AIRLINE RESERVATION SYSTEM

BY

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A REPORT

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Approved by:

[Major Professor]

Dr. Daniel Andresen

ABSTRACT

The objective of the project is to design an Airline Reservation System application which enables the customers to search and book flights, packages and hotels. The project has been designed in C#.NET technology and consists of a SQL server which acts as the database for the project.

My motivation for the project came from my enthusiasm and strong urge to learn C# and .NET which is one of the fastest growing technologies in today's world. The Airline Reservation System project mainly consists of two types of users. The customers who access the information provided by the website and the administrator who modifies and updates the information available in the website. All the data needed for the application is stored in the form of tables in the SQL server 2000.

The report contains the details of all the tasks carried out during the entire software development life cycle of the Airline Reservation Project. This document depicts all the details of the project starting from the project design to testing.

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Acknowledgements

I would like to thank Dr. Daniel Andresen my major professor who has helped me and guided me through the entire life cycle of the project. I would also like to thank Dr. Torben Amtoft and Dr. Mitchell L.Neilsen for accepting to serve on my committee.

I would also like to specially thank my parents for their constant moral support and encouragement throughout the project. It is they who have helped me achieve all my dreams through their blessings throughout my life.

Dedication

I would like to dedicate the MSE project Airline Reservation System to my mother Mrs. A.Uma Devi and my father Mr.K.V.S.Prasad .

CHAPTER 1 - VISION DOCUMENT

1. INTRODUCTION

1.1 PURPOSE AND MOTIVATION

The main purpose of this vision document is to list the requirements of the Airline Reservation System project. This document also helps us to collect and analyze the ideas gathered for the project. This vision document will be subject to change, if more requirements are added to the project. This document is mainly prepared to set stage for the design phase of the project. The document being prepared is the first version of vision document for the Airline Reservation System project.

C#.NET is a new technology which is being used a lot in the IT field. My interest to learn this new technology has prompted me to take up this project, which would set the stage for the applications I would be developing in the future.

1.2 PROJECT OVERVIEW

The Airline Reservation System project is an implementation of a general Airline Ticketing website like Orbitz, which helps the customers to search the availability and prices of various airline tickets, along with the different packages available with the reservations. This project also covers various features like online registration of the users, modifying the details of the website by the management staff or administrator of the website, by adding, deleting or modifying the customer details, flights or packages information. In general, this website would be designed to perform like any other airline ticketing website available online.

.1.3 REFERENCES

Some of the references used for preparing the vision document include:

1. http://inkboard.sourceforge.net/docs/VisionDocument.pdf
2. www.orbitz.com
3. IEEE document for Software Requirements Specifications
4. E-Draw software is used to generate the use case diagrams

5. wikipedia
6. MSE Portfolio presentation I lecture by Dr. Deloach, on the CIS website

2. OVERALL PRODUCT DESCRIPTION

2.1 PRODUCT PERSPECTIVE

The Airline Reservation System project uses the .NET framework 1.1 and is completely independent. The project itself is a bigger product and does not need to be introduced into a larger system. The application would be running on a Windows XP/2000 Operating system

2.2 PRODUCT FEATURES

The Airline Reservation System has the following features:

This project is mainly intended for two types of audiences. One is the customer or the end user and the other is the administrator of the website. Some of the major functions of the product can be categorized under two different categories that are for the administrator and the user.

2.2.1 Customer / End user activities

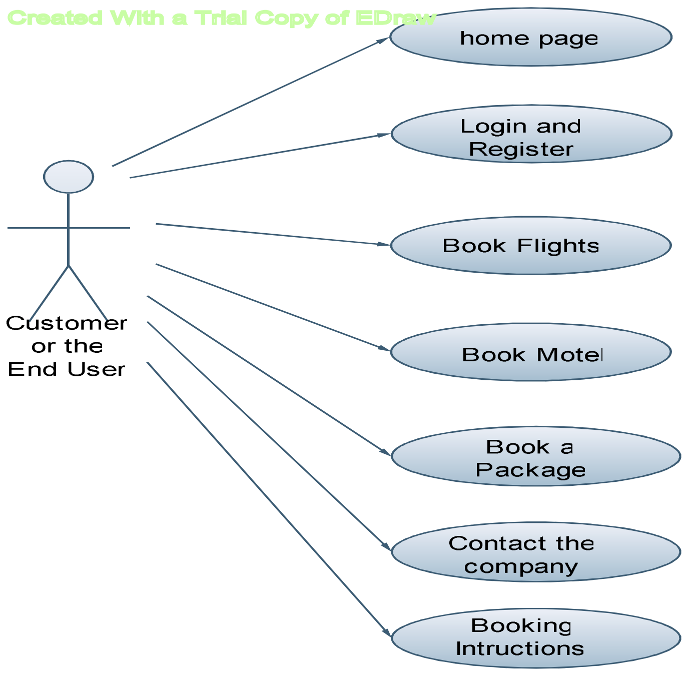


Figure 1 - Customer use case diagram

The above use case diagram depicts all the functions or activities that a user or a customer can perform on the application. They can be discussed in detail as follows:

Home Page: Like all the other airline websites available online, the user can access the user home page of the Airline Reservation System website, after he logs into the system.Here, he can look up information regarding flights, packages and motels.

Login and Register: The Airline Reservation System also comes with the customer registration details page, where the customer can enter his details and register. He can also create a username and password. Moreover, he will also be able to modify the registration information in case of a change in his e-mail address or any other information.

Booking Flights: The customer can also search for the flights available and reserve his place on the flight by purchasing a ticket.

Book Motels: Different Airline websites like Orbitz also offer various deals for booking Motels along with the airline tickets. So, the customer will also be able to view this functionality on the website.

Book Packages: This functionality is similar to the motel booking function, except the fact that the customer can look up various touring packages available at the person's destination.

Contact the Company: The Customer can also call the company if he has any concerns or questions related to the bookings he has made online.

Booking Instructions: The website also provides instructions to the customers on how to book airline tickets or motels along with the different packages.

Some of the functions of the Airline Reservation System, such as creating, maintaining and updating the database are available only to the administrator. The functions of the administrator, explained in detail are as follows:

2.2.2 Administrator Activities

Login/Logout: The administrator has to login first in order to be able to make changes to the Airline Reservation System, by adding, deleting or modifying the data in the Airline Reservation System database. After making the necessary changes, he then has to logout of the system, in order to prevent misuse of the data.

Add/Modify Customer Information: Daily the Airline Reservation System will have many customers registering with the website and many of them unsubscribing. Only the administrator will have the sole rights to modify the database accordingly.

Add/Modify Flight Information: The Administrator also has the sole rights to add, delete or modify the flight information. Sometimes, flights get cancelled for some reason, so such flights would be removed from the list of flights available to the customer. Similarly whenever any flight information has to be modified or if any new flights need to be added to the database, these operations are performed by the administrator.

Add/ Modify Motel Information: The administrator can also add/delete or modify information related to different motels. This information can be the number of rooms available at the motel, the prices etc.

Cancellation of Reservations: Sometimes, after making a reservation, a customer might cancel the reservation he has made. So, the administrator also handles such special situations and sends the customer an e-mail confirmation after deleting the specific transaction.

E-mail confirmations: Whenever a customer makes or cancels a reservation, the administrator is responsible for sending confirmation e-mails to the customer, confirming the transaction.

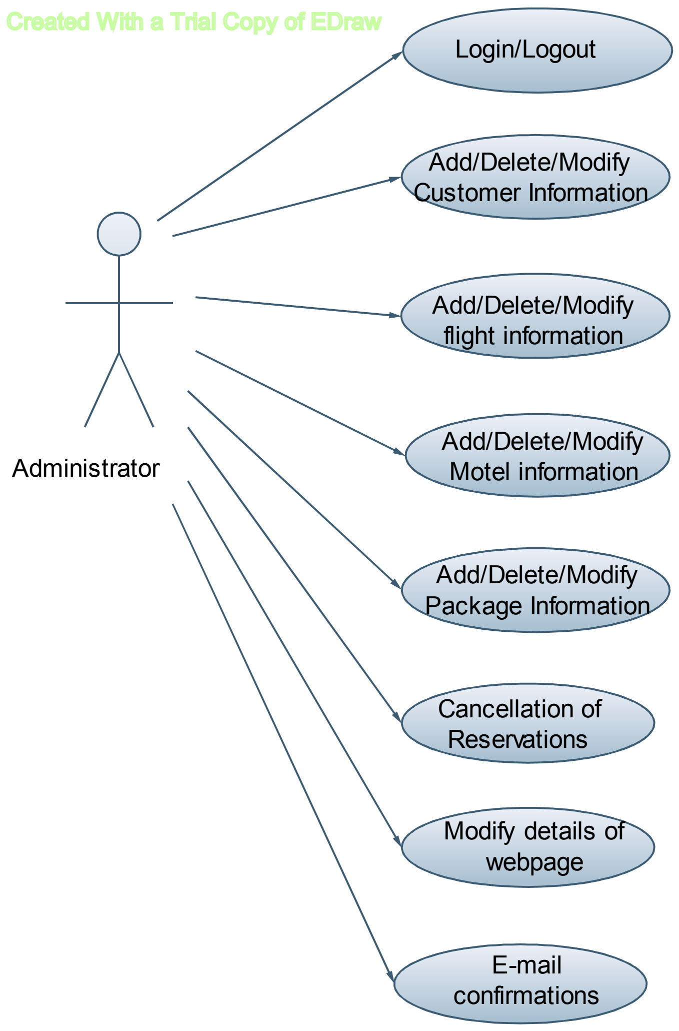

Created With a Trial Copy of EDraw
Login/Logout
Add/Delete/Modify Customer Information
Add/Delete/Modify flight information
Add/Delete/Modify Motel information
Add/Delete/Modify Package Information
Cancellation of Reservations
Modify details of webpage
E-mail confirmations
Administrator

Figure 2 - administrator use case diagram

2.3 USER CHARACTERISTICS

There are two kinds of users for the Airline Reservation System. One is the customer and the other is the administrator. The customers do not need to have any prior training to use the application. However, instructions for making flight and motel reservations would be provided to them on the airline website. The administrators would however need to be trained in order to use the application.

2.4 CONSTRAINTS

Incase of changes made to the database, the application should be able to show the updated information on the website, without much delay. The database for the project is designed to be of moderate size. Currently, the application is designed to be able to run in Internet

Explorer. The Airline Reservation system will be designed in such a way that, it can be run on a Windows XP/2000 and IIS server. The .NET technology will be used to code the project and SQL server 2000 will act as the database for the project. The project will run on Internet Explorer and it should be installed on User's system.

2.5 ASSUMPTIONS AND DEPENDENCIES

There are no assumptions as of now. To be updated in later versions of the vision document.

3. SPECIFIC REQUIREMENTS

3.1 EXTERNAL INTERFACES

The different types of interfaces that we would come across while developing the Airline Reservation System application are as follows:

- User Interface
- Hardware Interface
- Software Interface

3.1.1 USER INTERFACE

There are two types of users for the Airline Reservation System project. One is the customer and the other is the administrator. Both the customer and administrator user interface would be a graphical user interface. The graphical user interface for the customer home page would be as follows:

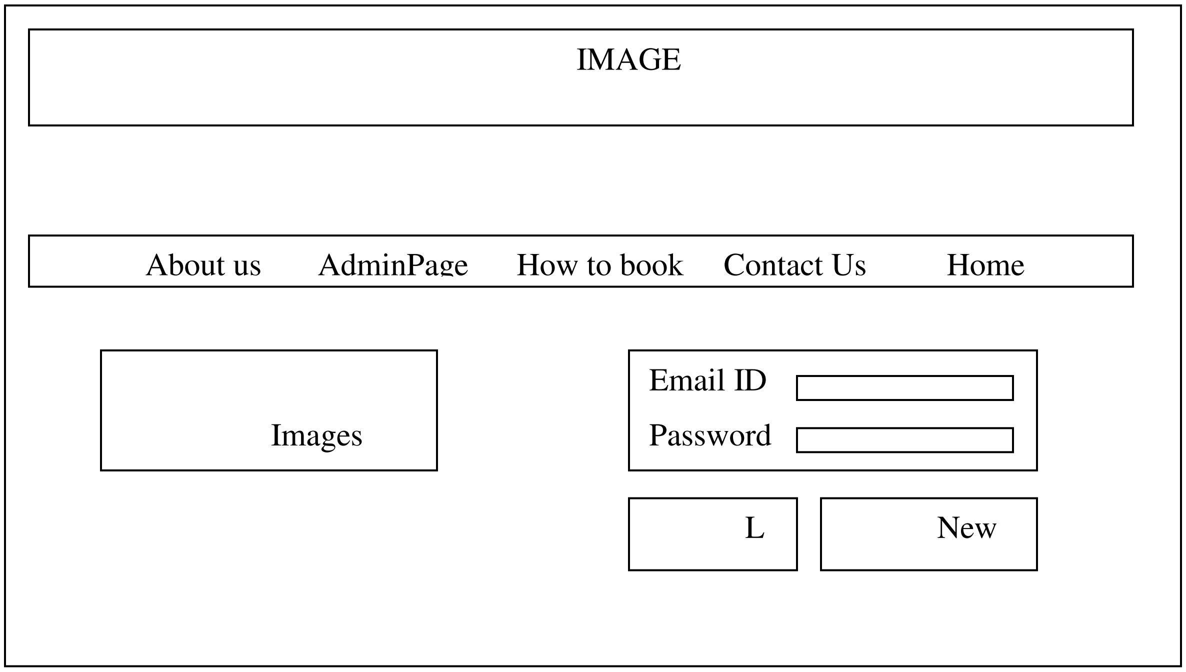


Figure representing the sample Customer GUI

The Graphical User Interface would mainly consist of Hyperlinks, Data entry fields like the E-mail Id field, push down buttons like the Login button etc.

The administrator of the website would also have a similar Graphical User Interface. After an administrator logs onto the system, the home page for the administrator would be as follows:

Figure representing the sample Administrator Interface

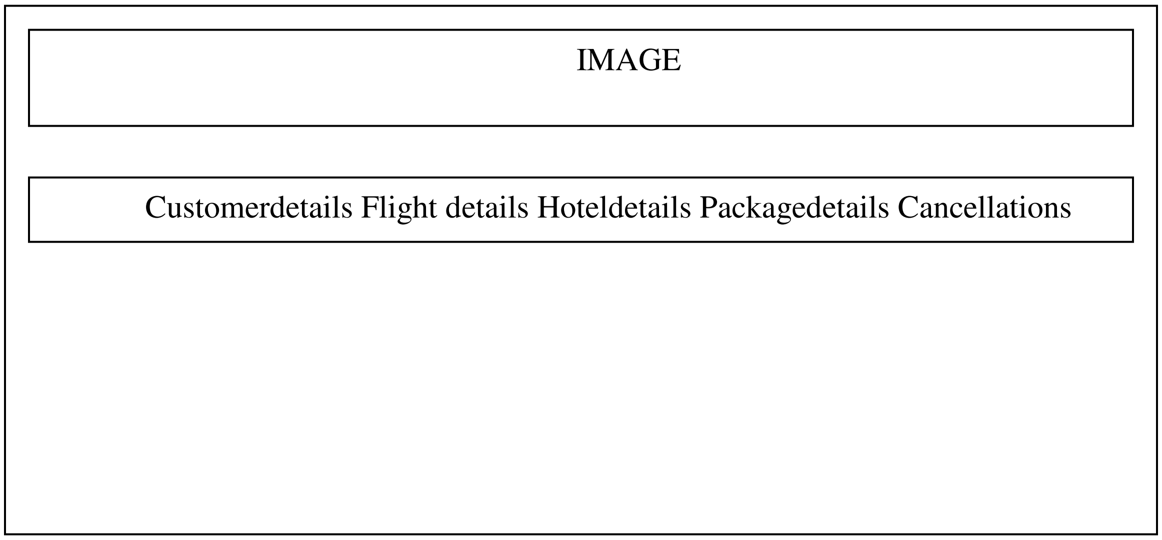


IMAGE
Customerdetails Flight details Hoteldetails Packagedetails Cancellations

3.1.3 SOFTWARE INTERFACE

The application should run on a Windows XP/2000 Operating System. Since the application needs a database to store all the customer details, airline, motel and package information, SQL server 2000 would be used.

Visual Studio.NET 2003 would be used for creating the application. All the coding will be done in C#.

4. FUNCTIONAL REQUIREMENTS

The functional requirements of the Airline Reservation System are divided among the customer and the administrator of the application.

These functional requirements can be explained in detail as follows:

4.1 Use Case name: User Registration

- **Description:** This use case describes the scenario where the user registers with the application by providing all the necessary details, in order to make reservations or bookings for flights, motels, special packages.
- **Actor:** User or the Customer
- **Input:** The user or the customer will have to provide all the necessary details present in the customer registration form of the application.
- **Output:** All the details entered in the customer registration page will be verified and accepted by the system into the database.

4.2 Use Case name: User Login

- **Description:** This use case describes the scenario where the user logs into the application, with the username and password he has provided while registering with the system.
- **Actor:** User or the Customer
- **Input:** The user or the customer creates a username and password at the time of registering with the system. He then uses them to logon to the system and make reservations or view any information.
- **Output:** The application then verifies the authenticity of the username and password that the customer has provided and allows the user to view the information available on the system, if the username and password are valid.

4.3 Use Case name: Contact the company

- **Description:** This use case describes the scenario where the user contacts the company for any information.
- **Actor:** User or the Customer
- **Input:** The customer can contact the airline company, requesting them for any information he needs.
- **Output:** The application verifies the authenticity of the username and password that the customer has provided and allows the user to view the contact information for the company.

4.4 User Case name: Booking Instructions

- **Description:** This use case describes the scenario where the user views the instructions for booking flights, packages, or motels.
- **Actor:** User or the Customer
- **Input:** After the customer logs onto the application with his username and password, he can look up the instructions posted on the website for booking flights, packages or motels.
- **Output:** The application verifies the authenticity of the username and password and displays the how to book instructions page.

4.5 Use Case name: Book Flights

- **Description:** This use case describes the scenario where the user books airline tickets.
- **Actor:** User or the Customer
- **Input:** After logging into the application, the customer looks up the information related to various airlines and checks the availability of seats on flights. If he finds that there are any available tickets, he then purchases them.
- **Output:** The application verifies the authenticity of the username and password and then displays information related to various flights to the customer.

4.6 Use Case name: Book Motel

- **Description:** This use case describes the scenario where the user books motels at the time of airline ticket reservation
- **Actor:** Customer or the user
- **Input:** After logging onto the application, the customer looks up the information for all the available motels at his destination.
- **Output:** The application verifies the authenticity of the username and password and then displays information pertaining to various motels at the customer’s destination.

4.7 Use Case name: Booking Packages

- **Description:** This use case describes the scenario where the user books different touring packages at the airline ticket reservation
- **Actor:** Customer or the user
- **Input:** The customer looks up information regarding various touring packages available at his destination at the time of airline ticket reservation.
- **Output:** The application verifies the authenticity of the username and password of the customer and then displays information of various touring packages available at customer's choice of place.

The administrator activities use cases will be described here:

4.8 Use Case name: Login/Logout

- **Description:** This use case describes the scenario where the administrator of the application, logs into the system and logs out after the work is done.
- **Actor:** Administrator
- **Input:** The administrator of the website logs into the application with the username and password provided to him.
- **Output:** The application verifies the authenticity and displays the home page of the administrator.

4.9 Use Case name: Add/Delete or Modify Customer information

- **Description:** This use case describes the scenario where the administrator adds, deletes or modifies customer information in the system database
- **Actor:** Administrator
- **Input:** The administrator of the applications logs onto the system with his username and password.
- **Output:** The application authenticates the administrator, and then displays the page where the administrator can add new customers to the database, or delete existing customers or modify details of customers in the database.

4.10 Use Case name: Add/Delete or Modify flight information

- **Description:** This use case describes the scenario where the administrator adds, deletes or modifies flight information in the application database
- **Actor:** Administrator
- **Input:** The administrator logs onto the system with the username and password provided to him.
- **Output:** The application authenticates the administrator, by verifying the username and password. Then the application displays the page where the administrator can add new flights to the database, delete the flights that have been cancelled or modify information for the flights.

4.11 Use Case name: Cancellation of Reservations

- **Description:** This use case describes the scenario where the administrator handles the cancellation of reservations by the customers.
- **Actor:** Administrator
- **Input:** The administrator logs onto the system with the given username and password.
- **Output:** The application authenticates the administrator and then displays the page where the administrator looks up the id of the customer who has requested cancellation of reservation. After canceling the reservation, the administrator then sends a confirmation e-mail to the customer.

4.12 Use Case name: E-mail confirmations

- **Description:** This use case describes the scenario where the administrator sends e-mail confirmations to the customers of the application.
- **Actor:** Administrator
- **Input:** The administrator logs onto the application with the username and password provided.
- **Output:** The application then authenticates the administrator and displays the page where the administrator can send e-mail confirmations to the customer. These e-mail

confirmations may be sent in cases where the customer has cancelled a reservation or changed the personal information available on the website.

4.13 Use Case name: Modifying details of webpage

- **Description:** This use case describes the scenario where the administrator logs onto the application to modify the details of the airline website
- **Actor:** Administrator
- **Input:** The administrator logs onto the application with the username and password provided to him
- **Output:** After verifying the username and password of the administrator, the application then allows the administrator to login. The administrators can then browse through the website and change the details of any webpage in the Airline Reservation system application.

4.14 Use Case name: Add/Delete or Modify Motel information

- **Description:** This use case describes the scenario where the administrator adds, deletes or modifies motel information in the database.
- **Actor:** Administrator
- **Input:** The administrator logs onto the system with the username and password provided to him.
- **Output:** The application authenticates the administrator, by verifying the username and password. Then the application displays the page where the administrator can add new motels to the database, delete a specific motel from the list of motels, since there are no more available rooms there. He can even update the price per room of each motel. To make it easier, the administrator might assign a unique id for each hotel.

4.15 Use Case name: Add/Delete or Modify package information

- **Description:** This use case describes the scenario where the administrator adds, deletes or modifies package information in the application database
- **Actor:** Administrator

- **Input:** The administrator logs onto the system with the username and password provided to him.
- **Output:** The application authenticates the administrator, by verifying the username and password. Then the application displays the page where the administrator can add new packages to the database, delete the packages that are no longer available or modify information for any particular package.

5. PERFORMANCE REQUIREMENTS

The Airline Reservation System application should be able to respond to the queries submitted by the customer without much delay. When a user searches for a flight leaving from a particular place to another place, the application should not take much time to return the results, similarly for the motel and package information. Considering that the application is of moderate size, it should be able to display 10 results at a time on each page, when the customer looks up for any particular data. Since the Airline Reservation websites have much traffic, the user should also be able to logon to the system using high speed internet. Most of the requests sent to the application should be answered in less than 5 seconds.

