ONLINE BILLBOARD

By

VIKRAM KUMAR KONDAPANENI

B.TECH, ACHARYA NAGARJUNA UNIVERSITY, 2007

A REPORT

Submitted in partial fulfillment of the requirements for the degree

MASTER OF SCIENCE

Department of Computing and Information Sciences
College of Engineering

KANSAS STATE UNIVERSITY
Manhattan, Kansas

2010

Approved by:

Major Professor
Mitchell Neilsen, PhD

Abstract

The Online Billboard Application provides different kinds of facilities to the users like education, rental, real estate, employment opportunities, cinema, used cars, etc. Administrator adds, modifies and deletes the different categories of information. The application provides an interactive interface through which a user can interact with different areas of the application easily. A report generation feature is provided using Crystal Reports to generate reports based on the criterion of the users. The user can search whether the vacancies are there or not in different courses in different colleges. The rental details of houses in different areas will be provided for the user based on the user's search criteria. The lands information which will be sold in different areas is provided in the Real Estate category. The user can search for different Movies information for booking. The Used-Cars details will also be provided for the user. The information of Vacancies in different companies will be provided for the user based on their search criteria. The working of the application is made convenient and easy to use for the end user.

Table of Contents

List of Figures v
List of Tables vi
Acknowledgements vii
CHAPTER 1 - Introduction 1
1.1 Goal 1
1.2 Need of the application 1
1.3 Scope 2
1.4 Platform specifications – Deployment 2
1.4.1 Hardware specification 2
1.4.2 Software specification 2
CHAPTER 2 - System Requirement Analysis 3
2.1 Features of the system 3
2.2 System Feasibility 4
2.2.1 Economic Feasibility 4
2.2.2 Technical Feasibility 4
2.2.3 Behavioral Feasibility 4
CHAPTER 3 - System Analysis 5
3.1 Class diagram 5
3.2 Dataflow diagram 6
3.3 Use case diagram 11
CHAPTER 4 - Design 13
4.1 Design Goals 13
4.2 Modular approach 13
4.2.1 Administrator 13
4.2.2 User/Customer 13
4.2.3 Reports 13
4.2.4 Search 13
CHAPTER 5 - Implementation 14

5.1 Database design and implementation 14
5.2 User interface design and implementation..... 14
CHAPTER 6 - Testing 22
6.1 Unit testing..... 22
6.2 White Box testing 22
6.3 Performance Testing 23
CHAPTER 7 - Results 26
CHAPTER 8 - Challenges 27
CHAPTER 9 - Conclusions 28
CHAPTER 10 - References 29

List of Figures

Figure 3.1 Class Diagram 5
Figure 3.2 Dataflow Diagram for admin activities 6
Figure 3.3 Second level DFD for admin activities 7
Figure 3.4 User registration diagram 8
Figure 3.5 User activity diagram 9
Figure 3.6 Second level DFD for user activities 10
Figure 3.7 Use case diagram 11
Figure 5.1 Database diagram 14
Figure 6.1 Report for 100 users with loop count 150 23

List of Tables

Table 6.1 Performance with constant users 24
Table 6.2 Performance with constant loop count..... 25

Acknowledgements

I would like to thank my major professor Dr. Mitchell Neilsen for his constant guidance and help throughout the project. I would also like to thank Dr. Torben Amtoft and Dr. Gurdip Singh for graciously accepting to be on my committee.

Finally I would like to thank my family and friends for all the support and encouragement.

CHAPTER 1 - Introduction

1.1 Goal

Classifieds serves various purposes for users. The goal of this application is to develop a classifieds website for online users. The system would be easy to use and serves the different requirements of the users. The goal of this application is

- To develop an easy to use web based interface where users can find complete information on different categories of their needs. The user can further filter the list based on various parameters.

- An AJAX enabled website with the latest AJAX controls giving attractive and interactive look to the web pages and prevents the annoying post backs.

1.2 Need of the application

It is a limited system. Searching for particular information is critical and it takes a lot of time. The user has to browse different websites to get required information which is a time taking process.

Problem

- The user has to browse different portals to get different categories information.

- The basic problems with the existing systems are the non-interactive environment they provide to the users.

- The use of traditional user interfaces which make continuous post backs to the server; each post back makes a call to the server, gets the response and then refreshes the entire web form to display the result. This scenario adds an extra trade off causing a delay in displaying the results

- A search engine that would display the results without allowing the users to further filter the results based on various parameters.

- Use of traditional and non user friendly interfaces that are hard to use.

Solution

- It is online portal for providing different categories of information like education, rental, real estate, movies, Cars and scenario of jobs.
- It provide interactive interface through which a user can interact with different areas of application easily.
- The users of this application can easily feel the difference between the Ajax empowered user interfaces vs. traditional user interfaces.
- Report generation feature is provided using crystal reports to generate reports based on the criterion of the users.

1.3 Scope

- The current system can be extended to allow the users to place an advertisement, add information in addition to view the information.
- The administrator has to authority to validate, approve or cancel the advertisement placed by the user.

1.4 Platform specifications – Deployment

1.4.1 Hardware specification

Processor - P IV
RAM - 250 MB
Minimum space required - 100 MB
Display - 16 bit color

1.4.2 Software specification

Operating environment - Windows XP/ Vista
Platform - .Net framework and IIS visual studio 2008
Database - MS SQL server 2008

CHAPTER 2 - System Requirement Analysis

2.1 Features of the system

The application has to provide different kinds of facilities to the users like Education, Rental, Real estate, Situations vacant, Sunday cinema, Wheels used cars, Job scenario. The application saves a lot of time and makes their search easy.

- Administrator adds, modifies and deletes the different categories information.
- Individual profile management for all users.
- The user can search whether the vacancies are there or not in different courses in different colleges.
- The rental details of houses in different areas will be provided for the user based on the user's search criteria.
- The lands information which will be sold in different areas is provided in Real Estate category.
- The user can search for different Movies information for booking.
- The Used-Cars details will also be provided for the user.
- The information of Vacancies in different companies will be provided for the user based on their search criteria.

The working of the application is made convenient and easy to use for the end user. Along with this, a lot of research on various other methods of building this application is done and to a few stronger features were added to the application [1]. The tools and controls used in the application are recommended ASP.NET controls and AJAX Toolkit controls which improves the navigation and usability and interactivity [5].

2.2 System Feasibility

The system's feasibility can be divided into economic feasibility, technical feasibility and behavioral feasibility.

2.2.1 Economic Feasibility

The project is economically feasible as the only cost involved is having a computer with the minimum requirements mentioned earlier. For the users to access the application, the only cost involved will be in getting access to the Internet.

2.2.2 Technical Feasibility

To deploy the application, the technical aspects needed are mentioned below:

Operating Environment Win 2000/XP

Platform .Net Framework & IIS

Database SQL Server 2008

For Users:

Internet Browser

Internet Connection

2.2.3 Behavioral Feasibility

The application requires no special technical guidance and all the views available in the application are self explanatory. The users are well guided with warning and failure messages for all the actions taken.

