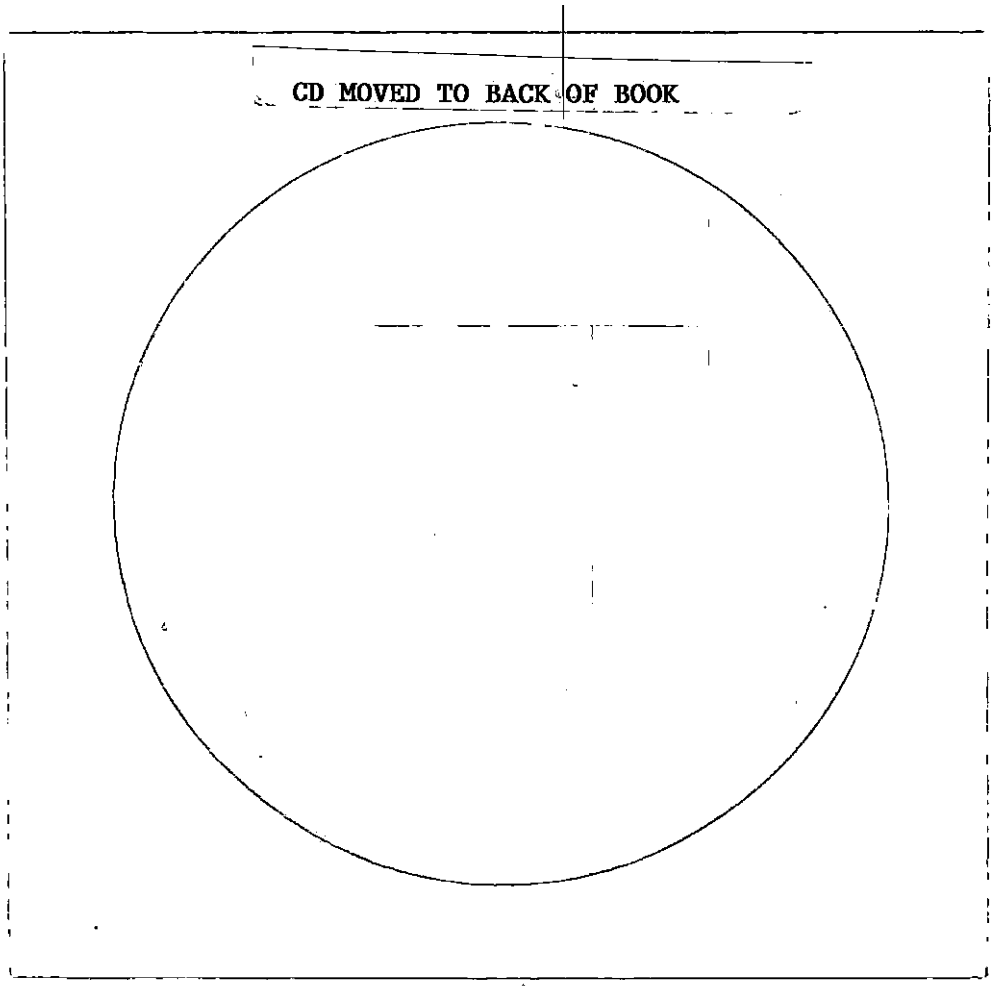
7.2 Future Directions

Human Resource Management System has come long way to take one step into the future by going from manual to web-based system. There is still a lot that can be done to improve the system. One of the immediate enhancements include the incorporating the ability to print filled W4 Form. Another enhancement could be the payroll system, so the administrator can print the payroll checks. HTTPS can be configured to guard against exposure of sensitive data by packet sniffing attacks. For better security the

administrator can use an encrypted database to protect the sensitive data.

APPENDIX A

SOURCE CODE CD ATTACHED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