CHAPTER 2 - PROJECT PLAN

1. TASK BREAKDOWN

1.1 INCEPTION PHASE

The Inception Phase is the first phase of a software development life cycle. The main objective of the inception phase is to establish the business case for the system and define the scope of the system. The inception phase of the Airline Reservation System project mainly focuses on defining the project requirements. The primary documents created in the inception phase consist of the Vision document, Software Quality Assurance Plan and the Project Plan.

The Vision document, which is one of the outcomes of the inception phase, mainly focuses on core project requirements and the key features. It also discusses the main features of the project along with the interfaces of the project. The next document which is an outcome of the inception phase is the project plan document. The project plan document as the name says is mainly used to document the schedule of the project as well as the time required for each phase of the project. This plan, gives us an estimate of when the project will be completed. The Software Quality Assurance Plan, which is also an outcome of the inception phase documents the standards and conventions that need to be followed in order to ensure good quality of the end product.

At the end of the inception phase, the developer will give a presentation to the supervisory committee after submitting all the documents necessary. This phase will be marked complete, once all the documentation for the phase I is reviewed and approved by the committee.

1.2 ELABORATION PHASE

The next phase in the software development lifecycle is the elaboration phase. The main purpose of the elaboration phase is to establish a strong architectural foundation for the Airline Reservation System project. It is the most critical phase of all the phases of the software development lifecycle. The entire architectural design of the Airline Reservation System will be documented using the appropriate UML diagrams. In this phase, revisions on the initial versions of the Vision document, Project Plan document will be made based on the suggestions made by the Supervisory Committee members. In the elaboration phase, each component in the Airline Reservation System architecture will be documented at the interface level. Another deliverable of this phase is the Test Plan which documents all the testing activities that will be carried out on the project and also states how to report and track the test results. The two technical inspectors of the project also perform an architectural review on the project and provide feedback by submitting the formal technical inspection letters which are based upon their findings.

At the end of this phase, the developer will demonstrate an executable prototype of the project and submit all the documentation required for the phase II of the project. The deliverables of this phase can be stated as follows:

- Vision Document 2.0
- Project Plan 2.0
- Formal Requirement Specification
- Architecture Design
- Test Plan
- Formal Technical Inspection – submitted by two individual MSE students
- Executable Architecture Prototype

Once all the above documents and the prototype is reviewed and accepted by the Supervisory Committee, the Elaboration phase is said to be complete.

1.3 PRODUCTION PHASE

The production phase of the Airline Reservation System project mainly focuses on the implementation and testing of the project. In this phase, the entire working code for the project will be constructed and all the documentation pertaining to the project is completed. In this phase, the entire code for the Airline Reservation System project will be tested to ensure that it has met all the requirements. All the test results will also be analyzed and documented. A user manual is also produced for the project which describes how to install, run and use the tool efficiently.

At the end of the production phase, the developer of the project will give a presentation to the supervisory committee and will also demonstrate the entire working of the software product. This presentation is the last presentation, and this phase of the project will be completed once the committee members have reviewed and approved all the documentation and the working code of the Airline Reservation System project. Once this phase is said to complete, then the MSE project is also said to be complete.

2. COST ESTIMATE

2.1 COCOMO MODEL

The Constructive Cost Model known as the COCOMO Model, has been designed in 1981 by Barry Boehm, to give an estimate of number of man months it will take to develop a software product. The model also estimates the development schedule for the project in months and gives us a schedule distribution for all the major phases of a project.

The COCOMO models are developed for three classes of software projects. They are as follows:

- **Organic Projects** - These are relatively small and simple software projects in which small teams with good application experience work towards a set of less than rigid requirements.
- **Semi – Detached Projects –** These are intermediate size software projects in which teams with mixed experience levels must meet a mix of rigid and less than rigid requirements.
- **Embedded Projects –** These are software projects that must be developed within a set of tight hardware, software and operational constraints.

The Airline Reservation System project has an average complexity and fair flexibility. Thus, this project is classified as an organic project under the COCOMO model.

The equations as they are modified for the organic projects are as follows:

Effort = 3.2 * EAF * (Size) ^ 1.05

Time = 2.5 * (Effort) ^ 0.38 where

Effort = number of staff months (PM)

EAF = effort adjustment factor

Size = number of lines of code for completed product. It is measures in KLOC (thousands of lines of code)

Time = total number of months

The Effort Adjustment Factor mentioned above is the product of 15 adjustment parameters. Each adjustment parameter is categorized as very low, low, nominal, high or very high. Each adjustment factor along with the range of values it lies within is shown in the following table:

Table 1 - adjustment factor table

IDENTIFIER	EFFORT ADJUSTMENT FACTOR	RANGE
RELY	Required Reliability	0.75 – 1.40
DATA	Database Size	0.94 – 1.16
CPLX	Product Complexity	0.70 – 1.65
TIME	Execution Time Constraint	1.00 – 1.66
STOR	Main Storage Constraint	1.00 – 1.56
VIRT	Virtual Machine Volatility	0.87 – 1.30
TURN	Computer Turnaround Time	0.87 – 1.15
ACAP	Analyst Capability	1.46 – 0.71
AEXP	Applications Experience	1.29 – 0.82
PCAP	Programmer Capability	1.42 – 0.70
VEXP	Virtual Machine Experience	1.21 – 0.90
LEXP	Language Experience	1.14 – 0.95
MODP	Use of Modern Practices	1.24 – 0.82
TOOL	Use of Software Tools	1.24 – 0.83
SCED	Required Development Schedule	1.23 – 1.10

The adjustment factors for the Airline Reservation System are as follows :

- RELY as nominal with a value of 1.00
- DATA as nominal with a value of 1.00
- CPLX as low with a value of 0.75
- TIME as nominal with a value of 1.00

- STOR as low with a value of 1.00
- VIRT as nominal with a value of 1.03
- TURN as low with a value of 0.88
- ACAP as high with a value of 0.9
- AEXP as nominal with a value of 0.9
- PCAP as nominal with a value of 0.9
- VEXP as nominal with a value of 1.00
- LEXP as nominal with a value of 1.00
- TOOL as high with a value of 0.9
- SCED as nominal with a value of 1.00

Being a beginner to the C#.NET technology, my experience with the technology is not very high, but only nominal, so I have assigned a value of 0.9 for the applications experience. Since I will be implementing the project while learning C#.NET,

With the help of above stated values, the EAF for the Airline Reservation System project is calculated as EAF = 0.45. Also by estimating the size of the project we have the value 3.0.

Since we already have the formulae for Effort and Time, we can calculate the values as follows:

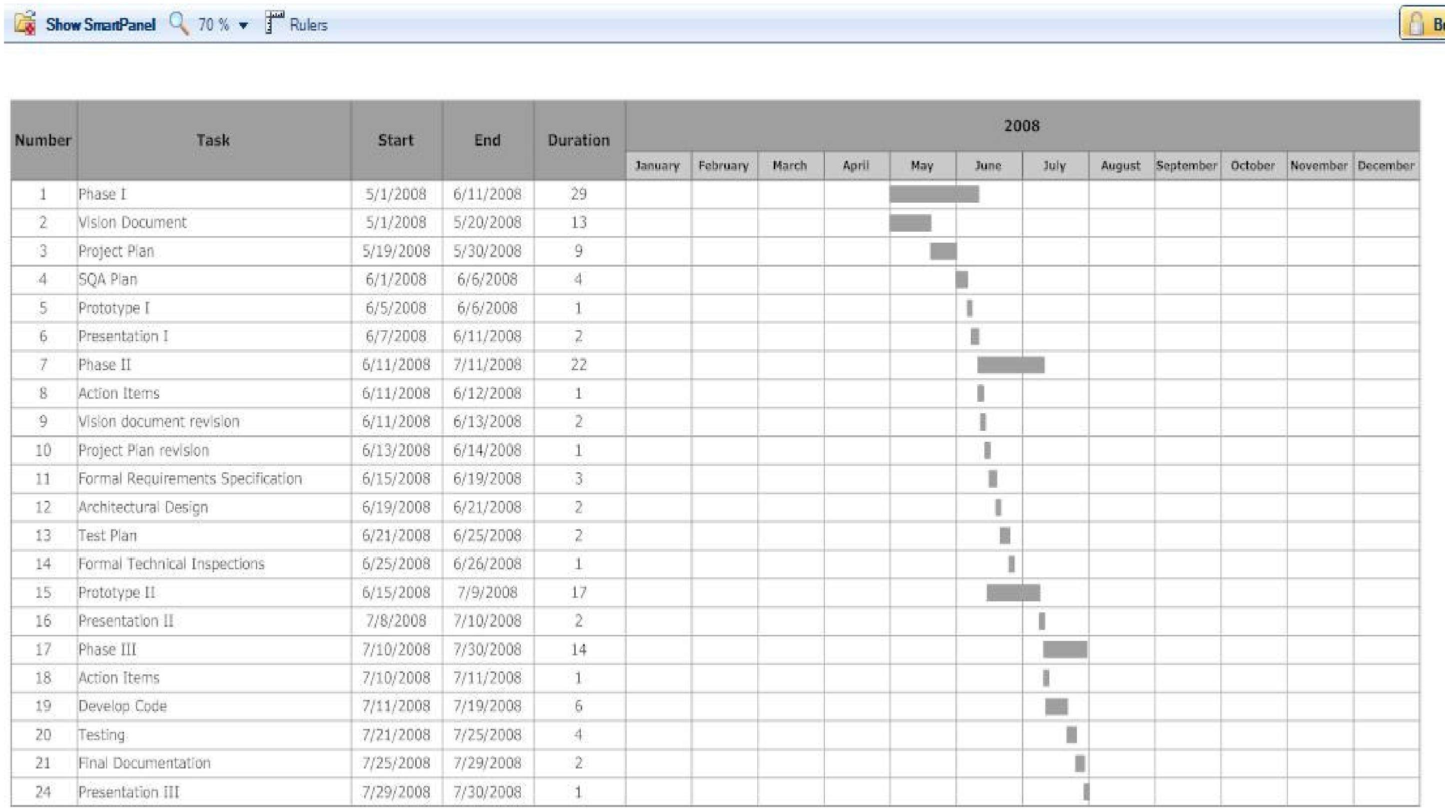
Effort = 3.2 * 0.45 * 3.0 ^ 1.05 = 4.56 staff months

Time = 2.5 * 4.56 ^ 0.38 = 4.44 months (development time)

2.2 GANTT CHART

The Gantt chart for the Airline Reservation System project can be depicted as follows:

Figure 3- gantt chart



Number	Task	Start	End	Duration	2008											
					January	February	March	April	May	June	July	August	September	October	November	December
1	Phase I	5/1/2008	6/11/2008	29					▨	▨						
2	Vision Document	5/1/2008	5/20/2008	13					▨							
3	Project Plan	5/19/2008	5/30/2008	9					▨							
4	SQA Plan	6/1/2008	6/6/2008	4						▨						
5	Prototype I	6/5/2008	6/6/2008	1						▨						
6	Presentation I	6/7/2008	6/11/2008	2						▨						
7	Phase II	6/11/2008	7/11/2008	22						▨	▨					
8	Action Items	6/11/2008	6/12/2008	1						▨						
9	Vision document revision	6/11/2008	6/13/2008	2						▨						
10	Project Plan revision	6/13/2008	6/14/2008	1						▨						
11	Formal Requirements Specification	6/15/2008	6/19/2008	3						▨						
12	Architectural Design	6/19/2008	6/21/2008	2						▨						
13	Test Plan	6/21/2008	6/25/2008	2						▨						
14	Formal Technical Inspections	6/25/2008	6/26/2008	1						▨						
15	Prototype II	6/15/2008	7/9/2008	17						▨	▨					
16	Presentation II	7/8/2008	7/10/2008	2							▨					
17	Phase III	7/10/2008	7/30/2008	14							▨					
18	Action Items	7/10/2008	7/11/2008	1							▨					
19	Develop Code	7/11/2008	7/19/2008	6							▨					
20	Testing	7/21/2008	7/25/2008	4							▨					
21	Final Documentation	7/25/2008	7/29/2008	2							▨					
24	Presentation III	7/29/2008	7/30/2008	1							▨					

3. ARCHITECTURE ELABORATION PLAN

The following tasks have to be completed by the end of Phase II of the Airline Reservation System project.

3.1 REVISE VISION DOCUMENT

The vision document which is produced at the end of Phase I will be revised in order to make sure that all the requirements for the project have been represented. All the requirements will be ranked in order of their importance. At the end of phase I of the project, the supervisory committee members will provide suggestions to the developer regarding improving the vision document. All the changes mentioned by the committee will be made in the revised document and the correct document will be submitted at the end of Phase II for approval.

3.2 REVISE PROJECT PLAN

Similar to the vision document, the project plan document, submitted at the end of Phase I, will also be reviewed by the supervisory committee and the updated document will be submitted by the developer at the end of Phase II. This updated document will provide us with an updated estimate of cost, size and effort required for the project. Finally, this document will be submitted to the major professor for approval.

3.3 ARCHITECTURE DESIGN

The complete project design of the Airline Reservation System project, will be documented using the UML diagrams.

3.4 DEVELOPING PROTOTYPE

The architecture executable prototype of the Airline Reservation System project will be built to illustrate that all the requirements stated in the project's vision document have been met.

3.5 TEST PLAN

A test plan will be developed at the end of the Phase II, which documents all the testing activities that will be performed on the Airline Reservation system project, to ensure that the project has satisfied all the requirements that have been mentioned in the vision document. This test plan will also include evaluation criteria for all the critical use cases of the project.

3.6 FORMAL TECHNICAL INSPECTORS

The architecture design of the Airline Reservation system project will be inspected by two other MSE students, Sandhya Bathini and Srunokshi Neelakantan.

3.7 FORMAL REQUIREMENTS SPECIFICATION

The Object Constraint Language will be used to define and verify the formal specification of the product.

CHAPTER 3 - ARCHITECTURE DESIGN

1. INTRODUCTION

The main purpose of the Architecture Design document is to discuss the architectural design for the Online Reservation System project in a clear and concise form. This design document will give a detailed description of the presentation tier, the middle tier which consists of the class diagrams, sequence diagrams for the Airline Reservation System and finally the data tier. The Unified Modeling Language (UML) is a standardized visual specification language for object modeling. Thus, the class diagrams and the sequence diagrams depicted in the Architecture design document will be developed according to the UML standard notation.

2. ARCHITECTURE OF THE AIRLINE RESERVATION SYSTEM

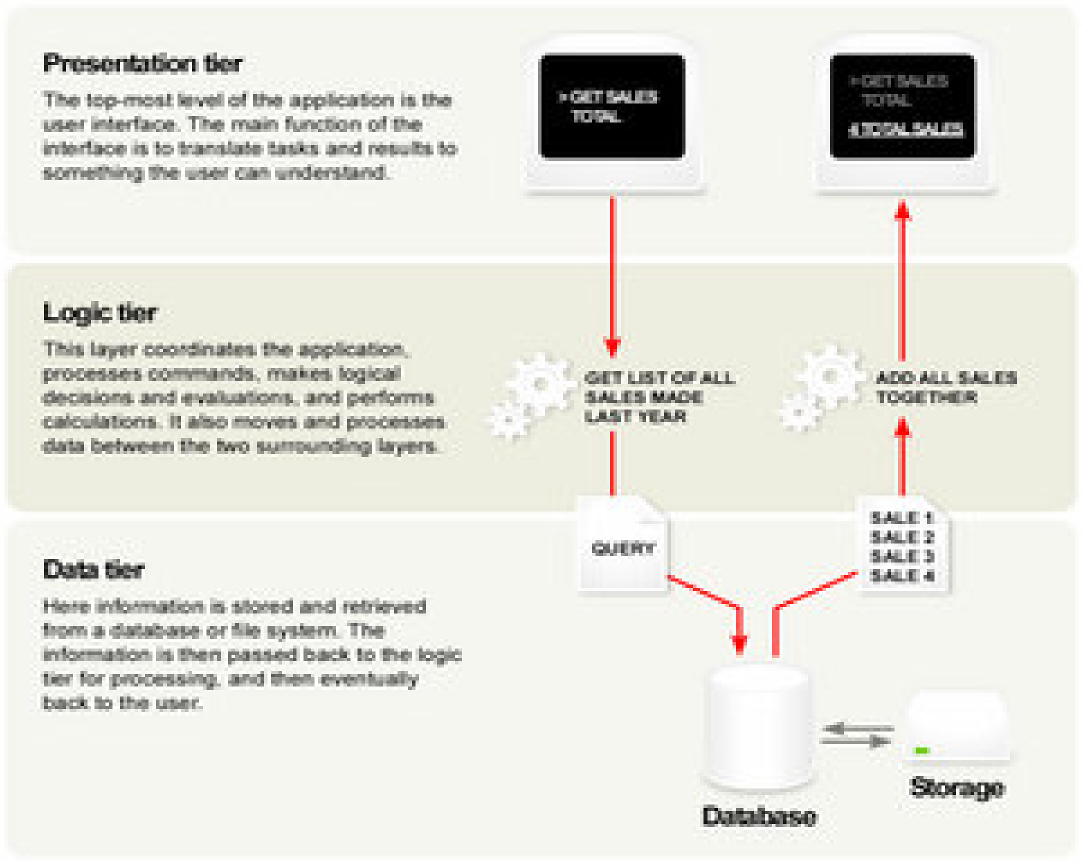
The architecture of the Airline Reservation System is based on the three-tier architecture. This three-tier architecture mainly consists of three layers namely:

- Presentation Tier
- Business Tier
- Data Access Tier

The Presentation Tier converts and displays information into a human legible form. This tier displays information related to services such as browsing the Airline website, purchasing tickets etc. It communicates with the other tiers by outputting results to the browser/client tier and all the other tiers. The Business Logic tier is mainly responsible for information exchange between the user interface and the database of the project. The final layer of the three tiered architecture is the Data Access tier, which mainly consists of the Database servers. The information related to the Airline Reservation System is stored and retrieved from here.

A simple representation of the three-tier architecture would be as follows:

Figure 4 - Three Tier Architecture



Presentation tier

The top-most level of the application is the user interface. The main function of the interface is to translate tasks and results to something the user can understand.

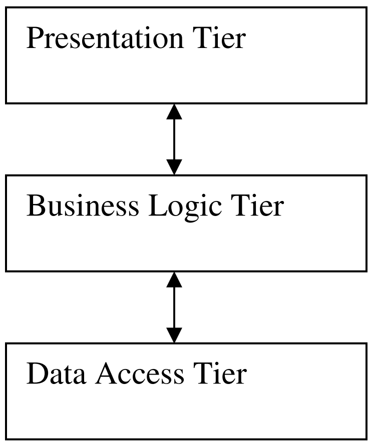
Logic tier

This layer coordinates the application, processes commands, makes logical decisions and evaluations, and performs calculations. It also moves and processes data between the two surrounding layers.

Data tier

Here information is stored and retrieved from a database or file system. The information is then passed back to the logic tier for processing, and then eventually back to the user.

The architecture of the Airline Reservation System can be depicted as follows:



This includes the ASP.NET web forms and the ASP.NET user controls for the Airline Reservation

This includes the C# classes or the C# business components for the

This includes the Database servers for the Airline Reservation System project. SQL server 2000 is

The three tier architecture would be discussed in detail in the following sections:

3. PRESENTATION TIER

The presentation tier is the top most layer of the Airline-Reservation system application. The presentation tier is mainly responsible for the user interface of the application which deals with the presentation of data to the user. The presentation tier of the Airline Reservation System is mainly formed by the ASP.NET web forms. In the case of the Airline Reservation system project, I have used the Visual Studio 2003.NET to create the web forms. Each web form will have the extension .aspx and there are several web forms created for the user and the administrator of the website.

The web pages of the Airline Reservation System project are as follows for the User as well as the Administrator. The following table shows the ASP.NET web forms for the users of the Airline Reservation System:

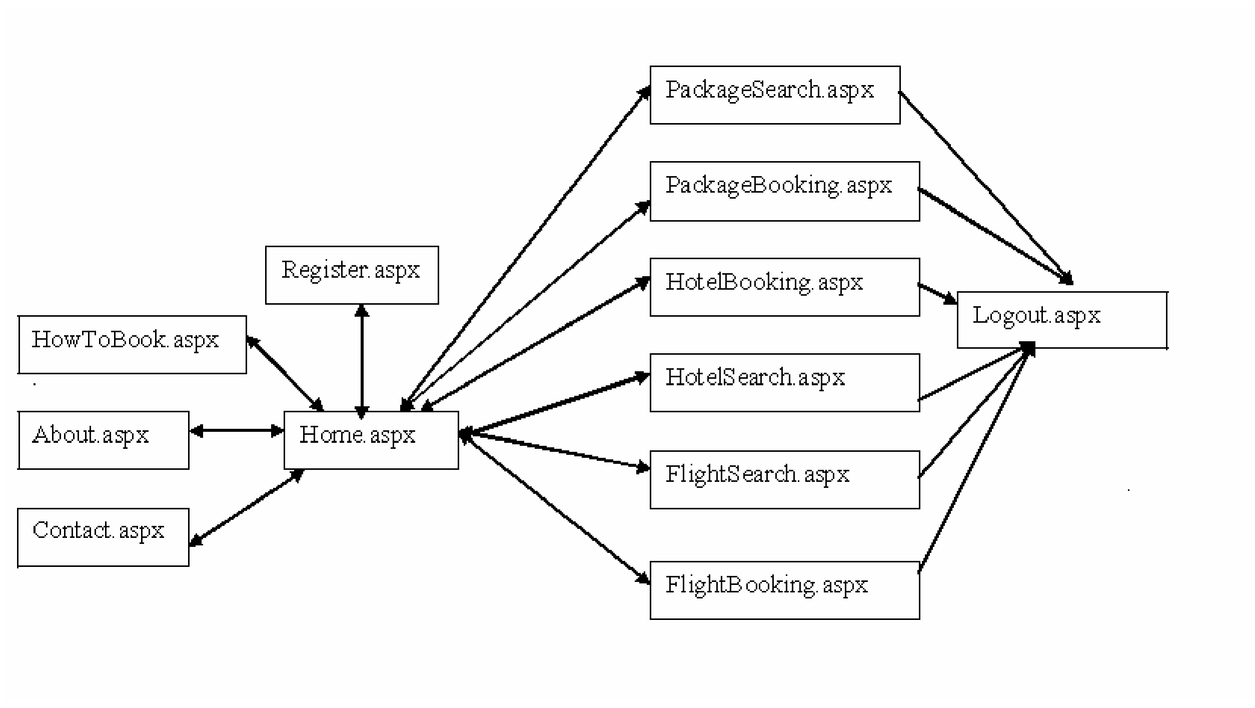
Table 2- ASP.NET webforms and their purpose

ASP.NET Web Forms	**PURPOSE**
Home.aspx	The home page for the Kansas Air Airline Reservation System website
Register.aspx	The page provided for the Customer Registration
Customer.aspx	The home page that appears after the customer logs in
FlightSearch.aspx	The page which helps the customer to search for the available flights
FlightBooking.aspx	The page which enables the customer to make reservations for the flights available online.
PackageSearch.aspx	The page which helps the customer to search for the packages available.
PackageBooking.aspx	The page which enables the customer to make reservations for the packages available online.
HotelSearch.aspx	The page which helps the customer to search for the available hotels and rooms in each hotel.
HotelBooking.aspx	The page which enables the customer to make reservations for the hotel rooms available online.
About.aspx	This page gives the customer some information about the Airline Reservation System website.