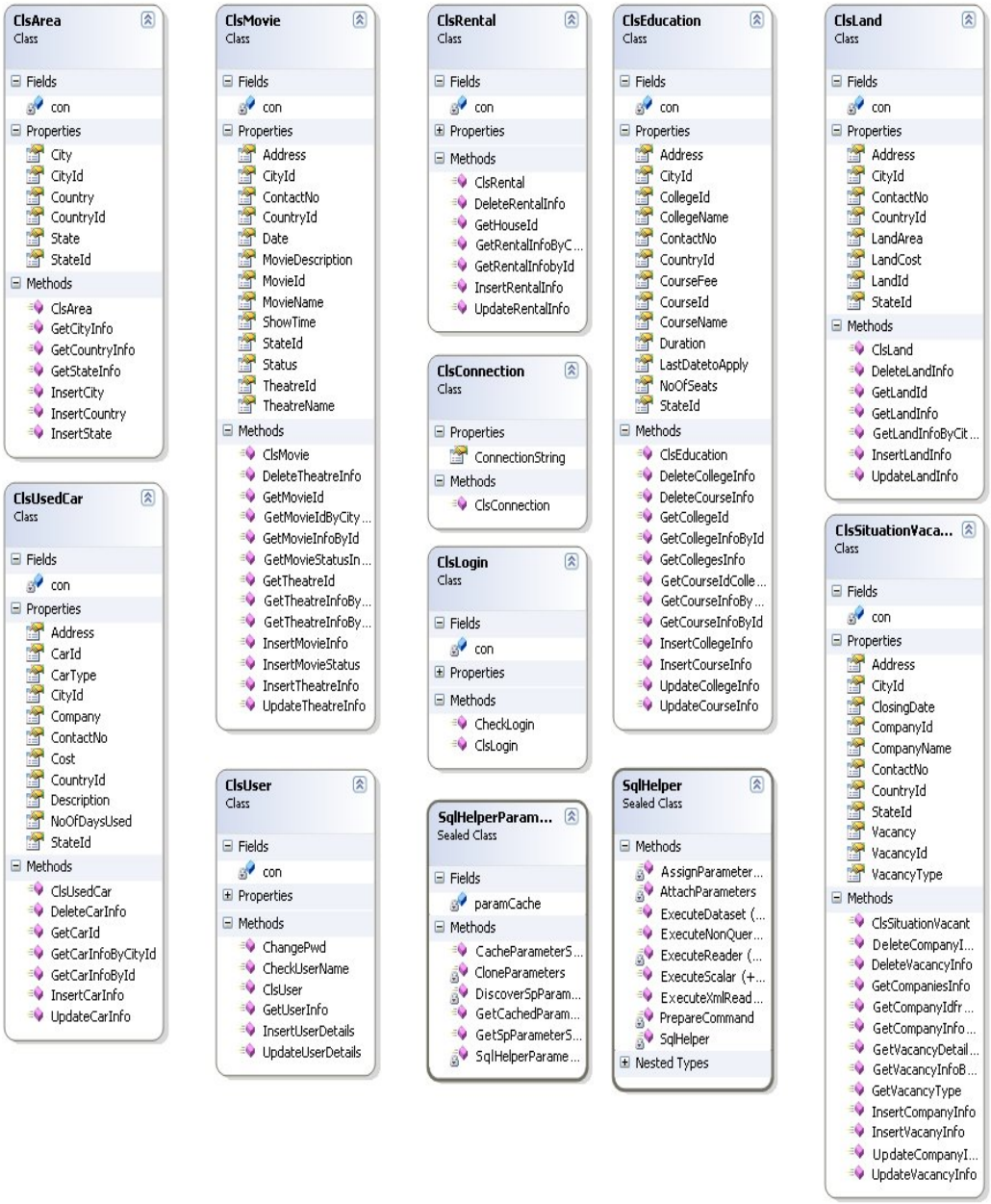
CHAPTER 3 - System Analysis

Two diagrams are presented after analyzing the requirements and functionality of the web application. They are ER diagram and dataflow diagram which helps to find out entities and relationships between them, the flow of information [4].

3.1 Class diagram

The class diagram in the figure 1 consists of 12 classes.

Figure 3.1 Class Diagram

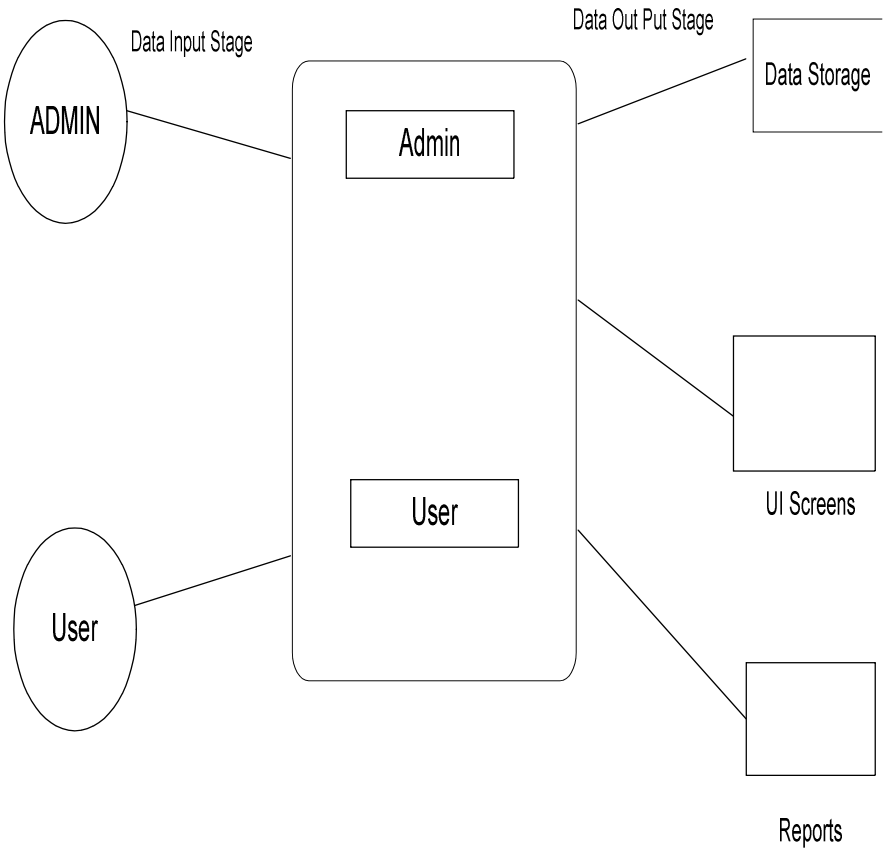


3.2 Dataflow diagram for admin activities

Context level diagram

The First level admin activities diagram in figure 2 gives the scenario of user and admin in the application.