3.1 PAGE FLOW DIAGRAM

The page flow diagram for the users of the Airline Reservation System would be as follows:

Figure 5 - page flow diagram for customer



The home page of the Airline Reservation System has the login id and the password field for the user to login. So the home page can also be used as the login page for the customer.

4. BUSINESS LOGIC TIER

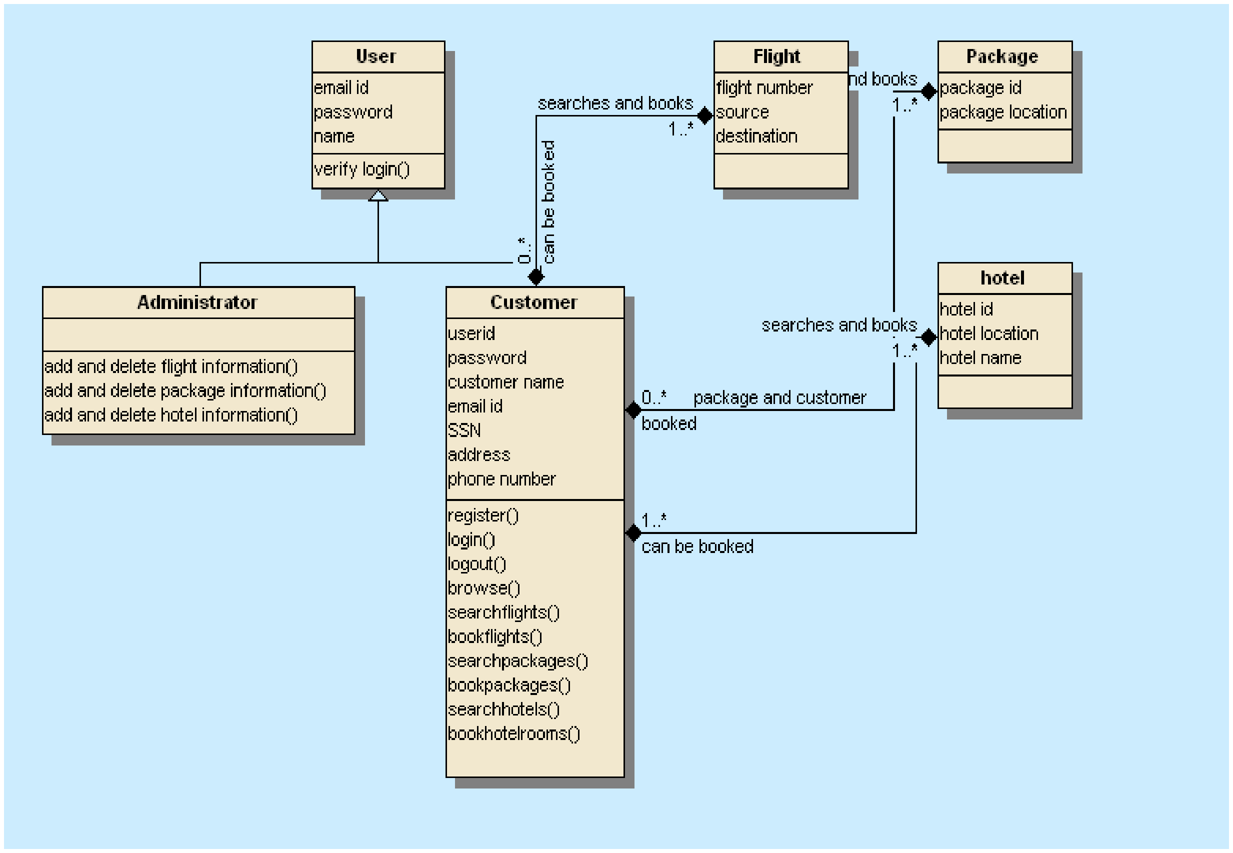
The Business Logic Tier is the middle tier of the three-tier architecture. The business logic for the Airline Reservation System would be present here. In the case of my project, the C# classes would be performing the duty of the business logic. This is the layer which is responsible for the information exchange between the user interface and the database.

The Airline Reservation system mainly consists of the Users, which can be further classified into the customer and administrator of the Airline Reservation System website.

The class diagram for the Airline Reservation System would be as follows:

4.1 CLASS DIAGRAM

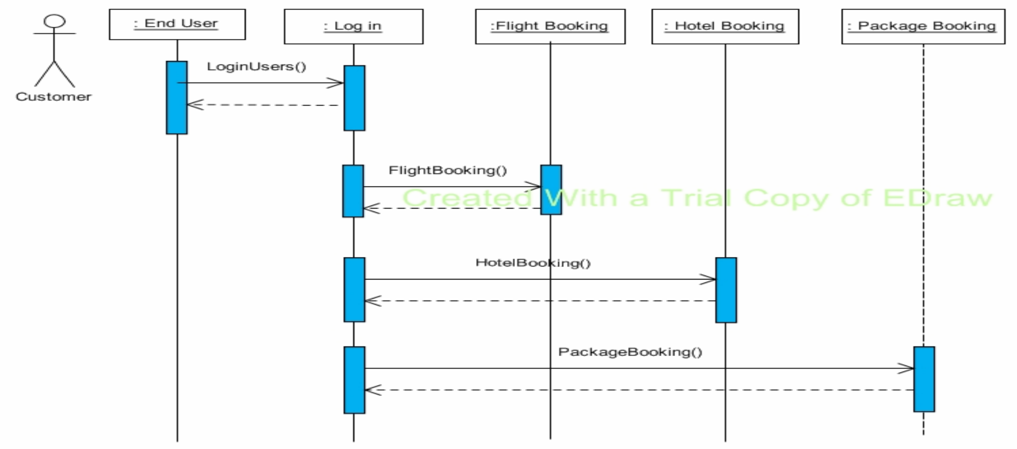
Figure 6 - class diagram



4.2 SEQUENCE DIAGRAM

The sequence diagram for the Customer of the Airline Reservation System would be as follows:

Figure 7 - sequence diagram for customer



5. DATABASE TIER

The database tier is the final and last tier of the three-tier architecture. All the data related to the Airline Reservation System project is stored and retrieved from here. For this project I have used the Microsoft SQL server to create the database. To be specific, Microsoft SQL server 2000 is being used. It is very easy to work with and makes creation and maintaining of tables very easy.

CHAPTER 4 - INSPECTION CHECKLIST

1. INTRODUCTION

The major purpose of the document is to provide a checklist to the formal technical inspectors of the Airline Reservation System project. The technical inspectors of the project will be provided with a checklist which they will use to verify the correctness and the consistency of the Airline Reservation System project. This helps the developer to understand any shortcomings present in the project.

2. ITEMS TO BE INSPECTED

The items that are to be inspected by the Formal Technical Inspectors are as follows:

- Vision Document
- Architecture Design Document
- UML diagrams like the class diagram, sequence diagram
- Formal specification document

3. FORMAL TECHNICAL INSPECTORS

The formal technical inspectors for the Airline Reservation System project are as follows:

- Srunokshi Neelakantan
- Sandhya Bathini

4. FORMAL TECHNICAL INSPECTION CHECKLIST

The formal technical inspection checklist for the Airline Reservation System project would be as follows:

Table 3 - inspection checklist

Items to be inspected	Pass /Fail/Partial	Comments
1. The document follows the MSE portfolio standard which is described at: http://mse.cis.ksu.edu/mse-portfolio.htm		

2. All the classes used in the USE model are represented in the class diagram		
3. The multiplicities have been correctly depicted in the class diagram		
4. All the symbols used in the class diagram are according to the UML standards		
5. Classes are clearly depicted in the class diagram		
6. The symbols used in the sequence diagram correspond to the UML standards		
7. Sequence diagram matches the class diagram		
8. All the diagrams are correct and match the documentation presented to the technical inspectors		

CHAPTER 5 - FORMAL REQUIREMENTS SPECIFICATION

```
model AirlineReservationSystem
```

----- CLASSES

```
class User
attributes
    userid: string
    password: string
    emailid: string
    name: string
    loginstatus : Boolean
operations
    VerifyLogin(email : string , password : string) : Boolean = user.allInstances -> exists (
    u: user | u.emailid = emailid and u.password = password)
end

class Customer < User
attributes
      userid : string
      password : string
      customername : string
      emailid : string
      address : string
      phonenumber : integer
      creditcardnumber : integer
      age : integer
operations
     register()
     login() : Boolean
     searchflights()
     bookflights()
    searchpackages()
    bookpackages()
    searchhotels()
    bookhotels()
    browse()
end

class flight()
attributes
        flightnumber : integer
        noofseats : integer
        source : string
        destination :string
end

class hotel()
attributes
       hotelname : string
       hotelid : integer
       noofrooms: integer
end

class package()
attributes
       packageid : integer
end

class seat()
attributes
```

```
        seatnumber : integer
    end
```

---- ASSOCIATIONS

-- This association is being written to indicate that there should be some number of seats on the plane greater than zero.

```
association planeseats between
Flight[1] role belongto
Seat[10..300] role has
end
```

-- A customer can book any no.of seats on the flight, depending upon the capacity of the flight.

```
Association customerandseats between
Customer[1] role bookedby
Seat[1..*] role books
End
```

-- A customer should be seated in the flight in only one seat.

```
Association customerseated between
Customer[1] role holds
Seat[1] role isheld
End
```

---- CONSTRAINTS

-- This constraint is written to indicate that each customer who registers to the Airline Reservation system website should have a unique id.

```
Context user
inv uniqueid:
user.allInstances -> forAll( u1,u2 | u1 <> u2 implies u1.userid <> u2.userid)
```

end

--This constraint is written to indicate that each user will have a unique e-mail id.

Context user

inv uniqueemail:

user.allInstances -> forAll(us1,us2 | us1 <> us2 implies us1.emailid <> us2.emailid)

end

-- This constraint is written to indicate that each customer's e-mail id, should be unique

Context customer

inv uniqueemail:

customer.allInstances -> forAll(c1,c2| c1<>c2 implies c1.emailid <> c2.emailid)

end

-- This constraint is written to indicate that the number of seats in the flight should be greater than zero

Context flight

inv noofseats:

flight.allInstances -> forAll (f1 | f1.nooseats >= 1)

end

--This constraint is written to ensure that no two flights have the same number.

Context flight

Inv uniquename:

flight.allInstances -> forAll (f1,f2| f1<>f2 implies f1.flightnumber <> f2.flightnumber)

end

--This constraint is written to ensure that a hotel can have multiple rooms.

Context Hotel

Inv hotelrooms:

Hotel.allInstances -> forAll(h1| (h1.noofrooms) ->size() >=1)

end

CHAPTER 6 - COMPONENT DESIGN

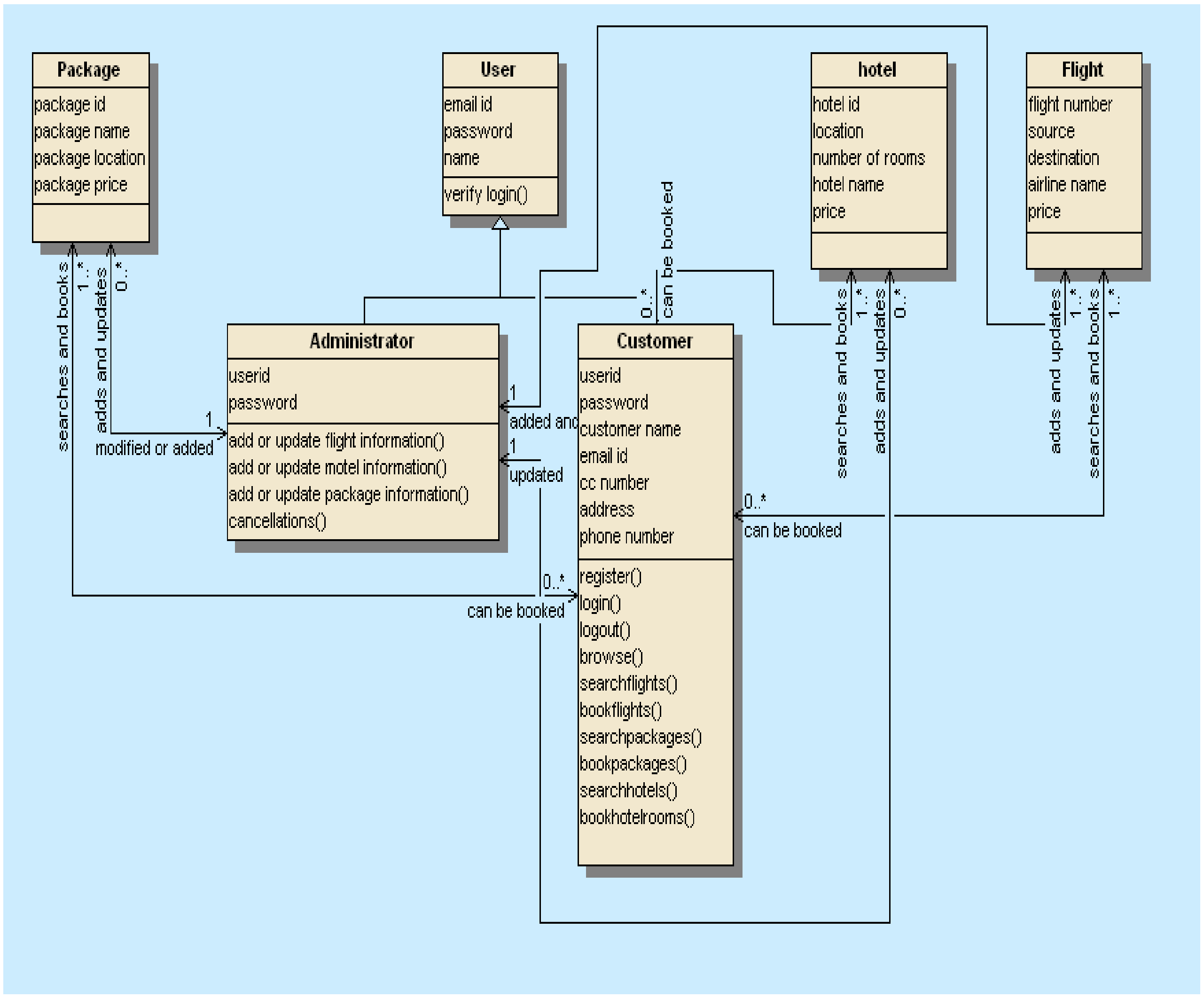
1. INTRODUCTION AND PURPOSE

The main purpose of the Component Design document is to provide and explain the component design for the Airline Reservation System project in detail.

2. CLASS DIAGRAM

The class diagram of the Airline Reservation System project would be as follows:

Figure 8 - class diagram



2.1 CLASS DESCRIPTIONS

2.1.1 USER

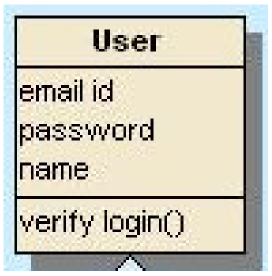


Figure 9 - user class

The user class is responsible for handling all the user functions. This user class is the super class or the base class for two types of users namely the customer and the administrator. The user logging into the system will be mainly verified for their username and password., which is the email id for the customer and a username for the administrator.

2.1.2 ADMINISTRATOR

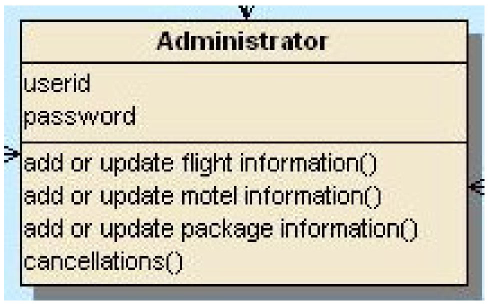

Administrator
userid
password
add or update flight information()
add or update motel information()
add or update package information()
cancellations()

Figure 10 - administrator class

The administrator class is the sub class of the user class. This class is mainly depicted here to define all the attributes and functions carried out by the administrator of the Airline Reservation System website. The attributes for the administrator of the Airline Reservation System website are the userid and password, which the administrator uses to log on to the Airline Reservation system website. The administrator would be able to perform the tasks of adding or updating the information for flights, motels and packages etc.

2.1.3 CUSTOMER

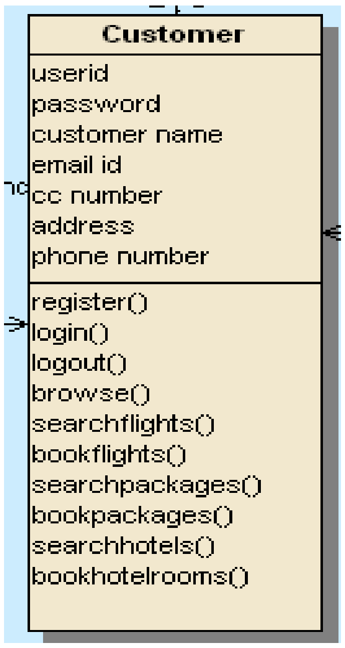


Figure 11- customer class

The customer class has been depicted here as it is a sub class for the super class user of the Airline Reservation System project. The attributes for the customer would be the userid, password, customer name, email id, credit card number, address, phone number.

The functions that the customer of the website would be able to perform are :

Register() – the customer would be able to register onto the system

Login() - the customer can login with the email id and password

Logout() – the customer would be able to logout of the system

Browse () – the customer can browse through the website

Searchflights() and bookflights() – the customer would be able to search and book the flights available on the website.

Searchpackages() and bookpackages() - the customer would be able to search and book packages available on the website

Searchhotels() and bookhotels() - the customer would be able to search and book for the hotels available on the website

2.1.4 PACKAGE

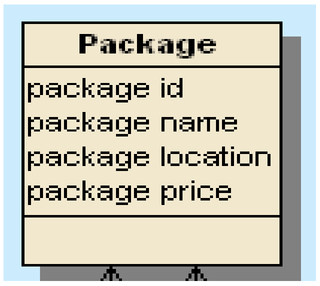


Figure 12 - package class

The class package is depicted in the class diagram to represent the set of packages present in the application. The customer can book packages using the PackageSearch page. Package generally has the following attributes:

Package id – a unique id given to a package

Package name – the name of the package

Package location - the location of the package…it indicates the place where the package is available

Package price – the price of the package

2.1.5 FLIGHT

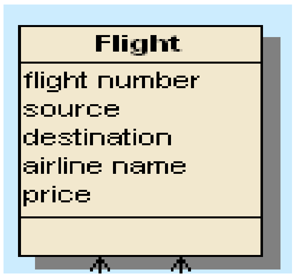


Figure 13 - flight class

The class flight is depicted in the class diagram to represent the set of flights present in the application. The customer can book packages using the FlightSearch page. A flight present in the airline reservation system, generally has the following attributes:

Flight number - A unique number is given to the flight airline name – the name of the airline that the flight belongs to

source – the place where the flight has as its beginning point

destination – the place where the flight has as its end point

price – the price of the airline ticket of a particular flight

2.1.6 HOTEL

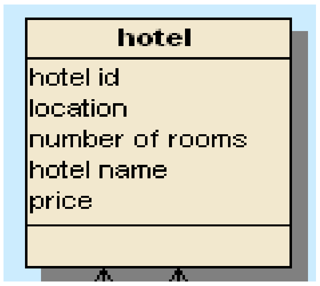


Figure 14 - hotel class

The class hotel is depicted in the class diagram to represent the set of hotels present in the application. The customer can book hotels using the HotelSearch and HotelBooking page. A Hotel available in the Airline Reservation System application generally has the following attributes:

hotel id – a unique id given to a hotel

hotel name – the name of the hotel

location - the location of the hotel

number of rooms – the number of rooms available at each hotel

price – the price of each room in a hotel

CHAPTER 7 - SOFTWARE QUALITY ASSURANCE PLAN

1. PURPOSE

The main purpose of the Software Quality Assurance plan is to ensure production of high quality end software product according to the specific requirements stated. The Software Quality Assurance plan of the Airline Reservation System establishes the goals, processes and responsibilities required to ensure high quality and on-time delivery of the project. The results of the reviews and audits conducted in the Software Quality Assurance plan would be provided to the appropriate management of the project, so that they can track and assess the progress being made on the project.

2. REFERENCE DOCUMENTS

- IEEE standard for Software Quality Assurance Planning
- IEEE guide for Software Quality Assurance Planning
- Project Plan document for the Airline Reservation System

3. MANAGEMENT

3.1 ORGANIZATION

The organization consists of the supervisory committee, major professor, developer and two formal technical inspectors.

Supervisory Committee

The supervisory committee consists of:

- Dr. Daniel Andresen
- Dr. Torben Amtoft
- Dr. Mitchell L. Nielsen

Major Professor

- Dr. Daniel Andresen

Developer

The developer for this project is Kaavya Kuppa.

Formal Technical Inspectors

The formal technical inspectors of the Airline Reservation Project are:

- Sandhya Bathini
- Srunokshi Neelakantan

3.2 RESPONSIBILITIES

Supervisory Committee

The supervisory committee will be responsible for attending the presentations and submitting their reviews at the end of each phase. After each presentation, the committee will provide feedback and suggestions pertaining to each phase.

Major Professor

The major professor of the project will supervise and evaluate the work of the developer on a regular timely basis. Along with the other supervisory committee activities, he will also measure the progress being made by the developer at each meeting.

Developer

The developer of the project will be responsible for all the documentation and software development tasks of the Airline Reservation System project. The developer will also meet the major professor on a timely basis to report the progress of the project.

Formal Technical Inspectors

The formal technical inspectors are necessary to ensure good quality of the software design of the project. They will be responsible for a technical review of the architecture design artifacts and the formal requirements specifications and will also be required to submit a formal report based on their observations.

These formal technical inspectors will be provided with a formal technical inspection checklist, which will contain all the items that need to be inspected. After inspecting the project against all the items in the checklist, the two technical inspectors will provide their report, which will be included in the documentation for the project.

3.3 TASKS

All the tasks performed during the Airline Reservation System project are documented in the project plan. The project plan along with the software quality assurance plan will be reviewed at the end of phase 1 by the supervisory committee and all the changes necessary will be incorporated in the documents and will be submitted at the end of phase 2.

4. DOCUMENTATION

The documentation for the Airline Reservation System project consists of documents submitted at the end of each phase of the project. They consist of the vision document, project plan, software quality assurance plan, architecture design, test plan, formal technical inspection, prototype, user manual, component design, source code, assessment evaluation, project evaluation, references and finally the formal technical inspection letters. The supervisory committee will review all the documentation submitted at the end of each phase for final approval. All the documentation prepared for the Airline Reservation System project will be uploaded at the developer’s website at:

http://people.cis.ksu.edu/~kaavya/MSE%20PROJECTPAGE.htm

5. STANDARDS, PRACTICES, CONVENTIONS AND METRICS

Documentation Standard

The IEEE standards are used as a guideline for all the documentation of the project.

Coding Standard

The project follows the guidelines in the C# coding standards and style guide.

Commentary Standard

Comments are used in the project to give a brief description of the code, which mainly focuses on the functionality and purpose of the commented areas.
Each block of statements will be well-commented. Each routine will also have a comment which will be placed above the specific routine.

Testing Standard

The IEEE standard for software test documentation will be used for the Airline Reservation System project.

Metrics

The basic COCOMO model will be used to estimate the project time and effort.

6. REVIEWS AND AUDITS

The main purpose of the reviews and audits is to check the quality of the application as it develops. Apart from the audits and reviews conducted periodically, all the project documentation will also undergo some technical inspections which will ensure that the quality of the documentation is in compliance with the project. The developer of the project will give three formal presentations, one at the end of each phase. The supervisory committee members will conduct periodic reviews on the project code and documentation and will also evaluate the performance of the developer at the end of each phase. So, the committee members will also evaluate the software prototype at the end of each presentation and suggest changes that need to be incorporated in the project code or documentation. The two formal technical inspectors of the project, assess the architecture design artifacts and submit a formal report based on their observations.

7. TEST AND PROBLEM REPORTING

The developer of the Airline Reservation System will develop a test plan which will outline all the test activities. All the tests and their results will be evaluated and documented. These documents will also be reviewed by the supervisory committee members. All the unresolved problems will be reported to the committee members.

8. TOOLS, TECHNIQUES AND METHODOLOGIES

The following are the tools that will be used for coding, testing and documentation:

- Microsoft Visual Studio .NET 2003 – for coding
- C# - for coding
- HTML – for coding
- JavaScript for coding
- IIS – for web server
- ASP.NET – for web forms
- SQL server 2000 – for database server
- MS WORD 2003 – for documentation
- XML – for coding
- NUnit – for unit testing
- JMeter for performance testing
- User Testing

9. RECORDS COLLECTION, MAINTENANCE AND RETENTION

Three copies of the design documentation are to be produced. One will be kept in the Kansas State University Library, one with the major professor and the third with the developer himself. A softcopy of the entire source code, documentation and web pages of the Airline Reservation System project will be submitted to the major professor. A copy will also be kept with the developer.

10. DELIVERABLES

The following set of deliverables will be submitted at the end of each phase:

Phase I

Vision Document 1.0

Project Plan 1.0

Software Quality Assurance Plan

Phase II

Action items identified during phase I

Vision Document 2.0

Project Plan 2.0

Formal Requirement Specification

Architecture Design

Test Plan

Formal Technical Inspection – submitted by two individual MSE students

Executable Architecture Prototype

Phase III

Action items identified during phase II

User Manual

Component Design

Source Code

Assessment Evaluation

Project Evaluation

Test Results

References

Formal Technical Inspection- submitted by two individual MSE students

CHAPTER 8 - TEST PLAN

1. TEST PLAN IDENTIFIER

Airline Reservation System – V 1.0

2. INTRODUCTION

The main purpose of the test plan for the Airline Reservation System is to discuss the testing details of the use cases of the Airline Reservation System. The software project test plan also describes the objective, scope and approach of the software testing effort for the Airline Reservation System project. The test plan for the Airline Reservation System also indicates the personnel responsible for each task and also specifies the risks associated with the test plan.

2.1 OBJECTIVES

The main objectives of the test plan for the Airline Reservation System are as follows:

- To identify the features of the system that will be tested.
- To identify and define all the activities necessary to prepare for and conduct the testing process on the Airline Reservation System
- To define the pass/fail criteria for each item that will be tested
- To identify the deliverables of the testing phase.
- To define any suspension criteria and resumption techniques
- To discuss the testing techniques being used to test the Airline Reservation System.

2.2 REFERENCES

The following references have been used in the preparation of the Test Plan document for the Airline Reservation System:

- IEEE Standard for Software Test Documentation Std 829-1998
- Deliverables of the Phase I for the Airline Reservation System.
- MSE Portfolio lectures online
- Wikipedia

2.3 DEFINITIONS

The following are some of the terms and definitions that are related to the test plan of the Airline Reservation System:

- **Pass/Fail criteria:** Decision rules that are used to determine whether a software item passes or fails a test.
- **Test:** A collection of one or more test cases
- **Test Item:** A software item that is an objective of testing.
- **Test Plan:** A document describing the scope, approach, resources and schedule of the intended testing activities.
- **Test Summary Report:** A document summarizing the testing activities and results.
- **Testing:** The process of analyzing a software item to detect the differences between the existing and required conditions.

3. TEST ITEMS

This section of the test plan lists all the items of the Airline Reservation System project that will be tested:

- Login
- Search and book flights
- Search and book packages
- Search and book hotels
- Register

4. APPROACH

This section of the test plan describes the overall approach for testing the Airline Reservation System project. The approach followed for testing the Airline Reservation System ensures that the major features of the project are adequately tested. All the testing will be done with the help ANTS (Advanced .NET Testing System). The testing would be carried out on the Airline Reservation System while logging into the system as a customer or a normal user of the system.

4.1 UNIT TESTING

The Unit Testing is a test that tests each single module of the software to check for errors. This is mainly done to discover errors in the code of the Airline Reservation System. The main goal of the unit testing would be to isolate each part of the program and to check the correctness of the code. In the case of the Airline Reservation System, all the web forms and the C# classes will be tested. There are many benefits for this unit testing:

- The unit testing facilitates change in the code.
- It allows testing to be done in a bottom up fashion.

At the same time, unit testing has some disadvantages such as, it might not identify each and every error in the system.

4.2 INTEGRATION TESTING

In Integration Testing, the individual software modules are combined and tested as a whole unit. The integration testing generally follows unit testing where each module is tested as a separate unit. The main purpose of the integration testing is to test the functional and performance requirements on the major items of the project.

All the modules of the project developed individually would be combined together and tested as a whole system in the integration testing.

4.3 REGRESSION TESTING

The Regression Testing is generally done whenever modifications are made to the source code of a project. The Regression Testing can also be defined as the process of testing changes made to the computer program and also makes sure that the older programming still works with the new changes.

So, before any new version of a software product is released, the old test cases for the project will be run against the software with the changes made, to make sure that the old functionalities of the project still work.

4.4 ACCEPTANCE TESTING

This testing is generally performed when the project is nearing its end. This test mainly qualifies the project and decides if it will be accepted by the users of the system. The users or the customers of the project are responsible for the test.

4.5 SYSTEM TESTING

The system testing is mainly done on the whole integrated system to make sure that the project that has been developed meets all the requirements. The test cases for the system testing will be the combination of unit and integration tests.

5. TEST CASES

The following are the test cases for the Airline Reservation System:

5.1 TEST CASE 1 – USER LOGIN

- **Incorrect Input:** Incorrect username, which is the email-id in the case of the Airline Reservation System.
- **Pass Criteria:** An appropriate message should be generated to indicate that an invalid username has been typed.
- **Correct Input:** The correct input would be a valid e-mail id of the user and a correct password associated with the email-id which he uses to log in.
- **Pass Criteria:** The user should be directed to the webpage that the customer is intended to go to after he logs into the system.

5.2 TEST CASE 2 – USER REGISTRATION

- **Incorrect Input:** Wrong format entered in the input fields for the registration page.
- **Pass Criteria:** An appropriate message should be generated to the user saying that he has entered the wrong format in the specific input field.
- **Correct Input:** The correct input would a correct format entered by the customer into the input fields of the registration page.

- **Pass Criteria:** The pass criteria for this test case would be a successful registration of the customer into the Airline Reservation System website. The system would log the user into the system after this.

5.3 TEST CASE 3 – USER REGISTRATION

- **Incorrect Input:** The data fields left out empty in the registration page.
- **Pass Criteria:** An error message should be generated to the user saying that he has to fill out those fields in order to be registered into the system.
- **Correct Input:** The correct input in this case, would be that the customer would enter the data in all the fields in the registration form.
- **Pass Criteria:** The pass criteria for the system would be that it accepts all the customer details and then registers the customer and helps him log into the system.

5.4 TEST CASE 4 – SEARCH AND BOOK FLIGHTS

- **Incorrect Input:** Incorrect input in this case, would be incorrect search criteria entered or incorrect format of data entered into the data entry fields of the flight search and booking page.
- **Pass criteria:** A message has to be generated to the user indicating the wrong entry that he has made in the fields.
- **Correct Input:** A correct input would be entering the data into the data entry fields in a correct format.
- **Pass Criteria:** The pass criteria for this test case would be that the search would return valid results and then when the customer made the booking, the system has to generate a confirmation to the customer and indicate that an e-mail has been sent to the customer.

5.5 TEST CASE 5 – SEARCH AND BOOK PACKAGES

- **Incorrect Input:** Incorrect input in this case, would be incorrect search criteria entered or incorrect format of data entered into the data entry fields of the package search and booking page. In this case, a wrong input would be an incorrect package id etc.

- **Pass criteria:** A message has to be generated to the user indicating the wrong entry that he has made in the fields.
- **Correct Input:** A correct input would be entering the data into the data entry fields in a correct format.
- **Pass Criteria:** The pass criteria for this test case would be that the search would return valid results and then when the customer made the booking, the system has to generate a confirmation to the customer and indicate that an e-mail has been sent to the customer.

5.6 TEST CASE 6 – SEARCH AND BOOK HOTELS

- **Incorrect Input:** Incorrect input in this case, would be incorrect search criteria entered or incorrect format of data entered into the data entry fields of the hotel search and booking page. In this case, an incorrect input would be an incorrect hotel id, or an incorrect format of date entered in the input field for the date.
- **Pass criteria:** A message has to be generated to the user indicating the wrong entry that he has made in the fields.
- **Correct Input:** A correct input would be entering the data into the data entry fields in a correct format.
- **Pass Criteria:** The pass criteria for this test case would be that the search would return valid results and then when the customer made the booking, the system has to generate a confirmation to the customer and indicate that an e-mail has been sent to the customer.

6. PASS OR FAIL CRITERIA

The test cases executed on the Airline Reservation System will pass if they meet the specific requirements mentioned in the Vision document of the project. A test case is said to fail, if the desired functionality is not satisfied by the system.

7. SUSPENSION CRITERIA AND RESUMPTION REQUIREMENTS

7.1 SUSPENSION CRITERIA

Testing for all the dependant features will be suspended if a test case fails. The failed test case will be logged onto the test log which contains the description for the error.

7.2 RESUMPTION REQUIREMENT

The test cases which are not dependant on the case where the bug is reported will be executed in parallel with the bug fixing. Once the failed test case has been taken note of and has been identified and fixed then the testing for the failed test case will resume.

8. TEST DELIVERABLES

The following documents will be produced after the testing phase for the Airline Reservation System has been completed.

- Test Plan
- Test Cases
- Test Log

CHAPTER 9 - ASSESSMENT EVALUATION

1. INTRODUCTION

The Assessment Evaluation document presents the results obtained by testing the Airline Reservation System. The test cases are in reference to the test cases defined in the Test Plan document from the Phase II.

2. TEST CASE RESULT SUMMARY

The summary of the test case result has been depicted in the table shown below:

These are the test cases for the User/Customer pages. The major part of testing has been concentrated on the customer pages, as they would be the main clients of the Airline Reservation System website.

Table 4- user/customer pages testing summary

TEST CASE #	DESCRIPTION	RESULTS/COMMENTS
TC # 1	**User Login**	**Passed**
TC # 2	**User Registration**	**Passed**
TC # 3	**Search and Book Flights**	**Passed**
TC # 4	**Search and Book Packages**	**Passed**
TC # 5	**Search and Book Hotels**	**Passed**

The below table represents the summary of results of testing on the Administrator pages. The results have been explained in detail later in the document.

Table 5 - Administrator pages testing summary

TEST CASE #	DESCRIPTION	RESULTS/COMMENTS
TC # 6	**Administrator sign in**	**Passed**
TC # 7	**New Flight/Package/ Hotel addition**	**Passed**
TC # 8	**Updating Flight/Package/Hotel details**	**Passed**

3. DETAILED TEST RESULTS

3.1 MANUAL TESTING

To start with, I have performed manual testing on the Airline Reservation System website. Manual Testing is one of the oldest and rigorous methods of software testing. This testing strategy gives the best opportunity to check every page thoroughly and make sure it works in the expected manner. Due to the complexity of the various automation tools and the time available for testing the entire web application, I preferred to use manual testing based on the fact that it is one of the best methods of testing suggested for a beginner.

All the test cases mentioned in the Test Plan document of Phase II were tested here. The results of the manual testing are represented in the following tables:

3.1.1 TC # 1 – USER LOGIN

Table 6 - tc # 1 - user login

TEST UNIT	TEST CASE	RESULT
Log In Button	An invalid username(which is the e-mail id in this case) or password is entered by the user	The system generates a message saying " invalid user id" or invalid password, whichever is the case.
Log In Button	A valid username and password is entered by the user	The system logs on the user and transfers him to the booking page

3.1.2 TC # 2 - USER REGISTRATION

Table 7 - tc # 2 - user registration

TEST UNIT	TEST CASE	RESULT
New User button (Used for Register)	Wrong format entered in the input fields of the registration page	The system prompts a message to the user saying that

		he has entered a wrong format in the input fields.
New User button	Passwords and Confirm Password fields do not match in the registration page	The system generates a message to the user saying "please enter the confirm password field" again.
New User button	Data Fields left out empty in the registration page.	The system prompts a message to the user asking him to fill the empty fields he has left out.
New User button	Correct data entered into the fields in the register page	The system accepts the details of the customer and then logs him onto the system and displays the page where he can search and book for flights, packages and hotels.

3.1.3 TC # 3 – SEARCH AND BOOK FLIGHTS

Table 8 - tc # 3 search and book flights

TEST UNIT	TEST CASE	RESULT
Flight booking	Wrong format of information entered into the data fields of the flight booking page	The system generates an error message to the user indicating that the wrong format of data is entered and to re-enter the data.
Flight Booking	Wrong date format, in the date of journey data field, wrong flight number in the Flight Number	The systems generates a message to the user saying that he has entered an invalid date

	fields etc, (similarly for all the other data fields of the FlightSearch page)	format and incase of wrong flight number, indicates that his entry is invalid.
Flight Booking	Correct format of data is entered into the data fields in the flight booking page.	The system allows the users to book the flight by providing details required and directs them to the booking confirmation page.

3.1.4 TC # 4 – SEARCH AND BOOK PACKAGES

Table 9 - tc # 4 search and book packages

TEST UNIT	TEST CASE	RESULT
Package Booking	Wrong format of data is entered into the data fields of the package booking page	The system displays an error message to the user saying that invalid form of data has been entered into the data fields of the page.
Package Booking	Correct form of data is entered into the datafields of the PackageSearch.aspx page.	The system verifies the details entered by the customer, accepts the details and confirms package booking by redirecting the customer to the package confirmation page.

3.1.5 TC # 5 - SEARCH AND BOOK HOTELS

Table 10 - tc # 5 search and book hotels

TEST UNIT	TEST CASE	RESULT

Hotel Booking	Wrong format of data is entered into the data fields of the flight search page.	The system displays an error message to the user saying that he has entered invalid data into the data fields
Hotel Booking	Correct data entered into the data entry fields of the HotelSearch.aspx Page	The system then verifies and accepts the data entered by the user into the data entry fields allowing the user to book hotel specified and then directs him to the hotel confirmation page

All the above mentioned results are for the customer pages. On the whole, the user/customer pages have passed the manual testing phase. The manual testing results for the Administrator pages of the Airline Reservation System are as follows:

3.1.6 TC # 6 - ADMINISTRATOR SIGN IN

Table 11 - tc # 6 Administrator sign in

TEST UNIT	TEST CASE	RESULT
Administrator sign in feature	Wrong username/password entered into the username and password data fields	The system generates a message to the user saying that an incorrect username / password have been entered.
Administrator sign in feature	Correct username and password entered into the username and password fields in the Administrator sign in page.	The system verifies the details and allows the administrator to log on to the system.

3.1.7 TC # 7 – NEW FLIGHT/PACKAGE/HOTEL ADDITION

Table 12 - new flight /hotel/.package addition

TEST UNIT	TEST CASE	RESULT
Add new flight /package/hotel to the database	The administrator tries to add flight details already matching the details of a flight present in the database. In other words, a duplicate record is being created by the administrator.	The system generates a message to the Administrator saying that the Record already exists, thus avoiding duplicates.
Add new flight feature	The administrator enters new flight details into the form, that is those details are already not present in the database.	The system then verifies the details entered by the Administrator and then saves the entry into the table and displays a message that Record has been saved successfully.

3.1.8 TC # 8 – UPDATING FLIGHT, PACKAGE, MOTEL DETAILS

Table 13 - updating flight, package, motel details

TEST UNIT	TEST CASE	RESULT
Update flight/package/motel details button	The administrator enters the wrong format of data in the data fields of the flight/motel/package page and hits the update button	The system displays a message to the Administrator saying that wrong format of data has been entered into the data fields
Update flight/package/motel	The administrator enters the correct format of data in the data entry	The system verifies the details entered by the

details button	fields for the flight/motel/package updating	administrator and then sends a message to the admin saying that the update was successful and updates the details in the database.

Thus, the Administrator web pages have also passed the manual testing phase and thus the above results have been produced.

3.2 PERFORMANCE TESTING

In general performance testing can be defined as one form of testing where we test the system to determine how fast the system performs under a particular workload. Several other features of the system such as scalability and security etc can also be tested under the performance testing phase. For the performance testing of the Airline Reservation System, I have used the JMeter tool. The Apache JMeter is a 100% pure Java desktop application which has been designed to load test functional behavior and measure performance. This tool has been originally designed for Web Applications, which has now been extended to a variety of other functions.

The Apache JMeter can be used to performance test both static and dynamic sources. With JMeter I was able to test various combinations of load types on the Airline Reservation System web application and analyze the strength of the system.The inputs to the JMeter tool, generally used for the performance testing of a web application would be as follows:

- Number of Threads /Users – The total number of people sending requests to a web page
- Ramp-Up Period - The Ramp Up period would be the time taken by J Meter to create and make sure that all the threads are up and running.
- Loop Count – It would be the value which determines the number of times that the test should be carried out.

The criteria selected to be the input to the JMeter tool for the Airline Reservation System would be explained later in the document. For the performance testing of the Airline Reservation System, I have chosen three kinds of pages.

1. Home Page of the Airline Reservation System - It deals with people just accessing the Home page of the Airline Reservation System. There is no database activity involved here. So this would be one good choice

   http://localhost/Kansas%20Air/Home.aspx

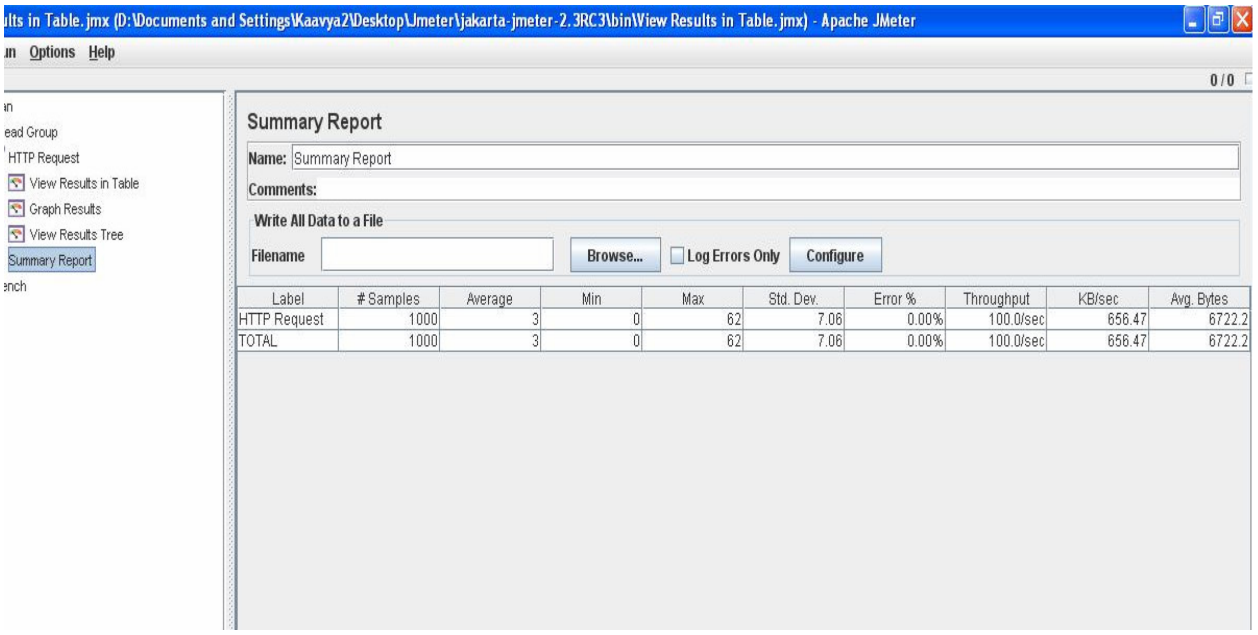
2. Login Page of the Airline Reservation System- This is the page where the user logs onto the home page of the system and is redirected to the Booking.aspx page after he logs in. So, here it involves authentication and some database activity. This would be another good choice.