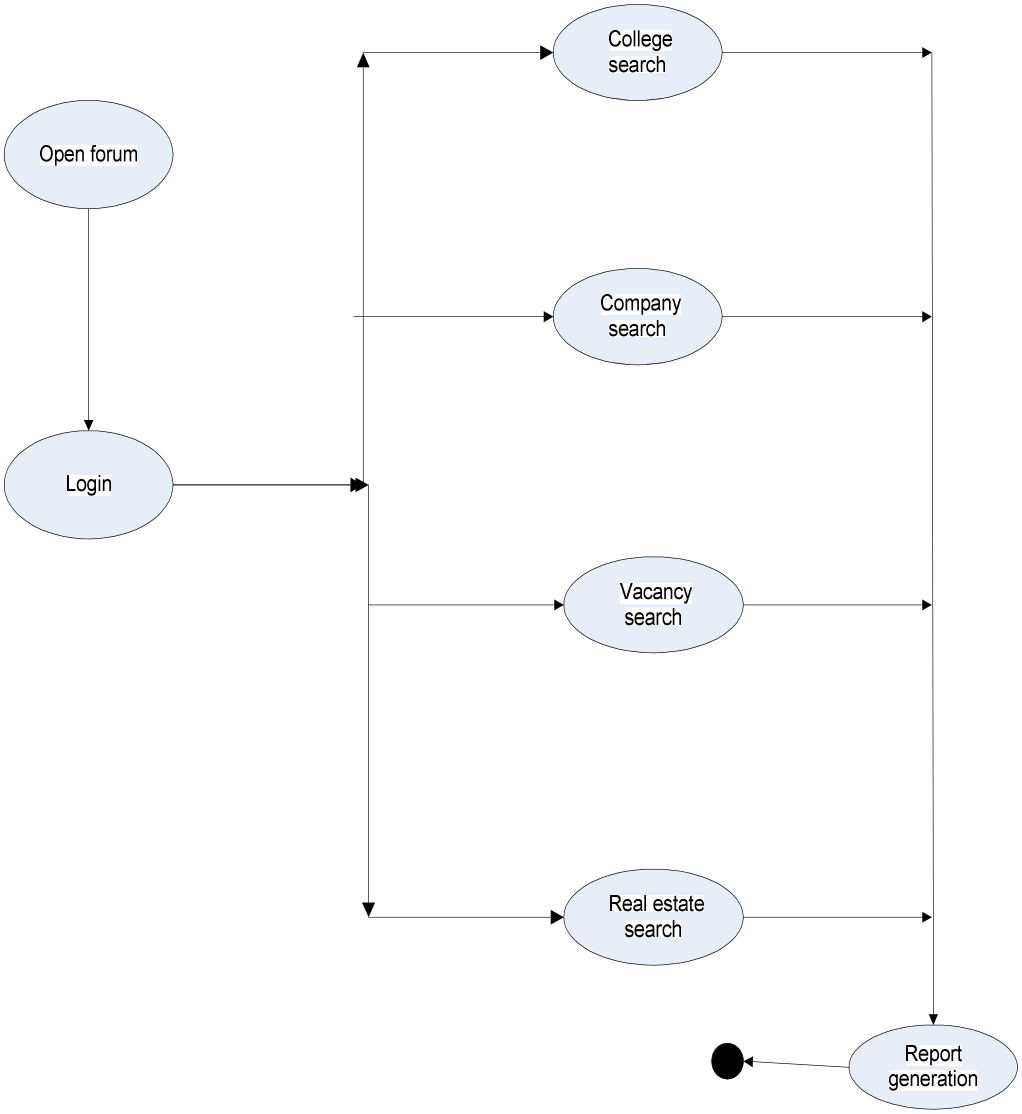
Figure 3.2 Dataflow Diagram for admin activities



3.3 Second level DFD for admin activities

Second level admin activities diagram in figure 3.3 consists of admin managing various modules.

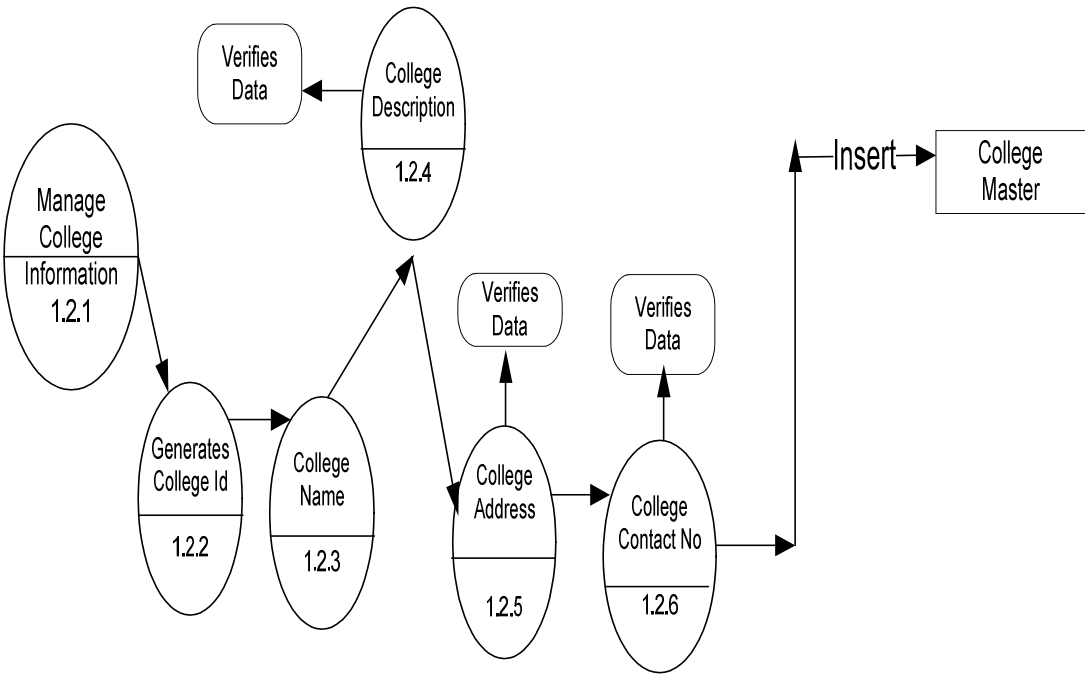
Figure 3.3 Second level DFD for admin activities



3.4 User registration diagram

User registration diagram in figure 4 explains about user registration process.