3. Flight Search and Booking Page of the Airline Reservation System

   Here, the user searches for the available flights in the database of flights available and makes a reservation for a specific flight. There is a lot of database activity involved with the flight search page. The results of the JMeter testing are as follows for each of the above mentioned pages:

3.2.1 Home page of Airline Reservation System website

http://localhost/Kansas%20Air/Home.aspx



Summary Report

Name: Summary Report

Comments:

Write All Data to a File

Filename

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	KB/sec	Avg. Bytes
HTTP Request	1000	3	0	62	7.06	0.00%	100.0/sec	656.47	6722.2
TOTAL	1000	3	0	62	7.06	0.00%	100.0/sec	656.47	6722.2

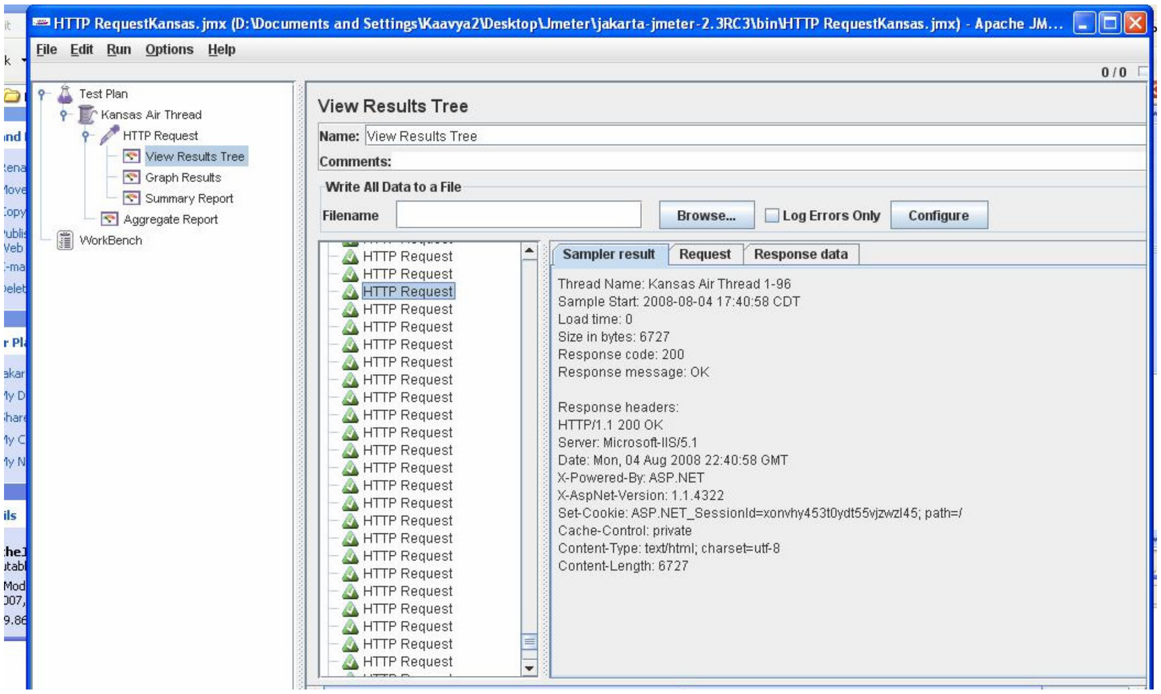
Fig: Summary report for Home.aspx page

The above screenshot shows the result of running the JMeter test for the home page of the Airline Reservation System project. The above sample has been obtained as a result of the following load details applied in the JMeter:

Thread Count	Ramp-Up Period	Loop Count
100	**10**	**10**

Thus the above result was obtained for a total of 1000 samples.

The following screen shot shows the response code 200 generated by the JMeter after it has accessed the page. Here the Response 200 code is generated in a response that the home page has been detected by the server.



Name: View Results Tree
Comments:
Filename

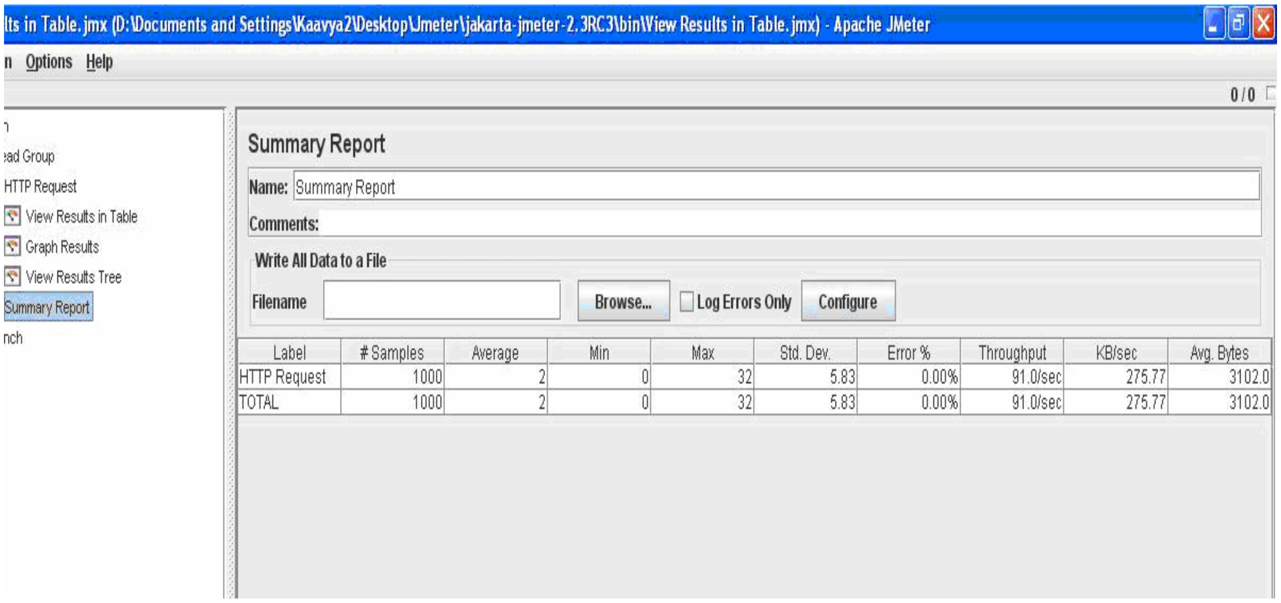
Thread Name: Kansas Air Thread 1-96
Sample Start: 2008-08-04 17:40:58 CDT
Load time: 0
Size in bytes: 6727
Response code: 200
Response message: OK

Response headers:
HTTP/1.1 200 OK
Server: Microsoft-IIS/5.1
Date: Mon, 04 Aug 2008 22:40:58 GMT
X-Powered-By: ASP.NET
X-AspNet-Version: 1.1.4322
Set-Cookie: ASP.NET_SessionId=xonvhy453t0ydt55vjzwzl45; path=/
Cache-Control: private
Content-Type: text/html; charset=utf-8
Content-Length: 6727

The response time for the Home page was very less, and the number of requests handled per sec is higher when compared to the other pages of the project. Since there is no database activity involved. For the home page a throughput of about 100 requests/sec is recorded, which is the number of requests handled by the server per second.

3.2.2 Login Page of the Airline Reservation System

http://localhost/Kansas%20Air/Booking.aspx



Summary Report

Name: Summary Report

Comments:

Write All Data to a File

Filename

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	KB/sec	Avg. Bytes
HTTP Request	1000	2	0	32	5.83	0.00%	91.0/sec	275.77	3102.0
TOTAL	1000	2	0	32	5.83	0.00%	91.0/sec	275.77	3102.0

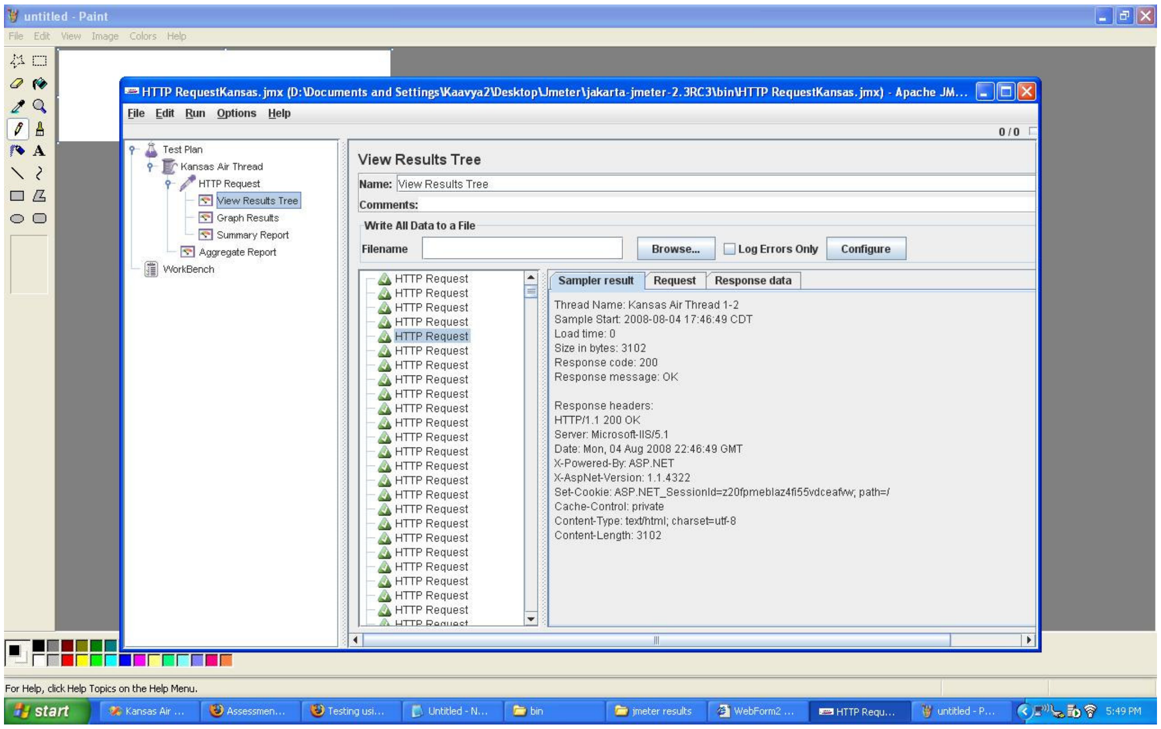
Figure: Summary report for Booking.aspx

The above screenshot is produced as a result of the JMeter test performed on the Booking.aspx page, which can be accessed by the user after he logs onto the website. The above result has been produced as a result of the following load being applied on the server:

Thread Count	Ramp Up Period	Loop Count
100	**10**	**10**

Thus, for a total of about 1000 samples, the above results were recorded by JMeter. The response time for the Booking.aspx page is a little higher than that of the Home page. The Home page of the project does not have any database activity related to it. Where as for the Booking.aspx page, the customer has to login in order to access the page. So, the response time for the Booking.aspx page was a little higher when compared to the Home.aspx.

The result of the response created by JMeter while accessing the Booking.aspx page is as follows:



Name: View Results Tree

Comments:

Write All Data to a File

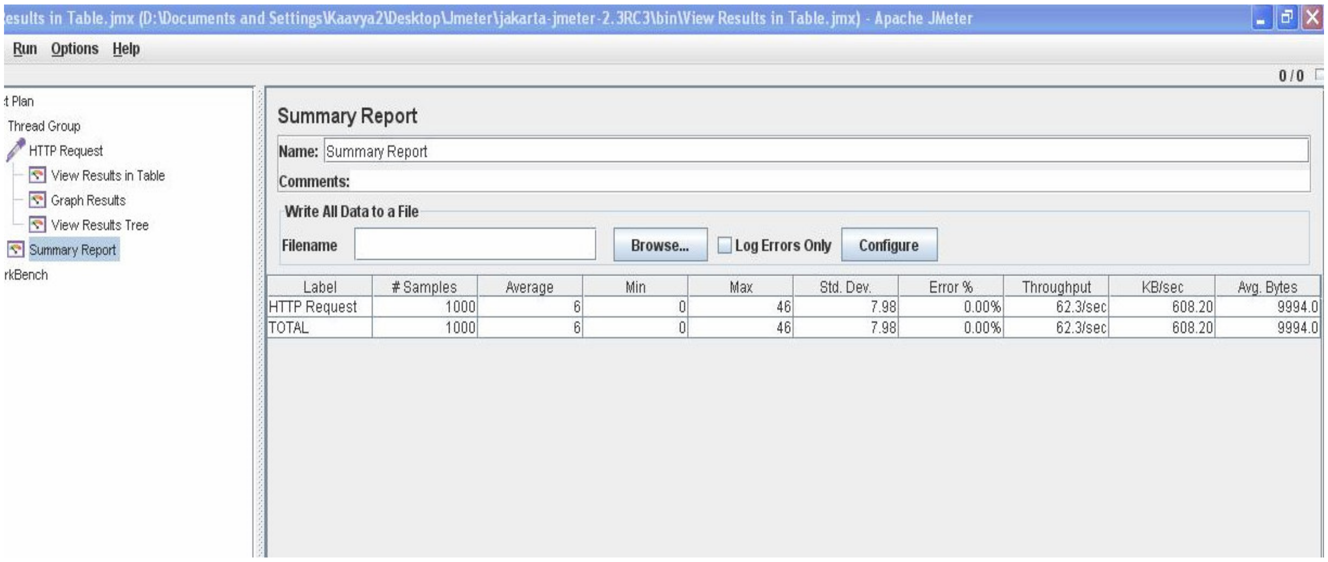
Filename

```
Thread Name: Kansas Air Thread 1-2
Sample Start: 2008-08-04 17:46:49 CDT
Load time: 0
Size in bytes: 3102
Response code: 200
Response message: OK

Response headers:
HTTP/1.1 200 OK
Server: Microsoft-IIS/5.1
Date: Mon, 04 Aug 2008 22:46:49 GMT
X-Powered-By: ASP.NET
X-AspNet-Version: 1.1.4322
Set-Cookie: ASP.NET_SessionId=z20fpmeblaz4fi55vdceafvw; path=/
Cache-Control: private
Content-Type: text/html; charset=utf-8
Content-Length: 3102
```

3.2.3 Flight Search and booking page of the Airline Reservation System

http://localhost/Kansas%20Air/FlightSearch.aspx



Name: Summary Report

Comments:

Write All Data to a File

Filename

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	KB/sec	Avg. Bytes
HTTP Request	1000	6	0	46	7.98	0.00%	62.3/sec	608.20	9994.0
TOTAL	1000	6	0	46	7.98	0.00%	62.3/sec	608.20	9994.0

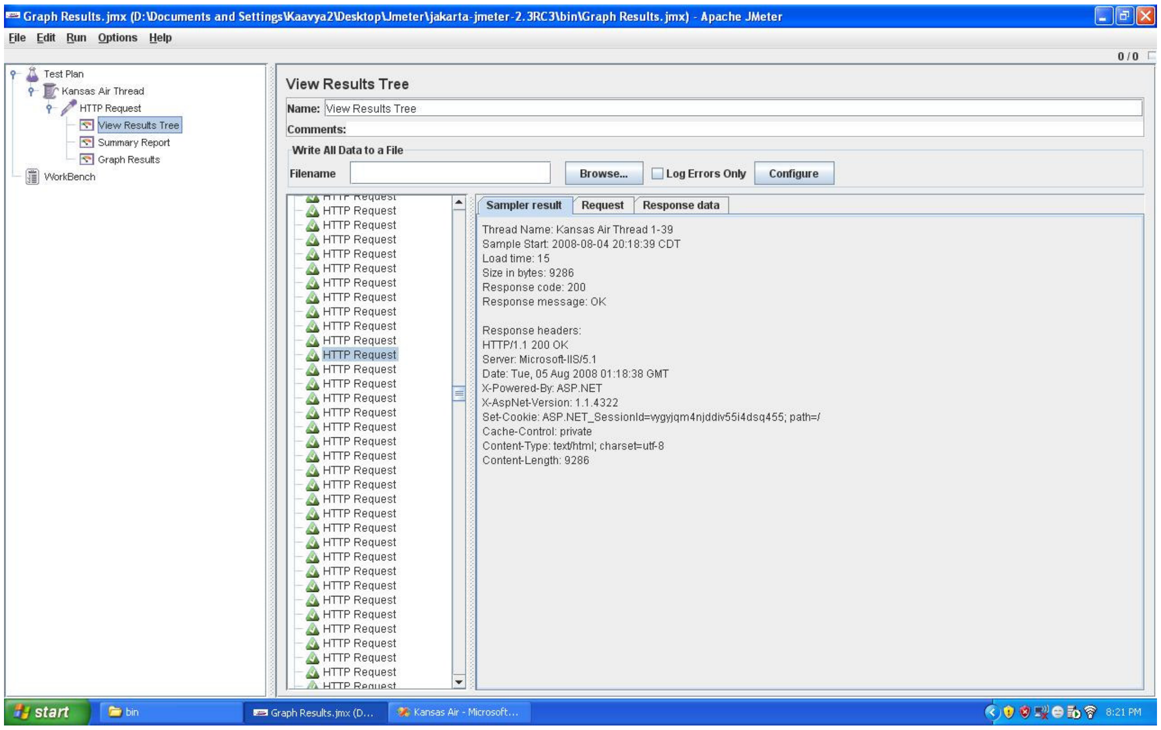
Fig: Summary report for the FlightSearch.aspx page

The above screenshot is produced as a result of the JMeter test performed on the FlightSearch.aspx page, which can be accessed by the user after he logs onto the website. The above result has been produced as a result of the following load being applied on the server:

Thread Count	Ramp Up Period	Loop Count
100	10	10

Thus, for a total of about 1000 samples, the above results were recorded by JMeter. The throughput for the FlightSearch.aspx page is very less when compared to the Home.aspx page or the Booking.aspx page. It is because, the Flights available to the customer are displayed on this page from the database and then the customer searches for a desirable flight and book the flight. The response time for the FlightSearch.aspx page is very high when compared to the other two pages. The time taken for the page to load is also very high compared to the other two pages.

The result of the response created by the JMeter for the FlightSearch.aspx page is as follows:



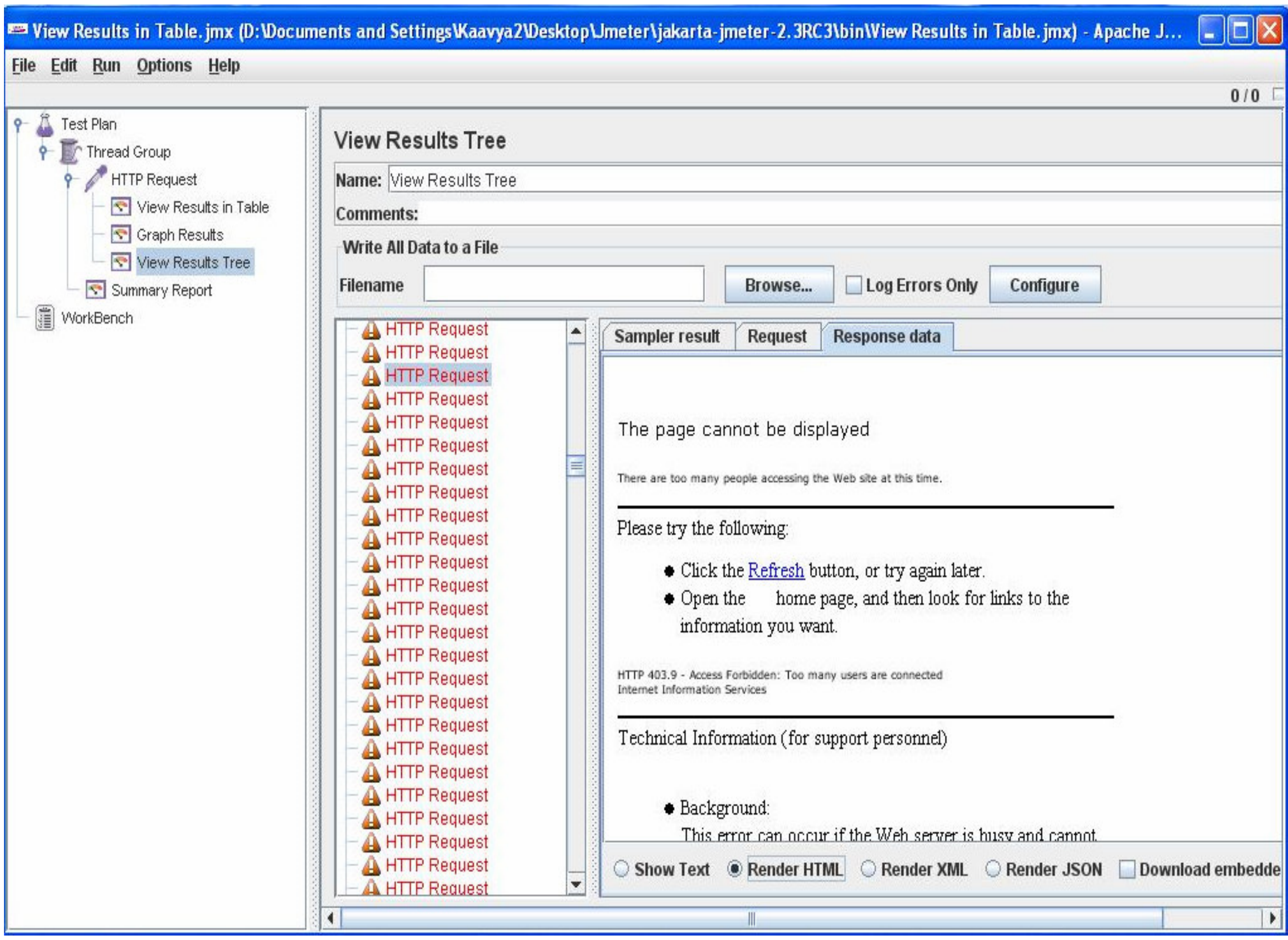
```
Thread Name: Kansas Air Thread 1-39
Sample Start: 2008-08-04 20:18:39 CDT
Load time: 15
Size in bytes: 9286
Response code: 200
Response message: OK

Response headers:
HTTP/1.1 200 OK
Server: Microsoft-IIS/5.1
Date: Tue, 05 Aug 2008 01:18:38 GMT
X-Powered-By: ASP.NET
X-AspNet-Version: 1.1.4322
Set-Cookie: ASP.NET_SessionId=vygyjqm4njddiv55i4dsq455; path=/
Cache-Control: private
Content-Type: text/html; charset=utf-8
Content-Length: 9286
```

4. OBSERVATIONS

Based on the results obtained from the JMeter, the following observations were made:

1. The system can accept only a total of 800 users at a time. But there are some exceptions to this too. If a combination of 800 users with a loop count of 1 was used for testing, then system responds well. But when a combination of 800 users with a greater loop count is used , it produced the following output in the response window of JMeter:



The page cannot be displayed

There are too many people accessing the Web site at this time.

Please try the following:

- Click the Refresh button, or try again later.
- Open the home page, and then look for links to the information you want.

HTTP 403.9 - Access Forbidden: Too many users are connected
Internet Information Services

Technical Information (for support personnel)

- Background:
  This error can occur if the Web server is busy and cannot

Ultimately, the page requested would not be available to any of the users and an error message would be displayed saying that there are too many people connected to the IIS server and that the access to the requested web page is forbidden.

There are many factors affecting the behavior of the server.

a. The Airline Reservation system project runs on a personal version of IIS and on a personal computer. So, the hardware capability of the system might be one of the reasons for the server to respond slowly.

b. JMeter also took a lot of time to respond to each request. This might be due to the fact that the server on the laptop is very slow. So, the results produced by JMeter also might not be accurate results.

2. The throughput obtained for the three pages are different. The three pages have been tested under the same condition that is for 100 users, the loop count being 10 and the ramp up period also being 10. The home page of the Airline Reservation System project does not have any database activity involved with it. So the throughput for it is very high when compared to the other pages.

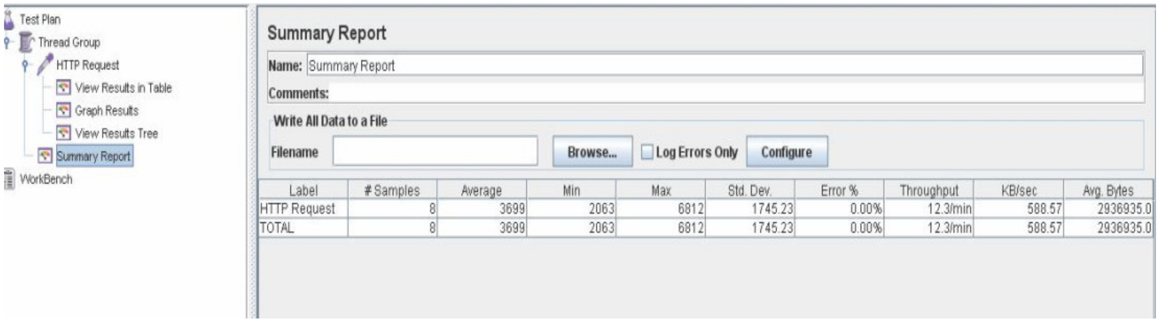
WEB PAGE	THROUGHPUT
Home page	**100/sec**
Login page	**91.0/sec**
Flight Search and Booking page	**62.3/sec**

Table: Comparison of throughput for three pages

3. The response time for each page also increases with the number of users accessing the page. For the three pages the average response time with the number of users as 100, loop count as 10 and ramp up period as 10, are as follows:

Web Page	Average Response Time
Home.aspx	3 ms
Booking.aspx	2 ms
FlightSearch.aspx	6 ms

Upon increasing the number of elements present in the customer database table, which is by adding around 5000 new rows of random data to the customer table, the results obtained for JMeter are as follows:



Summary Report

Name: Summary Report

Comments:

Write All Data to a File

Filename

☐ Log Errors Only

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	KB/sec	Avg. Bytes
HTTP Request	8	3699	2063	6812	1745.23	0.00%	12.3/min	588.57	2936935.0
TOTAL	8	3699	2063	6812	1745.23	0.00%	12.3/min	588.57	2936935.0

The throughput also decreases a lot and the number of requests handled by the server reduces to about 12.3 requests per second.

The average response time for the customer details page before adding large number of rows into the database table and after adding 5000 rows of data to the database table are as follows:

WEB PAGE	BEFORE	AFTER
CustomerDetails.aspx	5 ms	3699 ms

The average response time of the page has shot up by a very high percentage.
I have added 10,000 users to the customer table and tested the application with JMeter, the error rate obtained was very high and JMeter displayed a message in the response window saying that there are too many users accessing the website and the access has been forbidden.

4. The above results are also influenced by the fact that the IIS server and the database server run on the same machine. So, this excessive load might also affect the results being produced by the JMeter tool.

Based on the above observations the following conclusions can be made about the Airline Reservation System project:

1. The error percentage for each of the three pages is always 0%. So, the pages are very reliable to the customer.
2. A decent throughput has also been obtained for the tested pages and it is above 63 requests/sec. However by improving the hardware of the system and by testing under conditions where the overall performance of the system is very high also produces changes in the results.
3. Since the IIS server and the database server run on the same machine, the results obtained by JMeter might be affected by this factor. The performance and scalability of the Airline Reservation System could be further improved by using dedicated Database server and a dedicated web server.

Thus the above observations have been drawn based on results of testing of Airline Reservation System.

CHAPTER 10 - USER MANUAL

1. INTRODUCTION

The User Manual explains us the step by step procedure to set up and use the Airline Reservation System web application.

2. INSTALLATION AND SETUP

This section describes the required software and hardware for the Airline Reservation System project.

2.1 REQUIRED HARDWARE

- A Microsoft SQL Database Server

  The Server should be equipped with a processor clock speed of over 1.5 GHz and a memory of over 512 MB.

- An IIS web-server

  The server should be equipped with a processor speed of over 1.5 GHz and a memory of over 512 MB.

2.2 REQUIRED SOFTWARE

The required software for the Airline Reservation System project would be as follows:

- **Operating System:** Microsoft Windows XP Professional
- **Internet Information Server (IIS):** The IIS Web Server is included in the Windows XP Professional installation CD. Since it is not automatically installed along with the XP Professional Installation, it has to be installed.
- **.NET Framework 1.1 SDK.** It has been installed with the help of an installation CD provided by the CIS department at Kansas State University
- **Microsoft Visual Studio .NET 2003.** It has been downloaded from the MSDNAA account provided by the CIS department at Kansas State University.
- **Microsoft Internet Explorer 5.0 or higher (or) Mozilla Firefox for clients**
- **Microsoft SQL server 2000,** which includes the SQL Query Analyzer and the Enterprise Manager. It can be downloaded from the following website:

http://www.microsoft.com/downloads/details.aspx?FamilyID=D20BA6E1-F44C-4781-A6BB-F60E02DC1335&displaylang=en

2.3 REQUIRED NETWORK CONFIGURATION

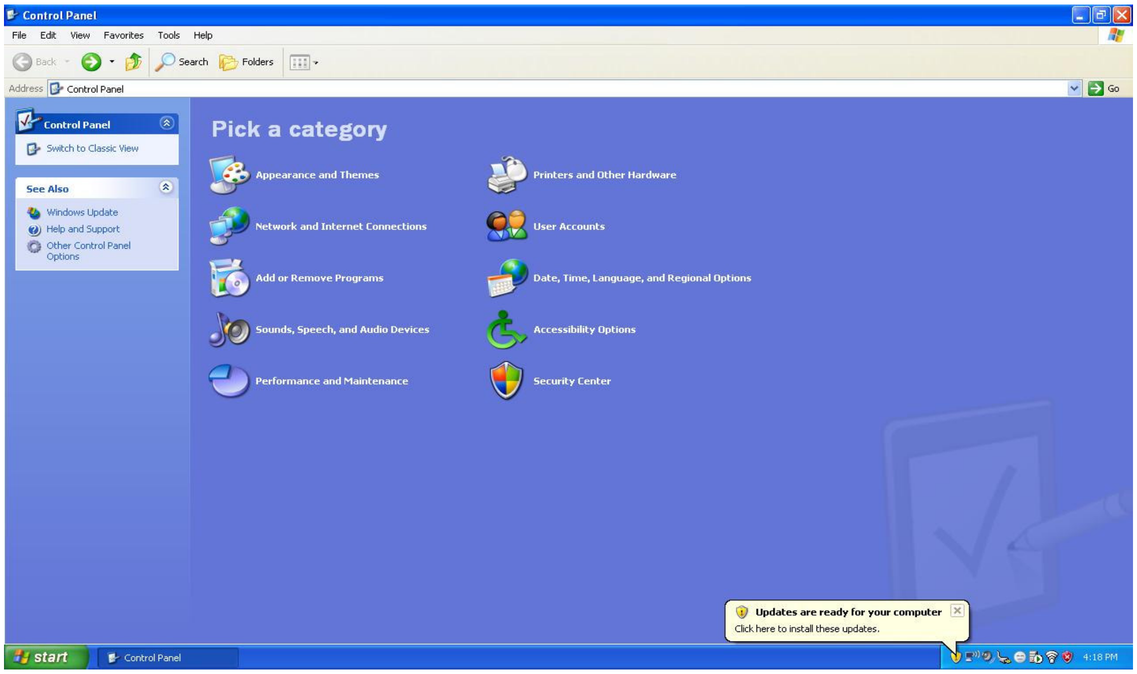
A broadband connection with 10Mbps and above connection is needed to provide fast linkage to the server, thus providing faster service to the user/customer.

2.4 SOFTWARE SET-UP

The Windows XP Professional Operating System is installed in the D: / drive of the laptop.

- Unpack the software to the World Wide Web root of the IIS Server. (Generally it is the "C:\Inetpub\wwwroot" directory. But in this case, since I have the XP Professional Operating System installed on the D:\ drive it is the
  "D:\Inetpub\wwwroot".
- Open the "Web.config" file and change the values of the < add name> property according to your connection configurations.
- Open the SQL server 2000
- Create a database and label it as KansasAir_DB
- Open the SQL Query Analyzer
- Paste the contents of the KansasAir SQL files
- Select the name of the database as Kansas Air_DB
- Select F5 and all the tables will then be populated and formed.
- Open the Internet Information Services
- Go to the Start -> Control Panel -> Performance and Maintenance as shown in the screen shot bellow:

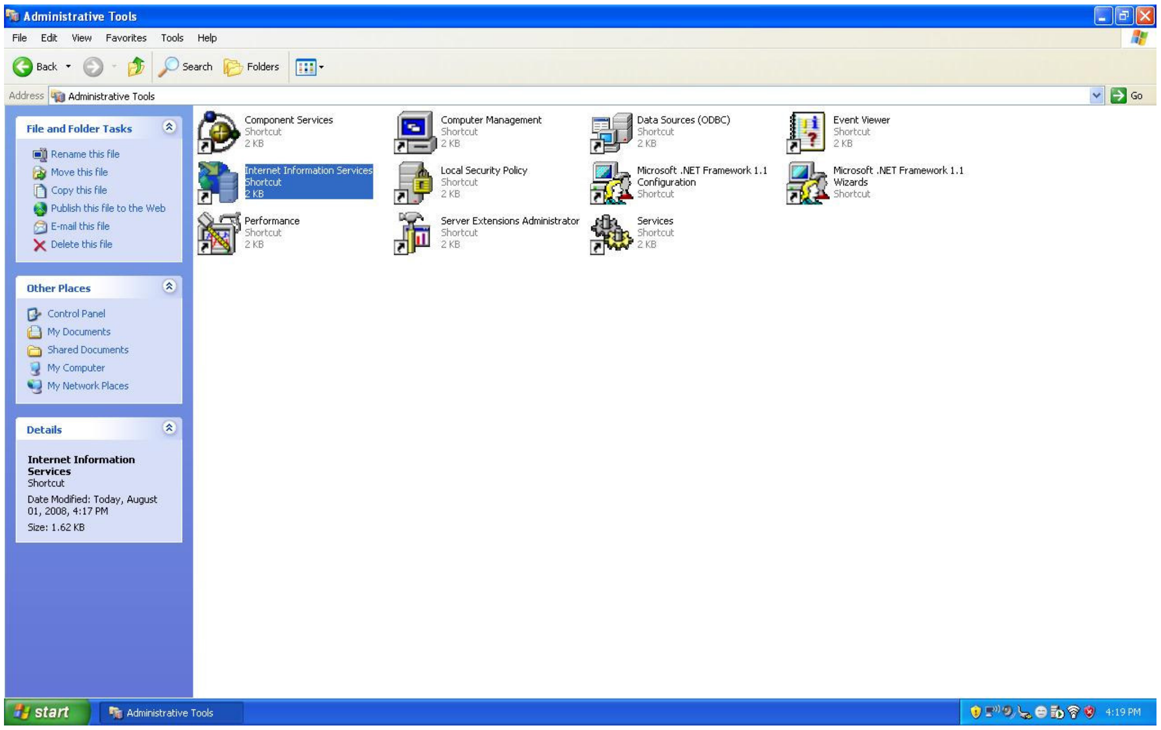
Figure 15 - Performance and Maintenance in Control Panel



Updates are ready for your computer
Click here to install these updates.

- Then select the administrative tools option and then select the Internet Information Services as shown in the figure below:

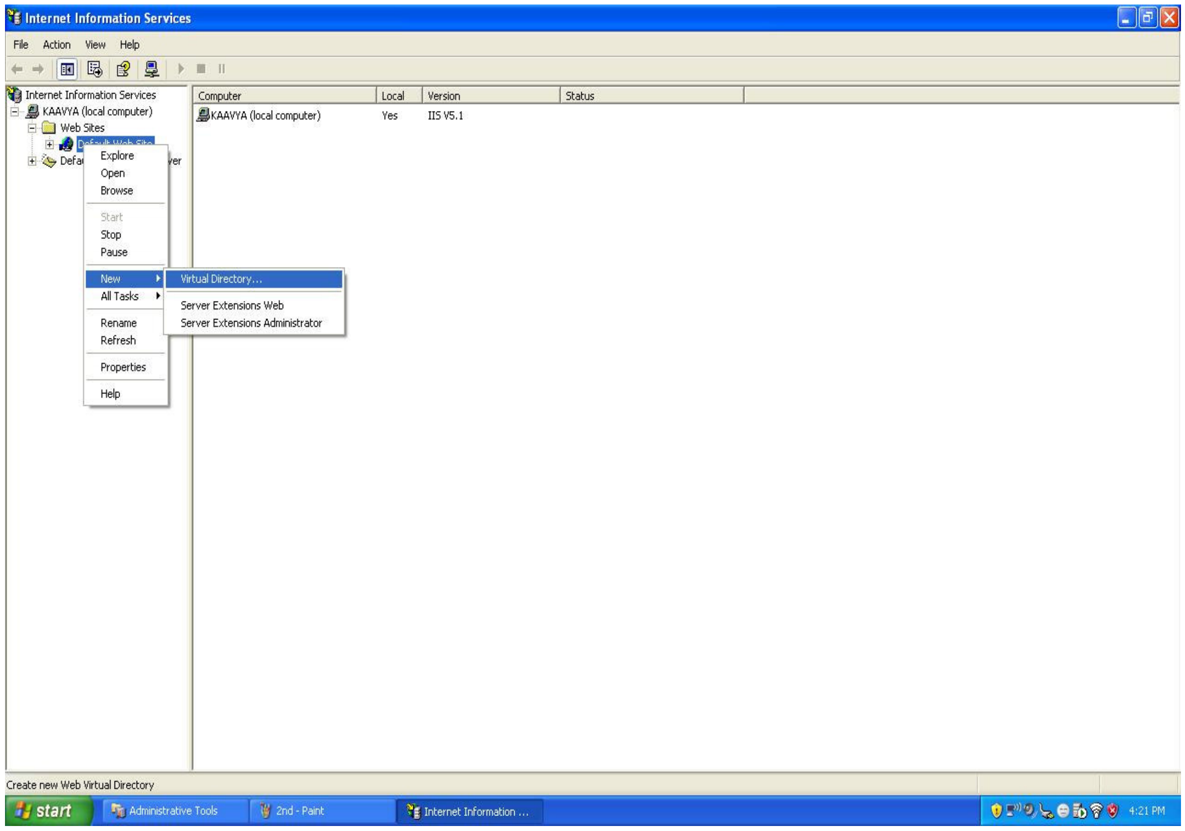
Figure 16 -IIS


Administrative Tools
File Edit View Favorites Tools Help
Back Search Folders
Address Administrative Tools
Go
File and Folder Tasks
Rename this file
Move this file
Copy this file
Publish this file to the Web
E-mail this file
Delete this file
Other Places
Control Panel
My Documents
Shared Documents
My Computer
My Network Places
Details
Component Services Shortcut 2 KB
Computer Management Shortcut 2 KB
Data Sources (ODBC) Shortcut 2 KB
Event Viewer Shortcut 2 KB
Internet Information Services Shortcut 2 KB
Local Security Policy Shortcut 2 KB
Microsoft .NET Framework 1.1 Configuration Shortcut
Microsoft .NET Framework 1.1 Wizards Shortcut
Performance Shortcut 2 KB
Server Extensions Administrator Shortcut 2 KB
Services Shortcut 2 KB
start
Administrative Tools
4:19 PM

Internet Information Services
Shortcut
Date Modified: Today, August 01, 2008, 4:17 PM
Size: 1.62 KB

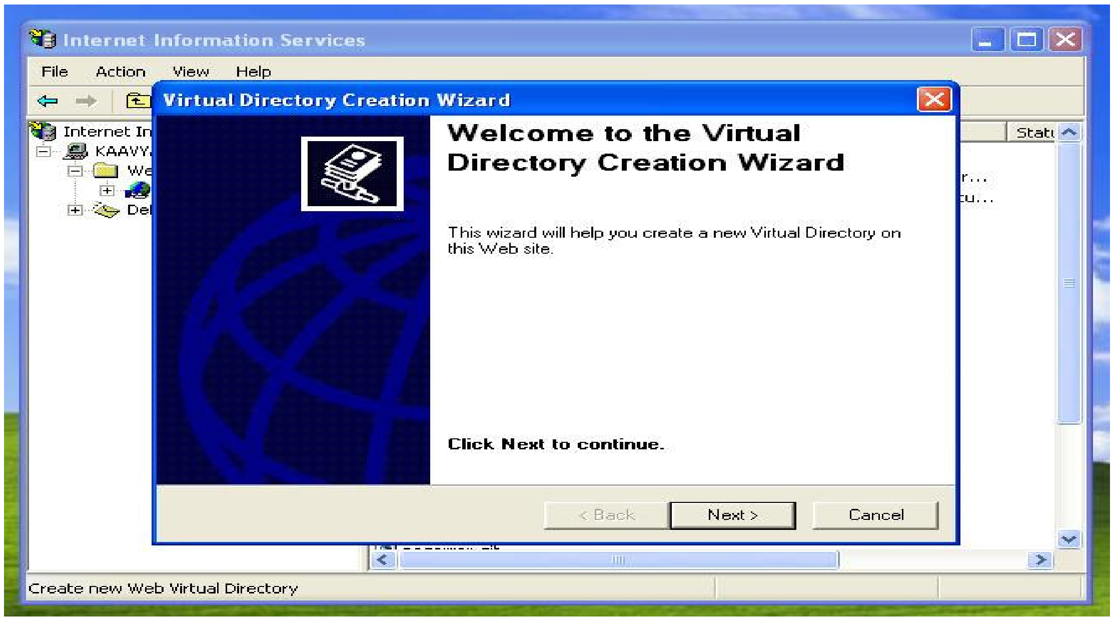
- Now choose the option Web Sites
- Then right click on the Default Web Site option
- Select the New -> Virtual Directory Option as shown in the screenshot below:

Figure 17 - Creating a New Virtual Directory



- Now click on the Next Button which will then open the Virtual Directory Creating Wizard.
- Click the Next Button

Figure 18 - Virtual Directory Creating Wizard


Internet Information Services
File
Action
View
Help
Virtual Directory Creation Wizard
Internet In
KAAVY
We
Del
Statı
r...
cu...
Back
Next >
Cancel
Create new Web Virtual Directory

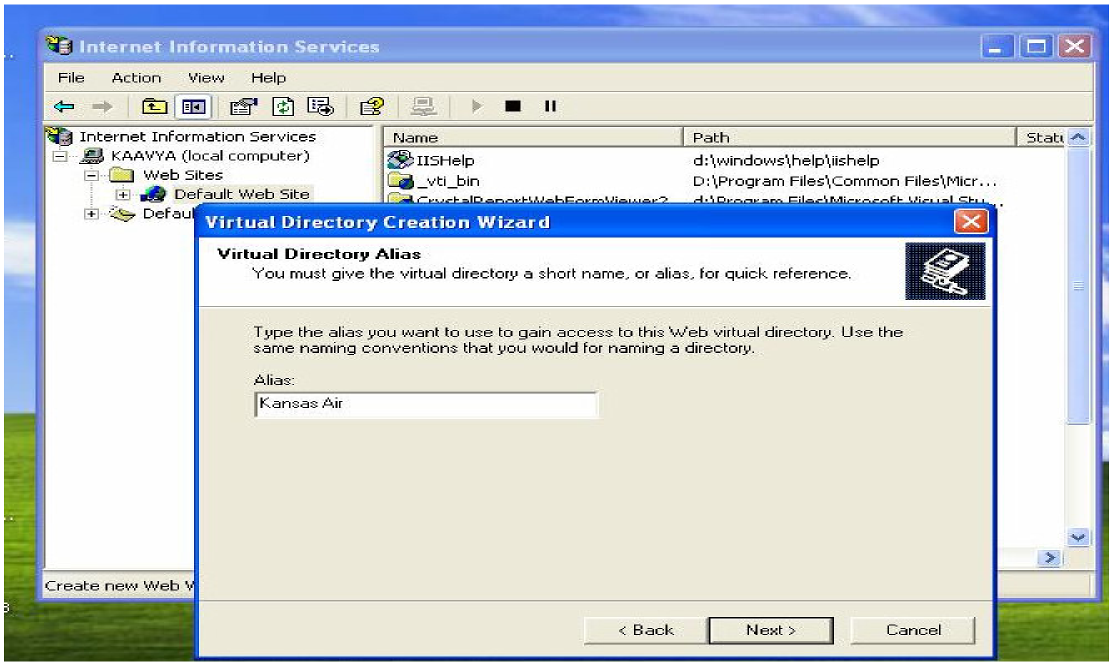
Welcome to the Virtual Directory Creation Wizard

This wizard will help you create a new Virtual Directory on this Web site.

Click Next to continue.