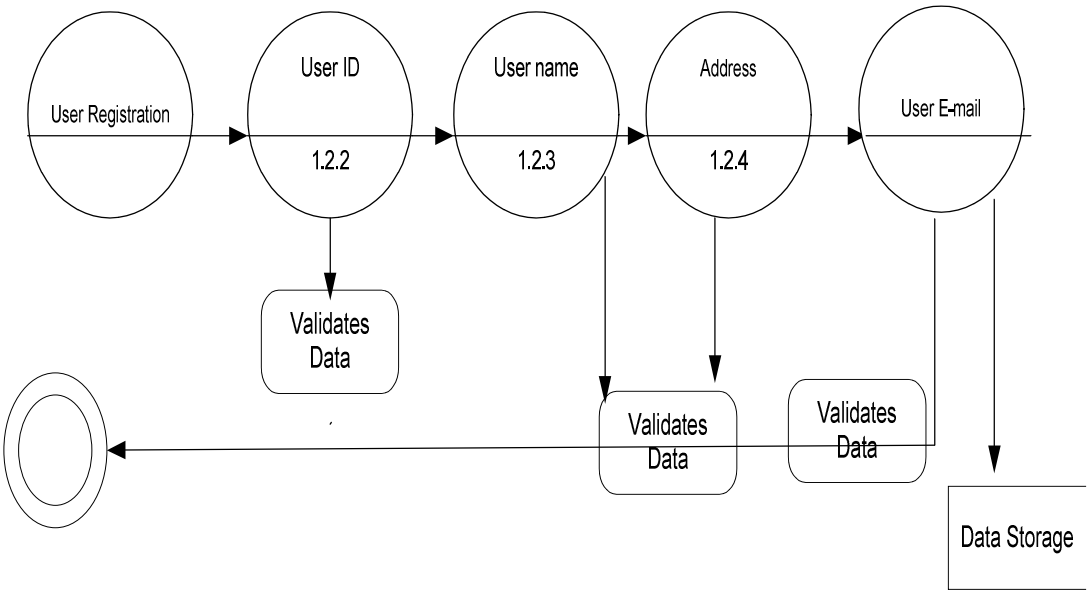
Figure 3.4 User registration diagram



3.5 User activity diagram

User activity diagram in figure 3.5 explains the user activities.

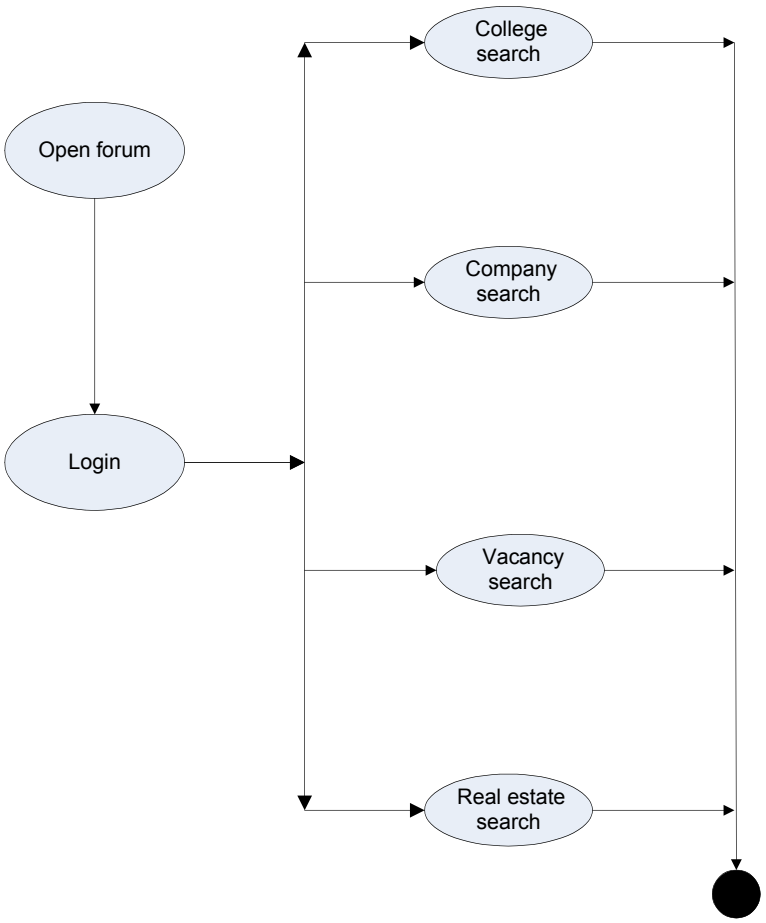
Figure 3.5 User activity diagram



3.6 Second level DFD for user activities

User activity diagram of second level in the figure 6 consists of user using various modules.

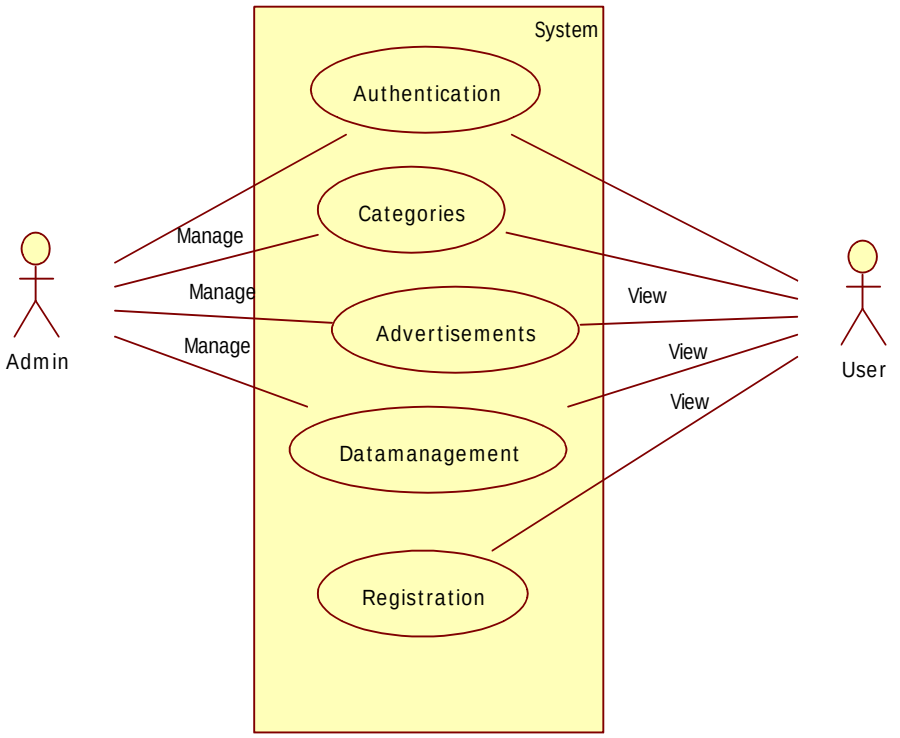
Figure 3.6 Second level DFD for user activities

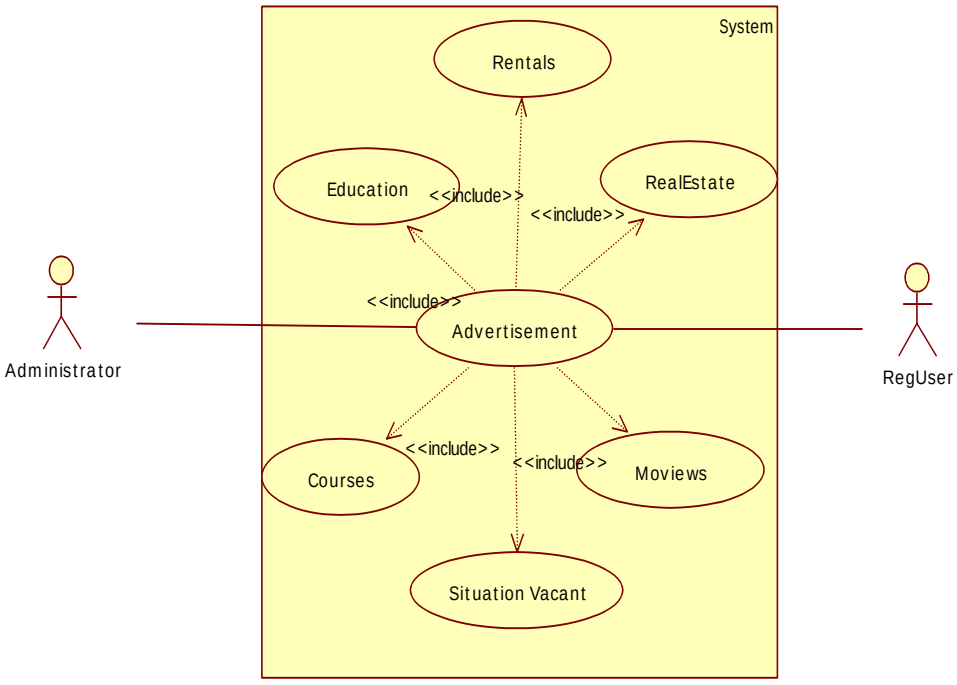


3.7 Use case diagram

The use case diagram in figure 7 gives the various actions done by administrator and user.

Figure 3.7 Use case diagram


System
Authentication
Categories
Advertisements
Datamanagement
Registration
Admin
User
Manage
Manage
Manage
View
View
View


System
Rentals
Education
RealEstate
<<include>>
<<include>>
<<include>>
Advertisement
Courses
Moviews
Situation Vacant
<<include>>
<<include>>
Administrator
RegUser

CHAPTER 4 - Design

4.1 Design Goals

- The design of the web application involves the design of the forms for various categories of information and displays the complete specification.
- Design of an interactive application that enables the user to filter the categories based on different parameters.
- Design of an application that has features like drag and drop etc.
- Design of application that decreases data transfers between the client and the server.

4.2 Modular approach

Modular approach is used [2]. The various modules are

4.2.1 Administrator

Administrator is a super user treated as owner of this site who has all the privileges. He can manage all the information which has to be provided to the user.

4.2.2 User/Customer

This module illustrates about customers and their responsibilities while accessing the application. User can view all advertisements and information of different categories provided by administrator. He can also search the information of different categories.

4.2.3 Reports

In this module administrator will get different types of reports regarding customers, advertisements etc and this module is controlled by administrator only.

4.2.4 Search

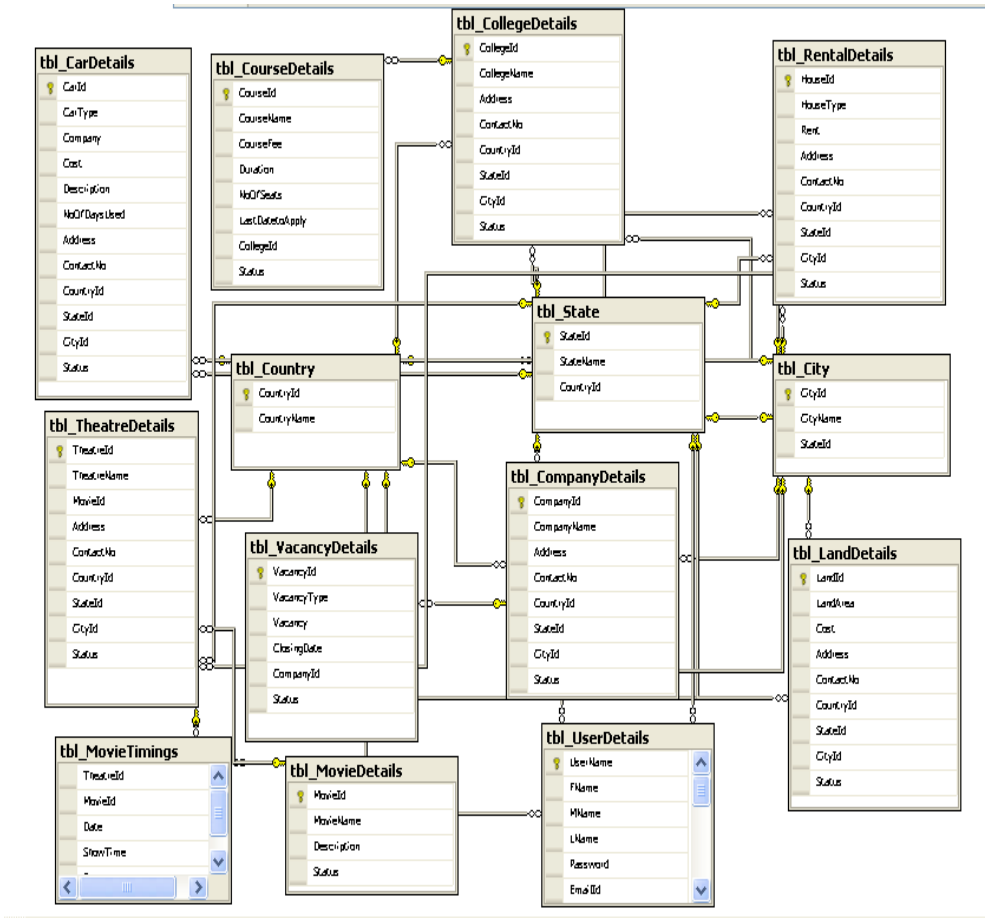
Search is a module used by all the users. Administrator can search customer details, advertisement type, advertisement details etc. Customer can able to search various types of advertisement details.

CHAPTER 5 - Implementation

5.1 Database design and implementation

The design of database is similar to the analysis phase. The database has been developed using SQL server 2008 [4].

Figure 5.1 Database diagram



These are main tables in the application and others are lookup and query tables. The tables are derived from class diagram.