- Enter the Alias Name as Kansas Air and then click the Next Button

Figure 19 - Virtual Directory Alias

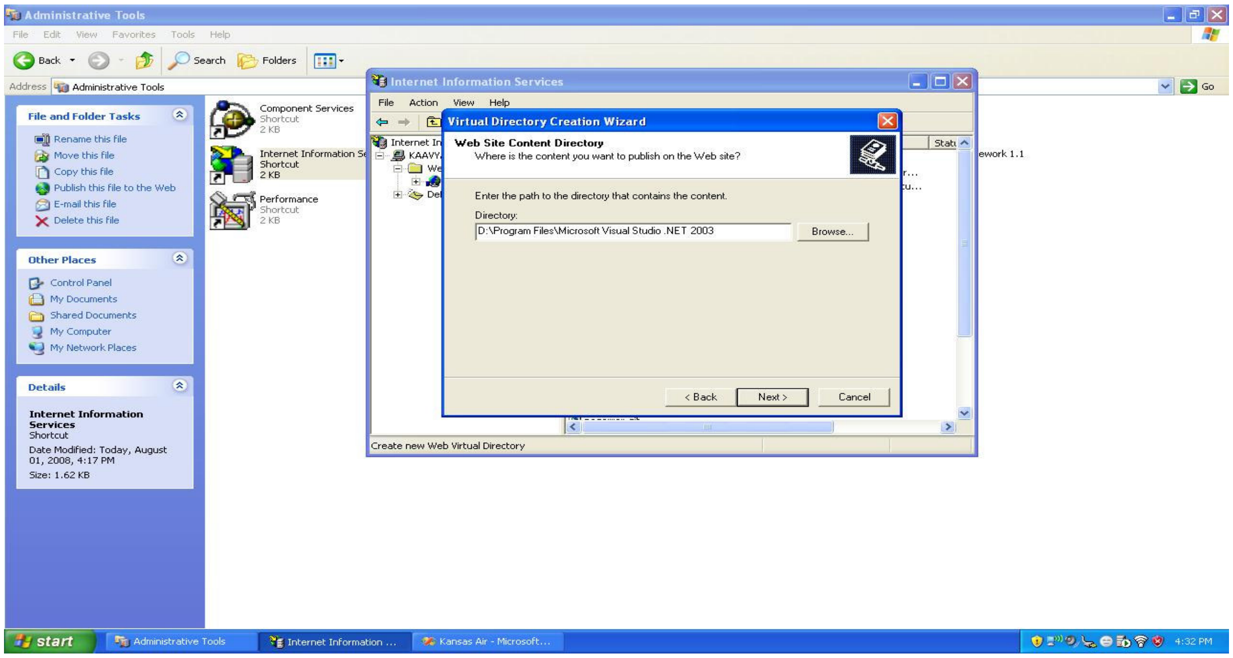

Internet Information Services
File Action View Help
Internet Information Services
KAAVYA (local computer)
Web Sites
Default Web Site
Name Path
IISHelp d:\windows\help\iishelp
_vti_bin D:\Program Files\Common Files\Micr...
Create new Web V
Virtual Directory Creation Wizard
< Back Next > Cancel

Virtual Directory Alias
You must give the virtual directory a short name, or alias, for quick reference.

Type the alias you want to use to gain access to this Web virtual directory. Use the same naming conventions that you would for naming a directory.

Alias: Kansas Air

- Now Browse the directory and select the folder where you have unpacked the software and then click on the Next Button.



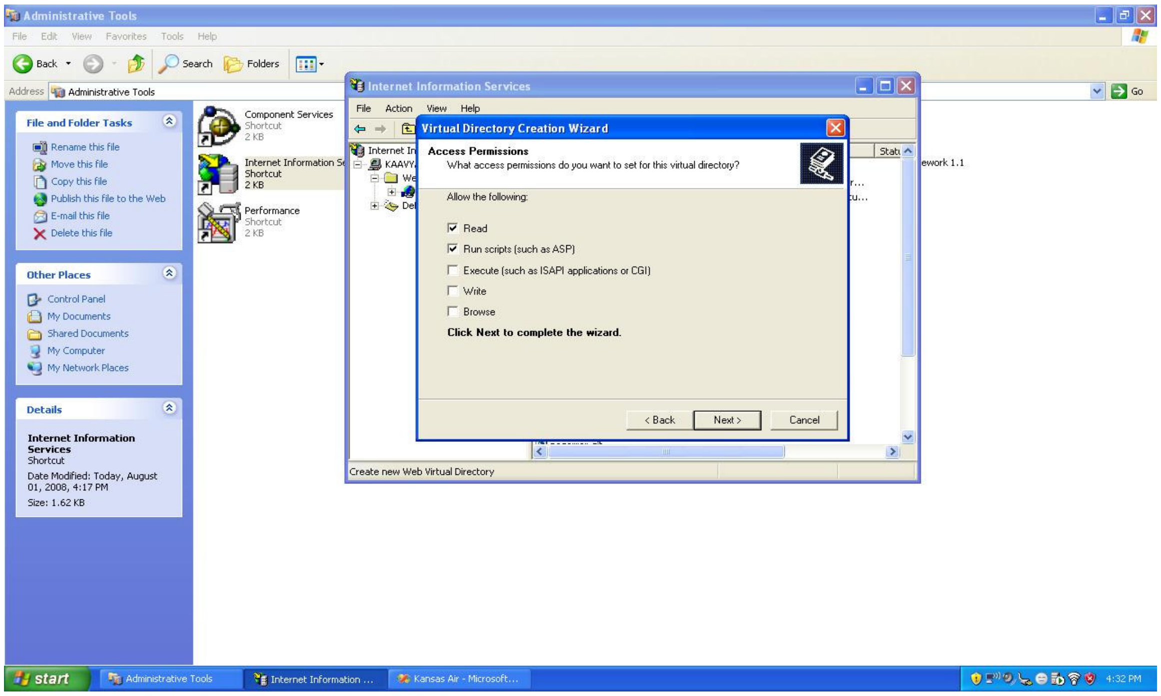
Web Site Content Directory
Where is the content you want to publish on the Web site?

Enter the path to the directory that contains the content.

Directory: D:\Program Files\Microsoft Visual Studio .NET 2003

- Now again click the Next Button

- Then the below screen shot appears



Internet Information Services Shortcut

Date Modified: Today, August 01, 2008, 4:17 PM

Size: 1.62 KB

Virtual Directory Creation Wizard

Access Permissions

What access permissions do you want to set for this virtual directory?

Allow the following:

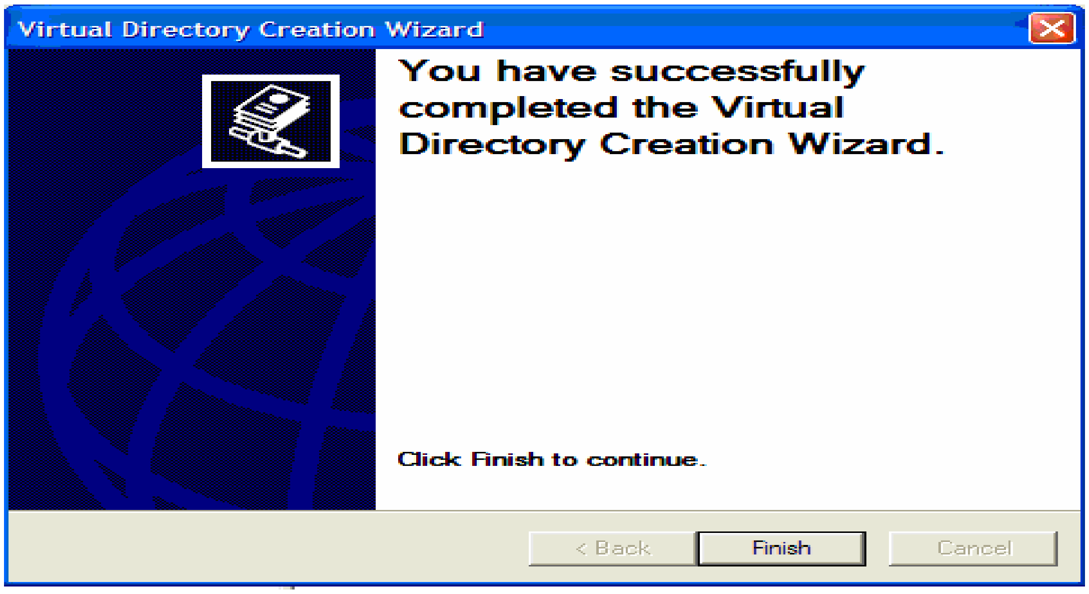
- [✓] Read
- [✓] Run scripts (such as ASP)
- [ ] Execute (such as ISAPI applications or CGI)
- [ ] Write
- [ ] Browse

Click Next to complete the wizard.

< Back | Next > | Cancel

Create new Web Virtual Directory

- Now click the Finish Button. The following screen shot will appear



Virtual Directory Creation Wizard

You have successfully completed the Virtual Directory Creation Wizard.

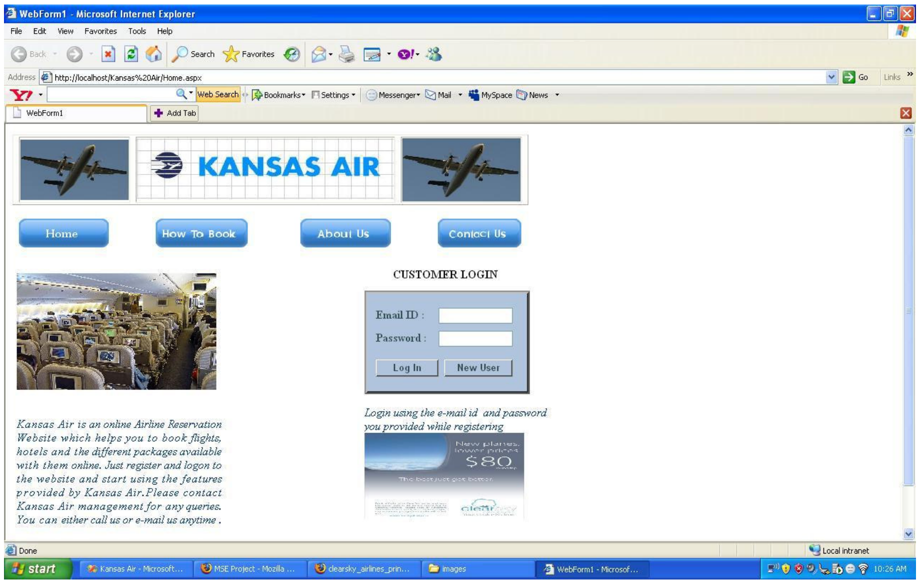
Click Finish to continue.

< Back | Finish | Cancel

- Now after this click on the Kansas Air folder and then select the “ Home.aspx “
- Right click on “Home.aspx” and then select the Browse option.

You should then be able to see the home page of the Airline Reservation System website as follows:

Figure 20 - Home Page of Airline Reservation System



Kansas Air is an online Airline Reservation Website which helps you to book flights, hotels and the different packages available with them online. Just register and logon to the website and start using the features provided by Kansas Air.Please contact Kansas Air management for any queries. You can either call us or e-mail us anytime .

Login using the e-mail id and password you provided while registering

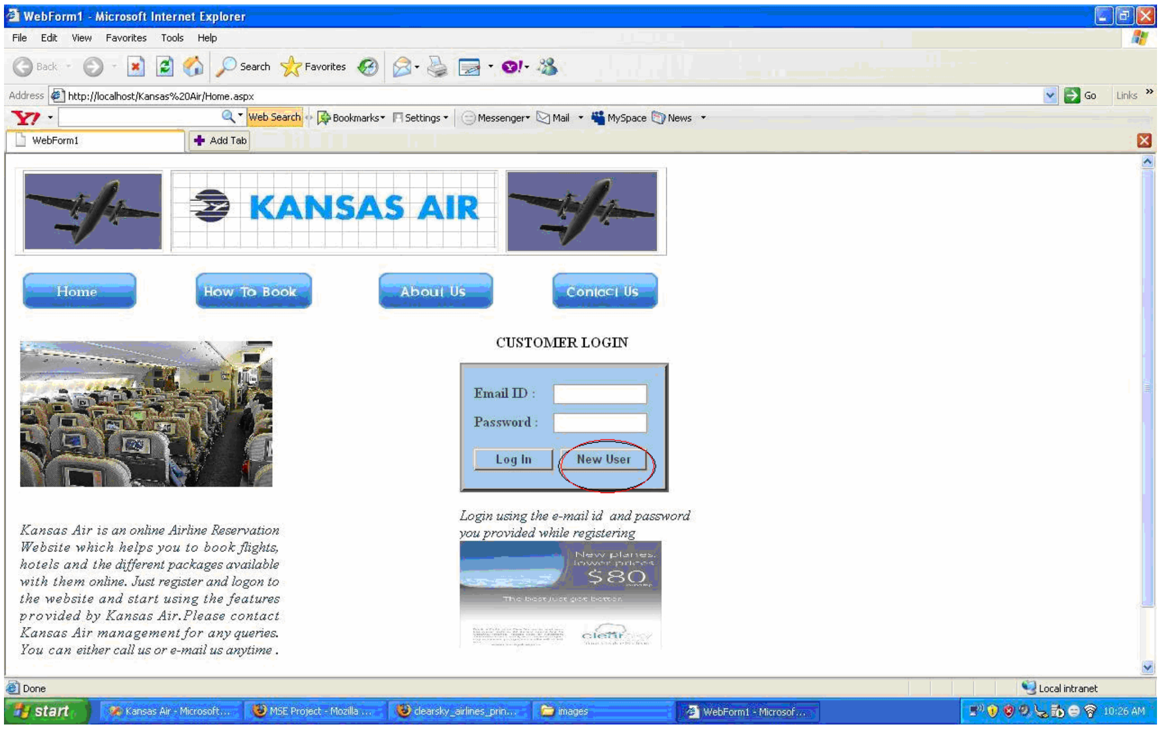
The customer of the Airline Reservation System website will then be able to logon to the system, to start using the features of the website. If the customer of the Airline Reservation System is a new user and does not have an account with the website, he can log on to the system only after registering with the web-site.

3. AIRLINE RESERVATION SYSTEM USAGE FOR CUSTOMERS

3.1 REGISTER FEATURE

After the user views the home page of the Airline Reservation System website, he can begin to browse the links available on the home page of the application. The main purpose of the Register feature is to help the customer of the website to create a login and password, which he will later use to log on to the system. The Register page will appear to the customer once he clicks the New User button on the home page of the application. The screen shot gives a description of the above explanation:

Fig: New User button on Home page of the application

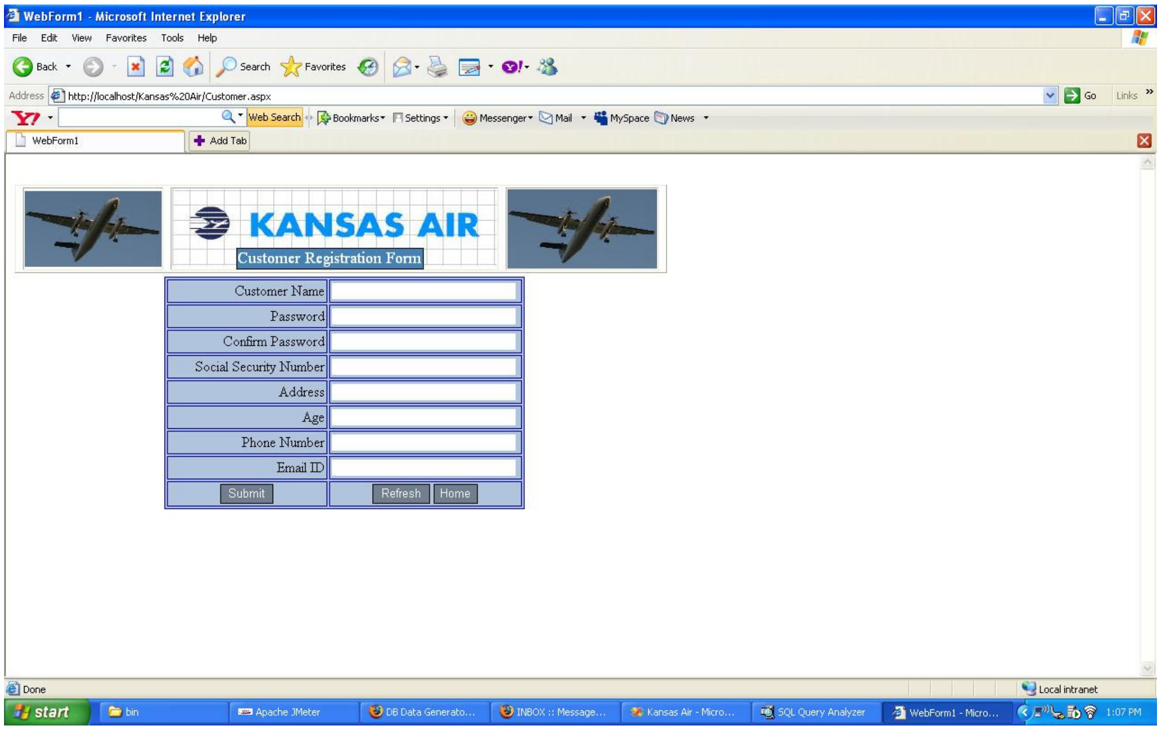


Login using the e-mail id and password you provided while registering

Kansas Air is an online Airline Reservation Website which helps you to book flights, hotels and the different packages available with them online. Just register and logon to the website and start using the features provided by Kansas Air. Please contact Kansas Air management for any queries. You can either call us or e-mail us anytime .

Once the user clicks the new user button, the Register page appears where the user can enter details into the system. The Registration page for the user would be as follows:

Figure 21 - Customer Registration Page


WebForm1 - Microsoft Internet Explorer
http://localhost/Kansas%20Air/Customer.aspx
KANSAS AIR
Customer Registration Form

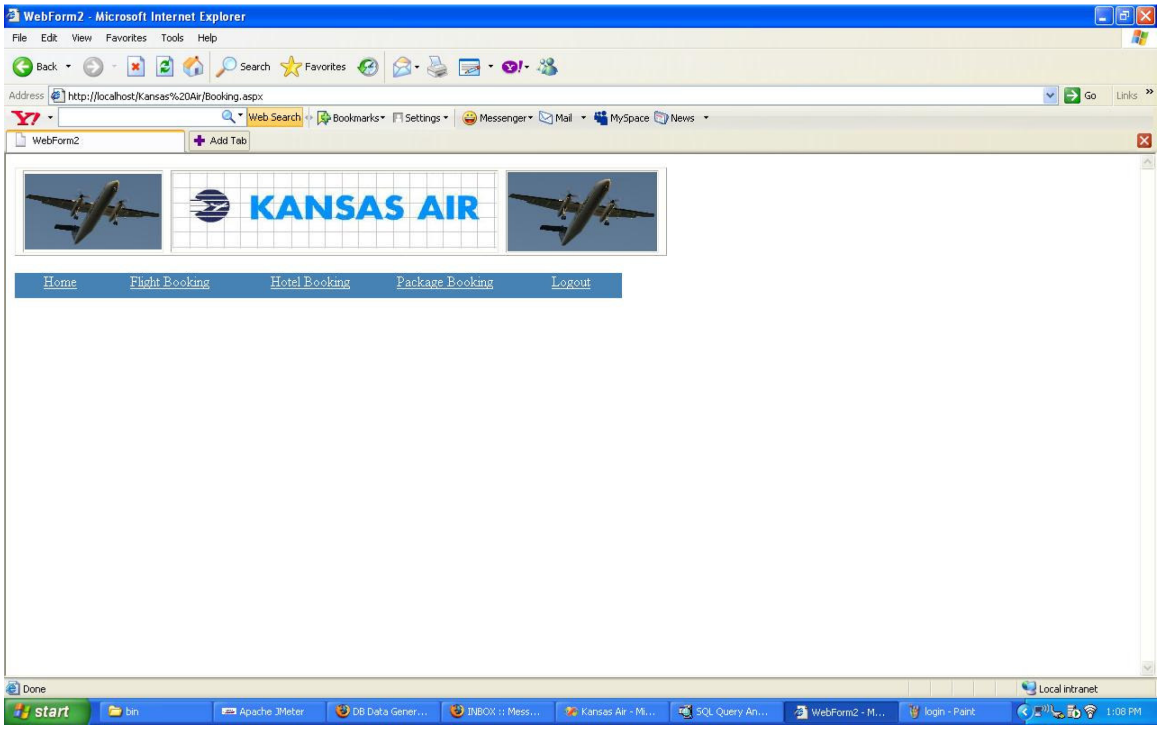
Customer Name	
Password	
Confirm Password	
Social Security Number	
Address	
Age	
Phone Number	
Email ID	
Submit	Refresh Home

On this page, if the user does not enter the correct details into the data fields of the registration page, then the system prompts an error message to the user asking him to enter the correct format of data into the fields.

Once all the details have been entered into the system by the user, the customer then clicks the submit button on the registration page. All the details are then accepted and verified by the system and then the user is redirected to the home page for the customer, where he can then search and book the various flights, packages and hotels available to him.

The home page for the user after he logs onto the system would be as follows:

Figure 22 - Customer Home Page

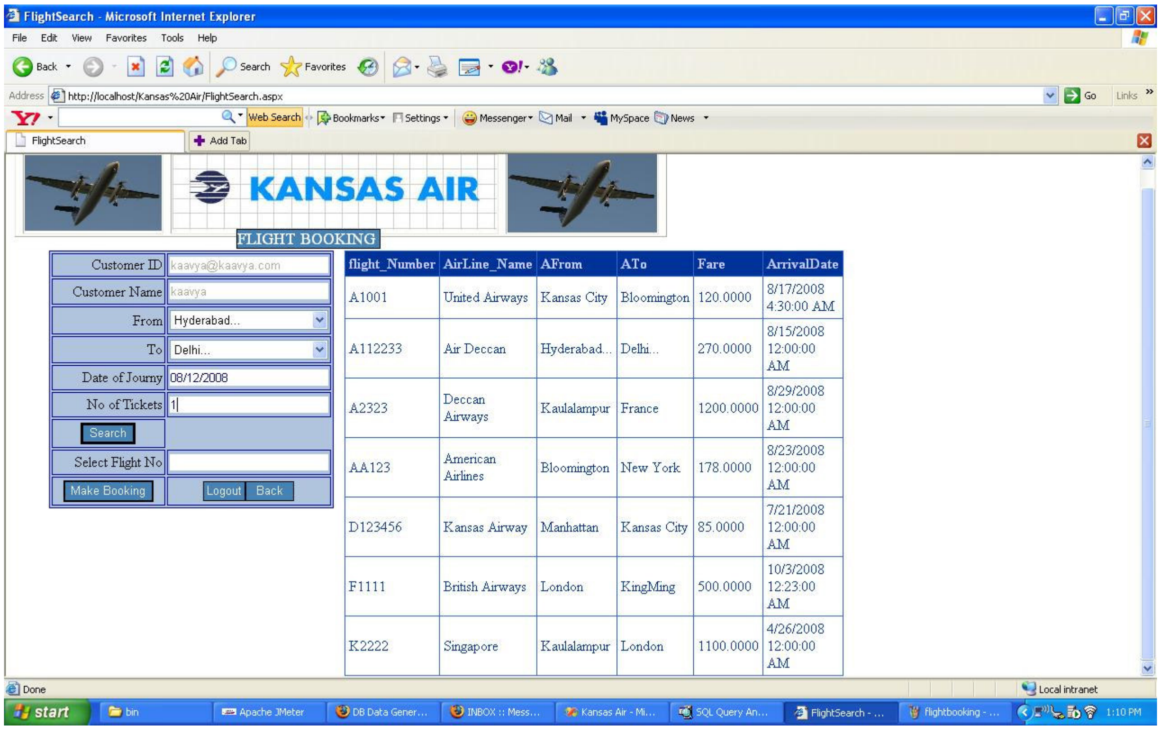

WebForm2 - Microsoft Internet Explorer
http://localhost/Kansas%20Air/Booking.aspx
KANSAS AIR
Home
Flight Booking
Hotel Booking
Package Booking
Logout

From this page, the user can either go back to the home page of the Airline Reservation System website, or he can search and book flights, packages or hotels or logout of the application.