5.2 User interface design and implementation

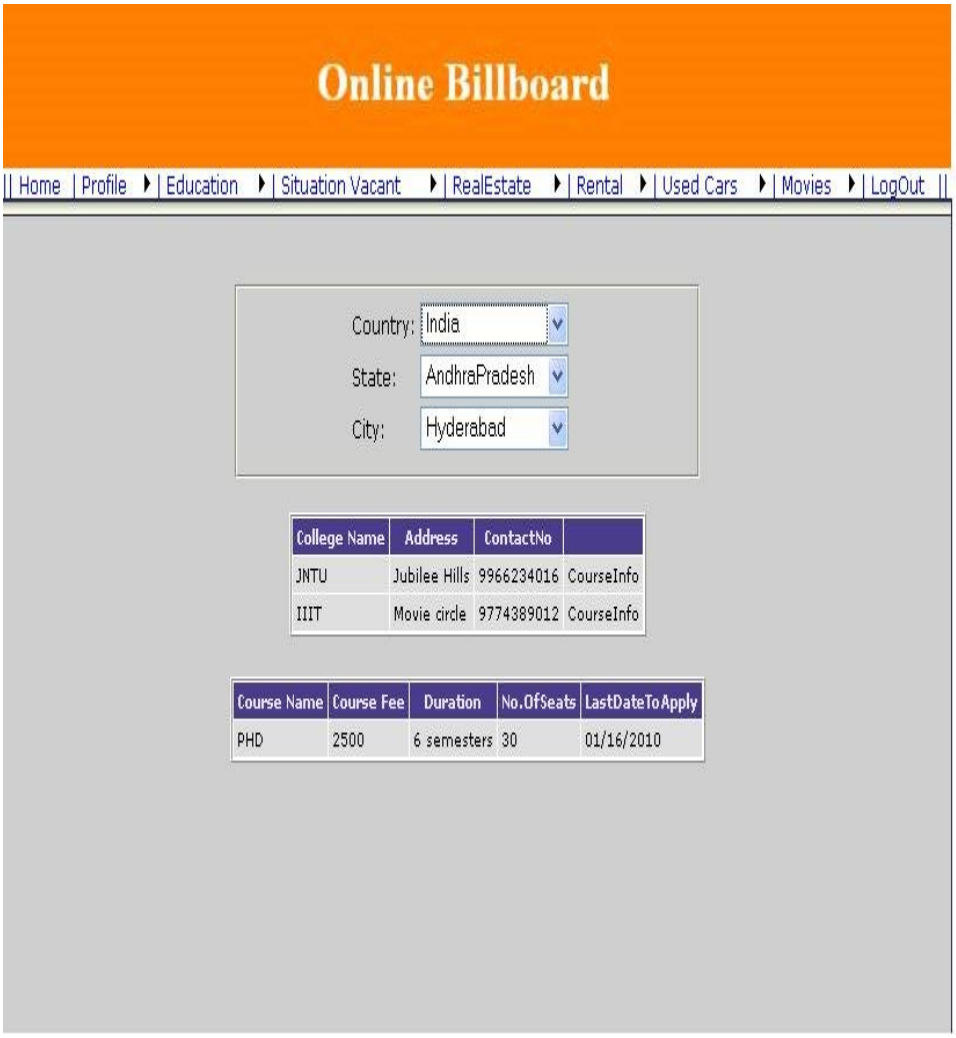
The user interface of the application has been designed using Microsoft Visual Studio 2008[1]. The main controls used in the design are repeaters and Ajax toolkit controls [5].

Home Page

The home page gives the aim of the application and an insight into different options available.

Education Page

The education page gives the details of various colleges present in a city along with information about course it offers, fee, duration, deadline, number of seats.

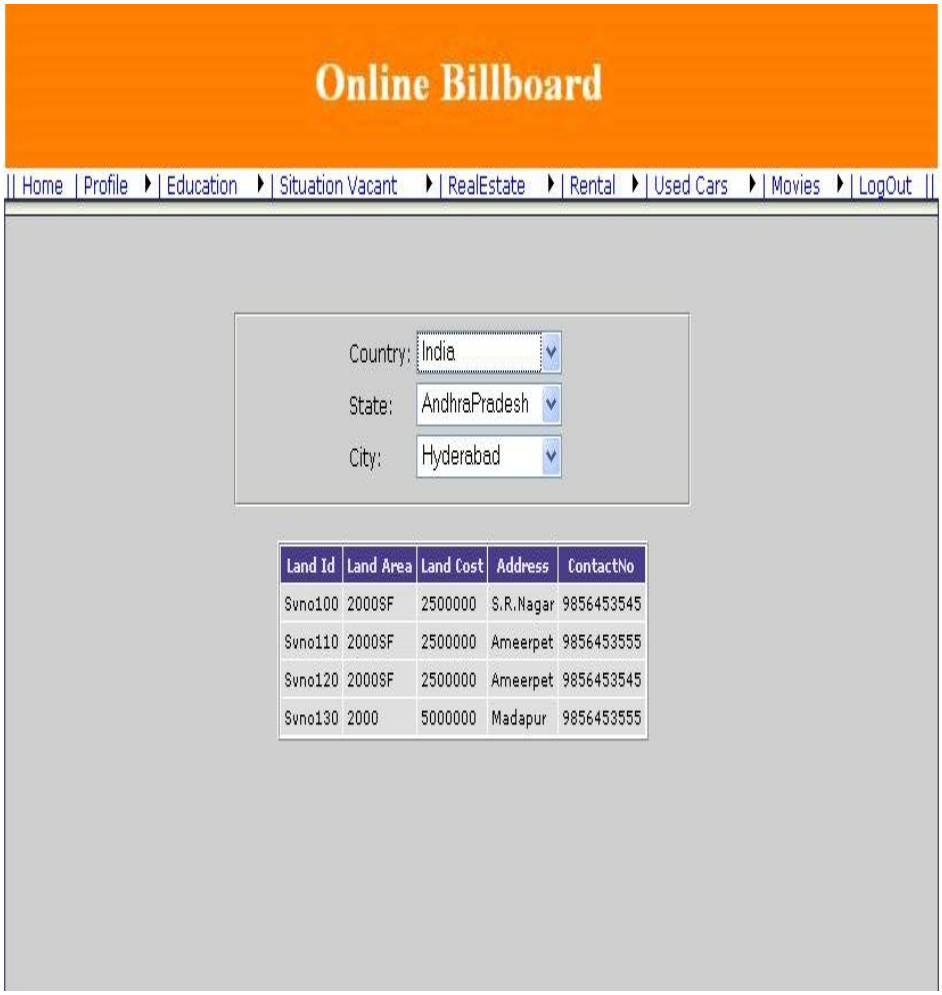


Vacancy Page

The vacancy page gives details of various companies offering jobs, type of job, position, deadline to apply and contact information.

Real estate Page

The Real estate page gives details of land identification number, its area, and cost, address and contact information.

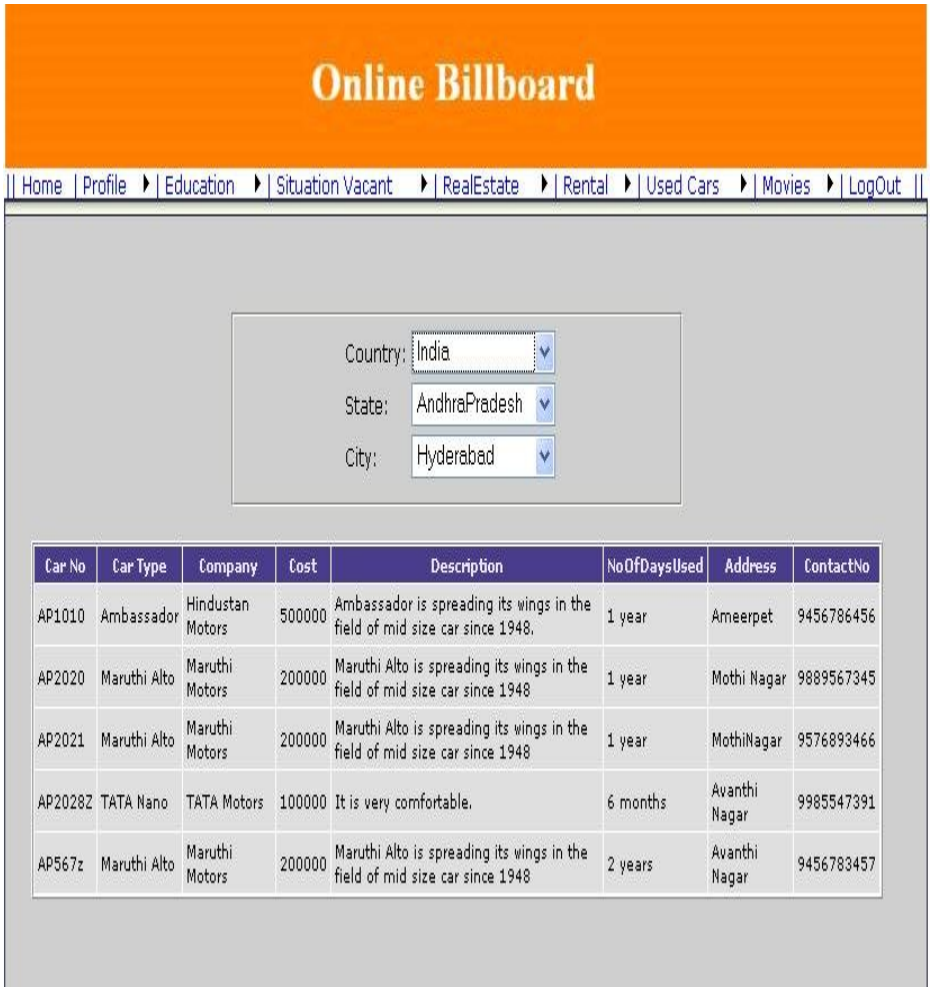


Rental Page

The rental page gives the details of type of house, rent, address and contact information in a particular city of a state.

Car Page

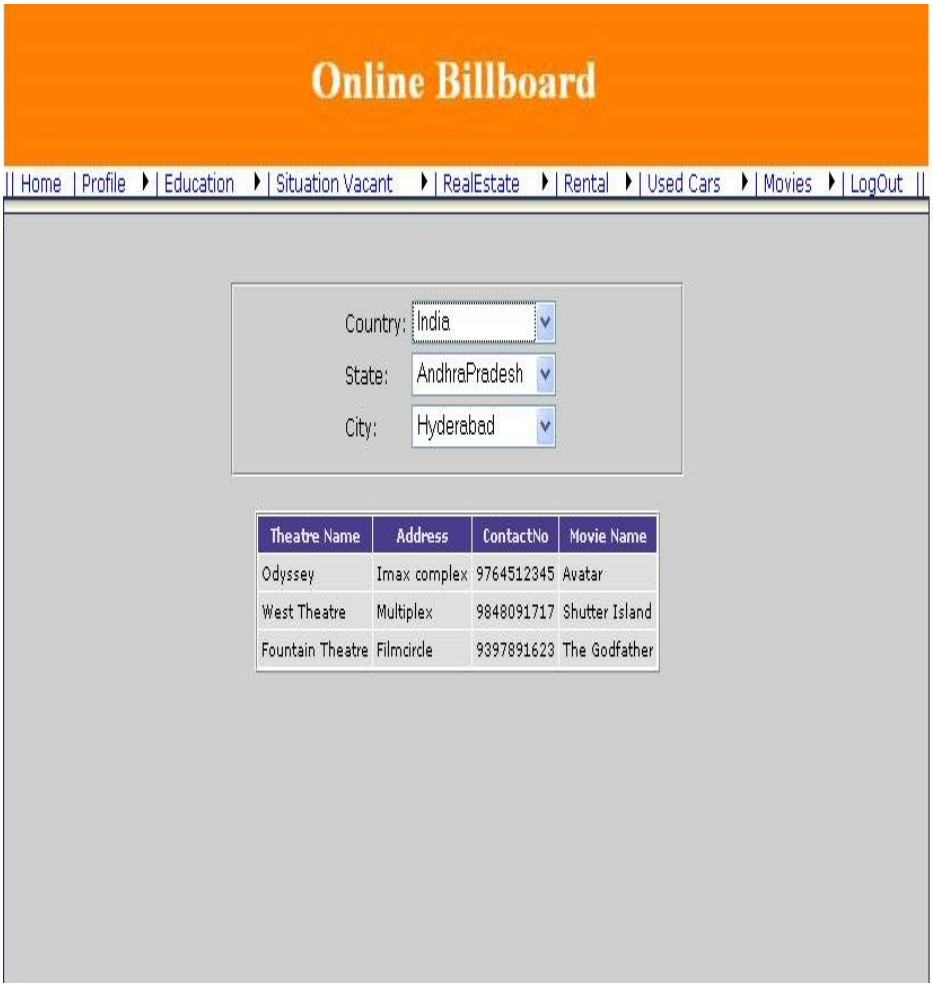
The car page gives the details of car number, type, company, and cost, and description, time used, address and contact information.



Car No	Car Type	Company	Cost	Description	NoOfDaysUsed	Address	ContactNo
AP1010	Ambassador	Hindustan Motors	500000	Ambassador is spreading its wings in the field of mid size car since 1948.	1 year	Ameerpet	9456786456
AP2020	Maruthi Alto	Maruthi Motors	200000	Maruthi Alto is spreading its wings in the field of mid size car since 1948	1 year	Mothi Nagar	9889567345
AP2021	Maruthi Alto	Maruthi Motors	200000	Maruthi Alto is spreading its wings in the field of mid size car since 1948	1 year	MothiNagar	9576893466
AP2028Z	TATA Nano	TATA Motors	100000	It is very comfortable.	6 months	Avanthi Nagar	9985547391
AP567z	Maruthi Alto	Maruthi Motors	200000	Maruthi Alto is spreading its wings in the field of mid size car since 1948	2 years	Avanthi Nagar	9456783457

Movie Page

The movie page gives the details of theatre name, address, and movies screened in one particular theatre in a city.



CHAPTER 6 - Testing

6.1 Unit testing

Unit testing has been performed during development of the website and the relevant loopholes have been handled accordingly. The following section indicates some of the cases that were handled [2].

Login Page: Error messages like “Username invalid” and “Password invalid” are used to for incorrect entry of user/password.

Insert Page: In the process of adding new information in any of categories, if any of the required fields are left empty, there will be an indication that they were left empty.

Dropdown list: While accessing the webpage, in the process of viewing information of a particular category, selecting a country shows all the states of which the information is available and shows the city after selecting a state.

6.2 White Box testing

In white box testing knowing the internal working of the product, tests can be conducted to ensure that internal operations are performed according to specification and all internal components have been adequately exercised. In white box testing logical path through the software are tested by providing test cases that exercise specific sets of conditions and loops.

Using white-box testing software developer can derive test case that

• Guarantee that all independent paths within a module have been exercised at least once.

• Exercise all logical decisions on their true and false side.

• Exercise all loops at their boundaries and within their operational bound.

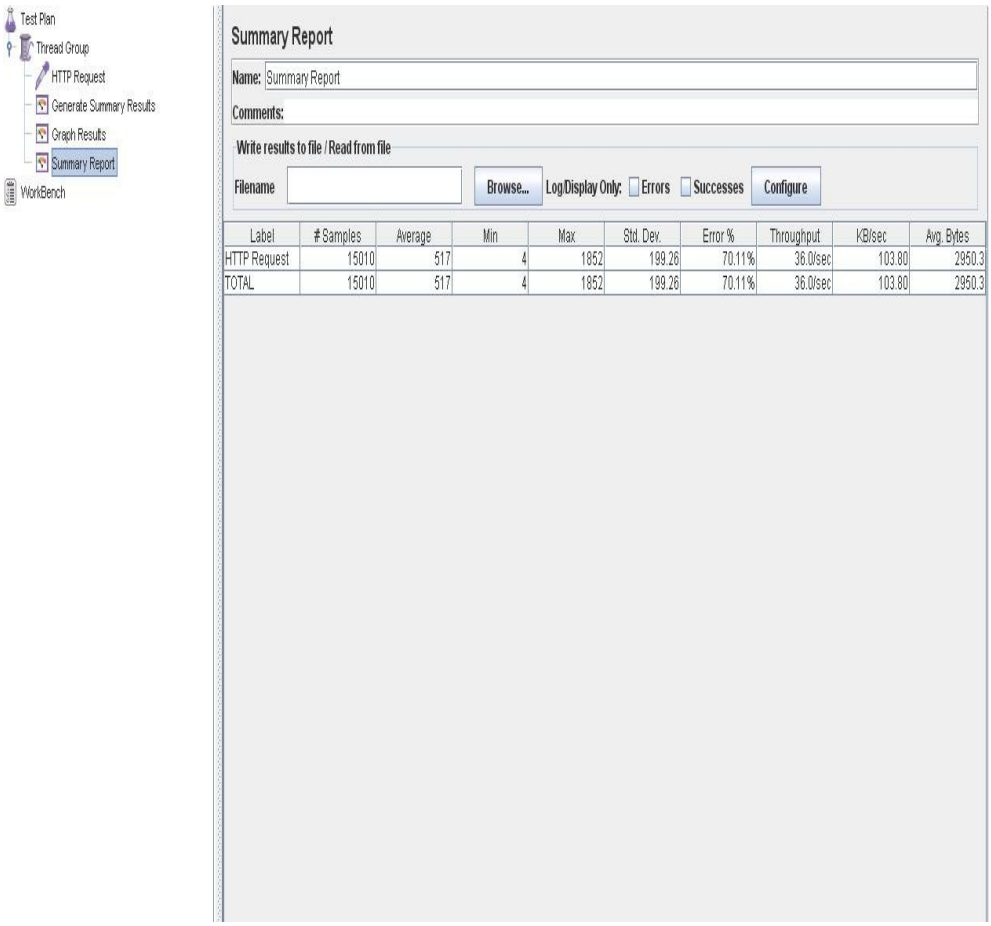
• Exercise internal data structure to ensure their validity.

At every stage of project development I have tested the logics of the program by supplying the invalid inputs and generating the respective error messages. All the loops and conditional statements are tested to the boundary conditions and validated properly.

6.3 Performance Testing

Jakarta JMeter, a tool for testing applications was used to simulate the virtual users (clients) and test the performance of the system. It can be used to test performance both on static and dynamic resources (files, Servlets, Perl scripts, Java Objects, Data Bases and Queries, FTP Servers and more). It can be used to simulate a heavy load on a server, network or object to test its strength or to analyze overall performance under different load types. It can be used to make a graphical analysis of performance and test the server/script/object behavior under heavy concurrent load. I have done performance testing to achieve an estimate of the peak and sustained load the application. A few sample Screenshots of test results are shown below. The tests have been conducted by running the application (server) and JMeter on same machine. These test results do not include factors like network bandwidth etc as the server is running on the same machine along with JMeter.

Figure 6.1 Report for 100 users with loop count 150



Comparison of Constant Users vs. Constant Loop-Count

Table 6.1 Performance with constant users

In the following test, the number of users has been kept constant and the Loop Count has been increased.

Users	Loop Count	Ramp Up period (sec)	Home Page Average Response (ms)
100	150	10	691
100	300	10	700
100	600	10	651
100	1000	10	662

Now the user's number is increased and number of loops is kept constant.

Table 6.2 Performance with constant loop count

Users	Loop Count	Ramp Up period (sec)	Home Page Average Response (ms)
100	150	10	691
200	150	10	1121
500	150	10	1643
1000	150	10	2367

The above data shows high response average which increases with the number of users and is not heavily influenced by loop count.

Observations

Response Time increases rapidly with number of users but not very much when the users are kept constant and only loop-count is increased. This is because, if the number of users is kept constant and only the loop count is increased, the number of requests handled by the server per second remains constant for every execution of the loop count and for every increase in the loop count. Hence the response time will not increase drastically in this case. Whereas, if the users are increased and loop count is kept constant, the requests handled by the server per second increases with increasing users and hence the longer response time.

CHAPTER 7 - Results

User friendly screens are provided. The application is easy to use and interactive, making online classifieds a recreational activity for users. It has been thoroughly tested and implemented.

CHAPTER 8 - Challenges

- Compatibility with browsers like Mozilla Firefox, Internet explorer etc
- Using a layered approach in developing the application makes the application maintainable.
- Learning new technologies like using JavaScript for drag and drop behavior and Ajax toolkit controls with little guidance.

The overall idea of doing this project is to get a real time experience and learn new technologies.

CHAPTER 9 - Conclusions

The ‘Online Billboard’ is designed to provide an application that would make viewing of items of various categories easier. Use of Ajax components would make the application interactive and prevents annoying post backs.

Limitations

The users can only view and cannot post an advertisement. Whatever information that is available on the website is managed and maintained by a single administrator.

Future scope

- The website would be more interactive if there is an option that users can post can advertisement which can authorized by administrator.
- The information available on the website would be more updated if it could come from various sources.

CHAPTER 10 - References

[1] All about Microsoft controls in C#

http://www.msdn.microsoft.com/

[2] Wikipedia for various diagrams & testing methods

http://www.wikipedia.org/

[3] K-State Research Exchange for samples in report writing

http://krex.k-state.edu/dspace/handle/2097/959

[4] Smart Draw for drawing all the Diagrams used in this report.

http://www.smartdraw.com/

[5] Ajax Toolkit controls

http://asp.net/ajax