3.2 FLIGHT SEARCH AND BOOKING

The main feature of this part of the application is to enable the user to search and book for the flights available to him through the website. When the user clicks the flight booking link available to him on the Booking.aspx page, the user would be redirected to the FlightSearch.aspx page where the user would be able to see the list of available flights. The screen shot of the FlightSearch.aspx page would be as follows:

Figure 23 - FlightSearch Page



FlightSearch - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Address http://localhost/Kansas%20Air/FlightSearch.aspx
KANSAS AIR
FLIGHT BOOKING
Search
Make Booking
Logout
Back
Done
Local intranet

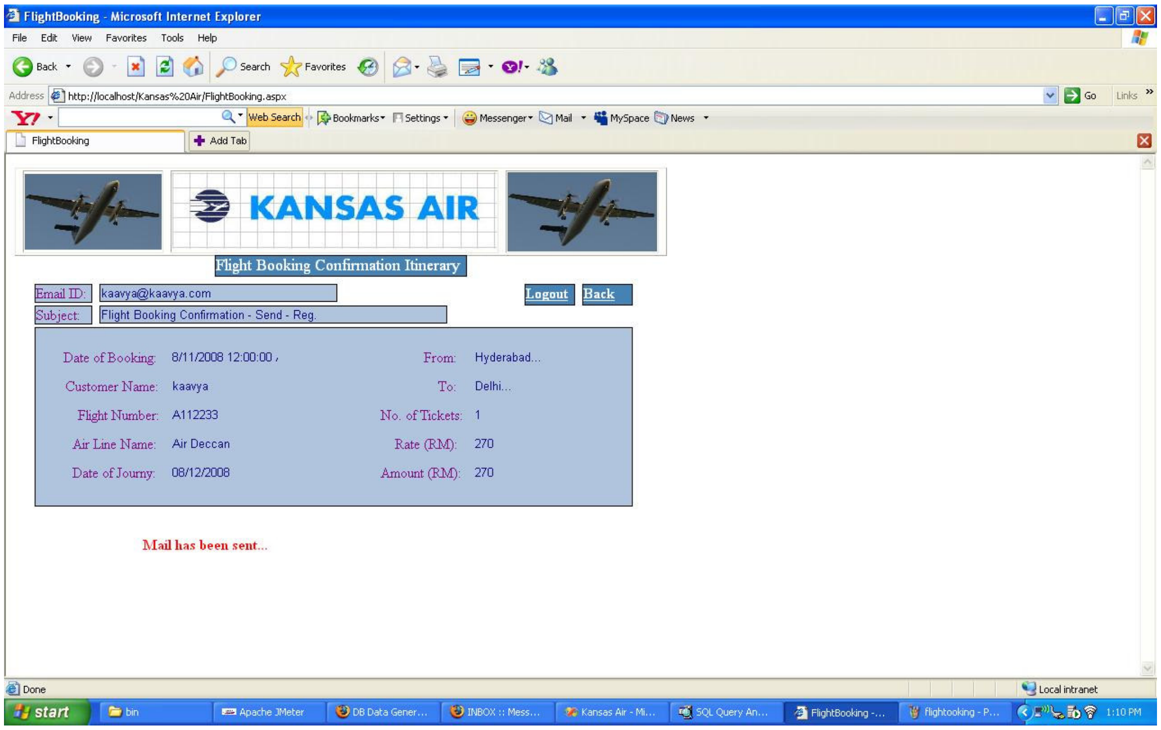
Customer ID	kaavya@kaavya.com
Customer Name	kaavya
From	Hyderabad...
To	Delhi...
Date of Journy	08/12/2008
No of Tickets	1
Select Flight No	

flight_Number	AirLine_Name	AFrom	ATo	Fare	ArrivalDate
A1001	United Airways	Kansas City	Bloomington	120.0000	8/17/2008 4:30:00 AM
A112233	Air Deccan	Hyderabad...	Delhi...	270.0000	8/15/2008 12:00:00 AM
A2323	Deccan Airways	Kaulalampur	France	1200.0000	8/29/2008 12:00:00 AM
AA123	American Airlines	Bloomington	New York	178.0000	8/23/2008 12:00:00 AM
D123456	Kansas Airway	Manhattan	Kansas City	85.0000	7/21/2008 12:00:00 AM
F1111	British Airways	London	KingMing	500.0000	10/3/2008 12:23:00 AM
K2222	Singapore	Kaulalampur	London	1100.0000	4/26/2008 12:00:00 AM

The user can then search for a specific flight which has a choice of his source and destination. From the drop down list available to the user, the user can select a place of his choice from the source and a place of choice from the destination drop down box and then hit the search button on the page. If there is a flight in the database with the above choice of the customer, he can then view the results on the following page:

Then by filling in the required details on the page, like the data of journey, number of tickets and the flight number, he can then click the make booking button on the page and then the user would be directed to a confirmation page, which is as follows:

Figure 24 - Flight Booking Confirmation Page


FlightBooking - Microsoft Internet Explorer
http://localhost/Kansas%20Air/FlightBooking.aspx
KANSAS AIR
Logout
Back

Flight Booking Confirmation Itinerary

Email ID:	kaavya@kaavya.com
Subject:	Flight Booking Confirmation - Send - Reg.

Date of Booking:	8/11/2008 12:00:00	From:	Hyderabad...
Customer Name:	kaavya	To:	Delhi...
Flight Number:	A112233	No. of Tickets:	1
Air Line Name:	Air Deccan	Rate (RM):	270
Date of Journy:	08/12/2008	Amount (RM):	270

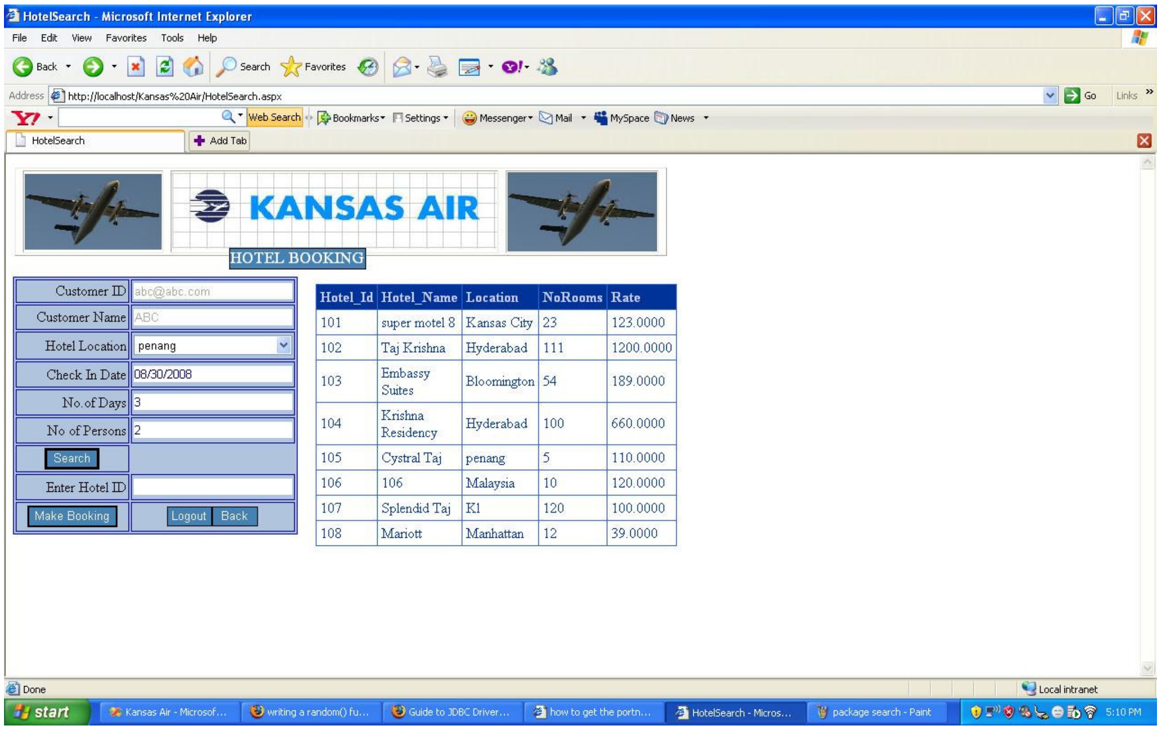
Mail has been sent...

The customers can logout from the system after this process by clicking the logout button on the FlightBooking.aspx page shown above.

3.3 HOTEL SEARCH AND BOOKING

The main feature of this part of the application is to enable the user to search and book for the hotels available to the customer through the website. When the user clicks the HotelBooking link available to him on the Booking.aspx page, the user would be redirected to the HotelSearch.aspx page where the user would be able to see the list of available hotels. The screen shot of the HotelSearch.aspx page would be as follows:

Figure 25 - Hotel Search page


HotelSearch - Microsoft Internet Explorer

http://localhost/Kansas%20Air/HotelSearch.aspx

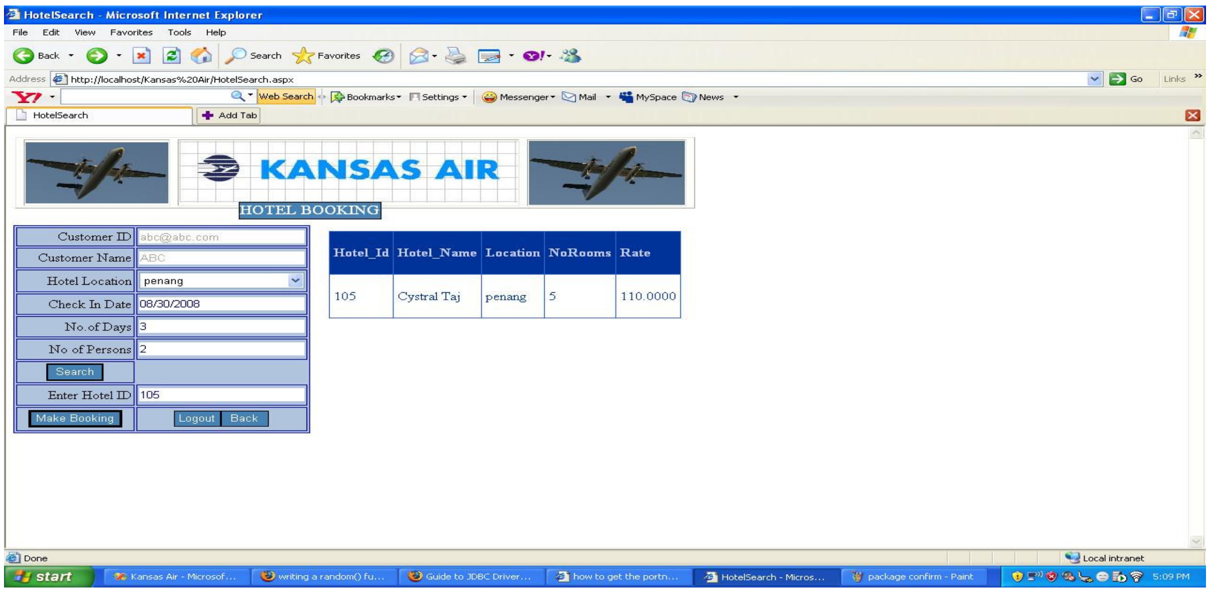
KANSAS AIR

HOTEL BOOKING

Customer ID	abc@abc.com
Customer Name	ABC
Hotel Location	penang
Check In Date	08/30/2008
No.of Days	3
No of Persons	2
Search	
Enter Hotel ID	
Make Booking	Logout Back

Hotel_Id	Hotel_Name	Location	NoRooms	Rate
101	super motel 8	Kansas City	23	123.0000
102	Taj Krishna	Hyderabad	111	1200.0000
103	Embassy Suites	Bloomington	54	189.0000
104	Krishna Residency	Hyderabad	100	660.0000
105	Cystral Taj	penang	5	110.0000
106	106	Malaysia	10	120.0000
107	Splendid Taj	Kl	120	100.0000
108	Mariott	Manhattan	12	39.0000

The user can then search for a specific hotel of his choice. From the drop down list available to the user, the user can select a place of his choice and then hit the search button on the page. If there is a hotel in the database with the choice of the customer, he can then view the results on the following page:


HotelSearch - Microsoft Internet Explorer

http://localhost/Kansas%20Air/HotelSearch.aspx

KANSAS AIR

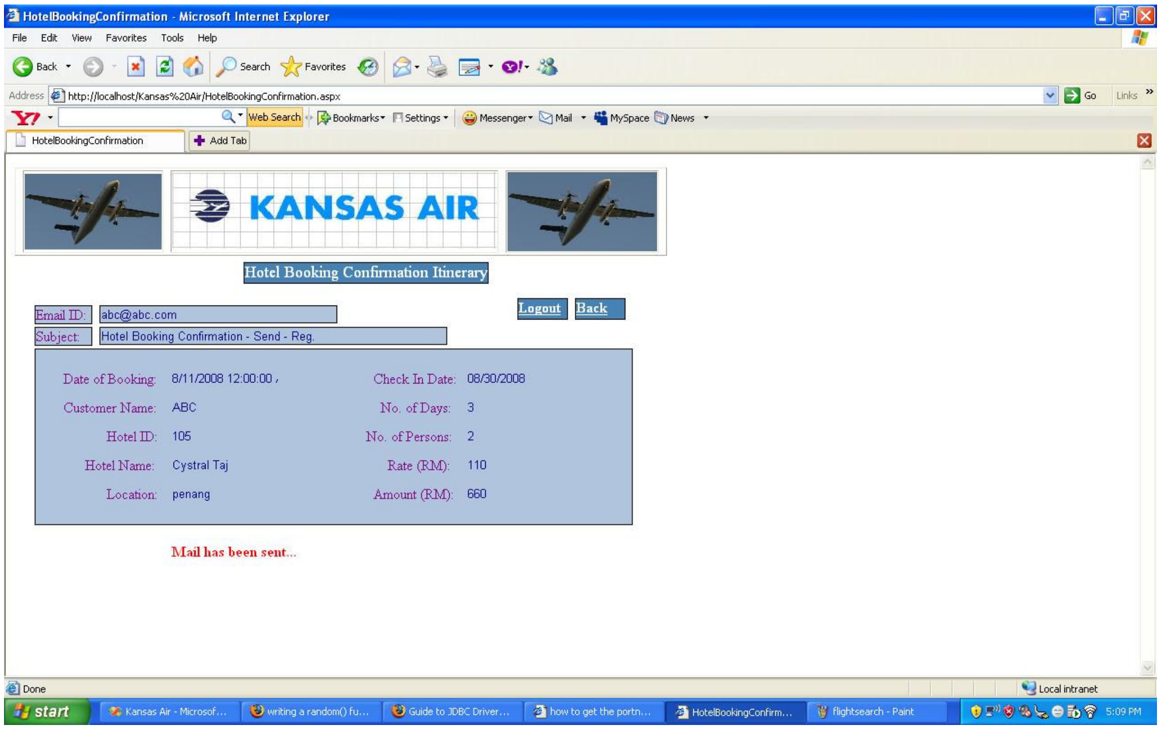
HOTEL BOOKING

Customer ID	abc@abc.com
Customer Name	ABC
Hotel Location	penang
Check In Date	08/30/2008
No.of Days	3
No of Persons	2
Search	
Enter Hotel ID	105
Make Booking	Logout Back

Hotel_Id	Hotel_Name	Location	NoRooms	Rate
105	Cystral Taj	penang	5	110.0000

Then by filling in the required details on the page, like the check in date, number of persons, number of days etc, he can then click the make booking button on the page and then the user would be directed to a confirmation page, which is as follows:

Figure 26 - Hotel Booking Confirmation


HotelBookingConfirmation - Microsoft Internet Explorer
http://localhost/Kansas%20Air/HotelBookingConfirmation.aspx
KANSAS AIR
Logout
Back

Hotel Booking Confirmation Itinerary

Email ID:	abc@abc.com		
Subject:	Hotel Booking Confirmation - Send - Reg.		
Date of Booking:	8/11/2008 12:00:00	Check In Date:	08/30/2008
Customer Name:	ABC	No. of Days:	3
Hotel ID:	105	No. of Persons:	2
Hotel Name:	Cystral Taj	Rate (RM):	110
Location:	penang	Amount (RM):	660

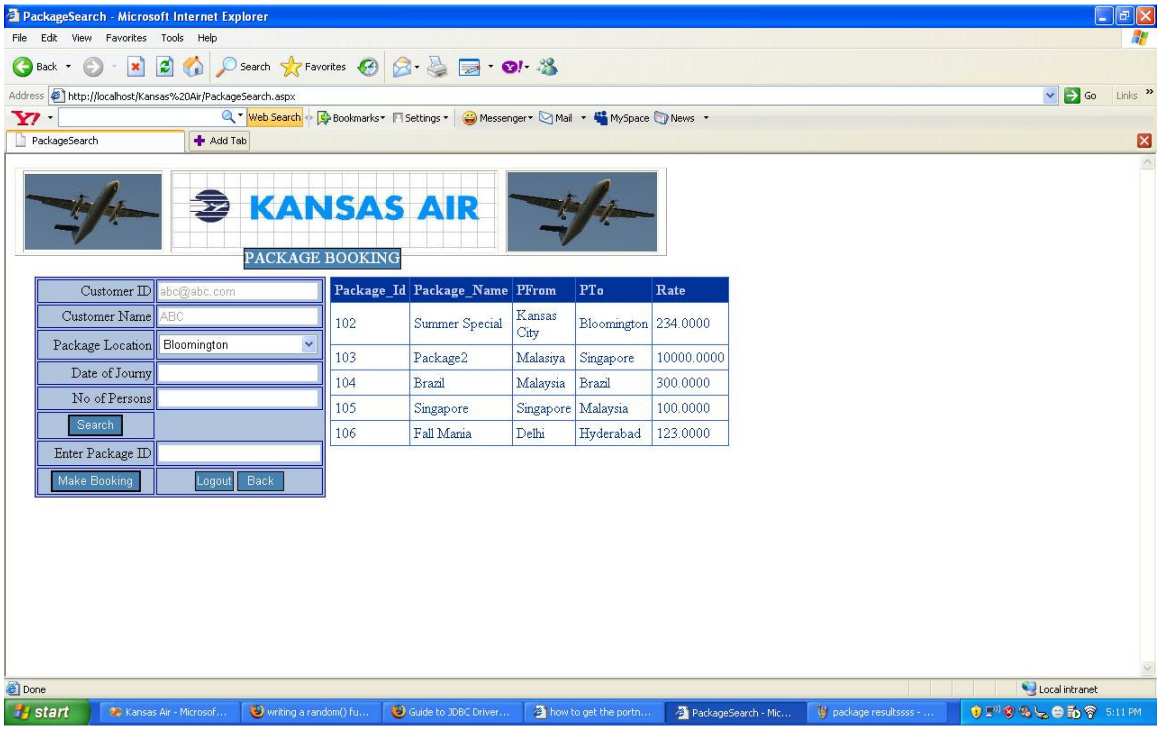
Mail has been sent...

The customers can logout from the system after this process by clicking the logout button on the HotelBooking.aspx page shown above.

3.4 PACKAGE SEARCH AND BOOKING

The main feature of this part of the application is to enable the user to search and book for the packages available to the customer through the website. When the user clicks the PackageBooking link available to him on the Booking.aspx page, the user would be redirected to the PackageSearch.aspx page where the user would be able to see the list of available packages. The screen shot of the PackageSearch.aspx page would be as follows:

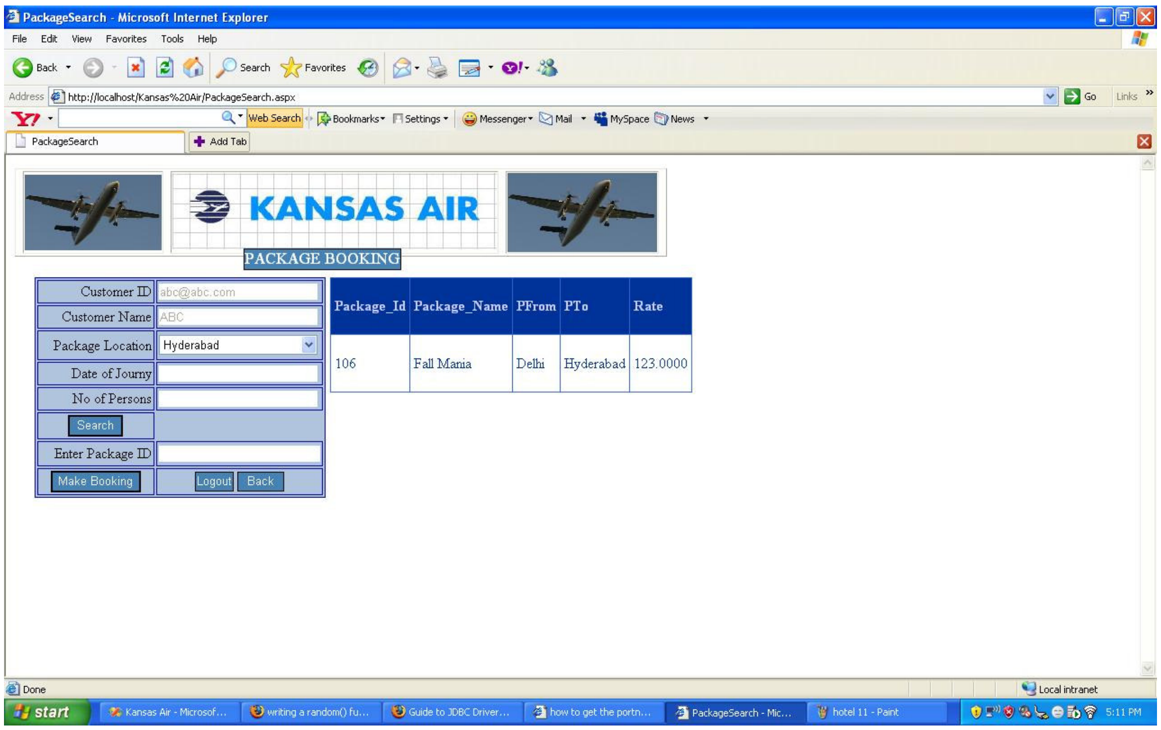
Figure 27 - Package Search page


PackageSearch - Microsoft Internet Explorer
http://localhost/Kansas%20Air/PackageSearch.aspx
KANSAS AIR
PACKAGE BOOKING

Customer ID	abc@abc.com
Customer Name	ABC
Package Location	Bloomington
Date of Journy	
No of Persons	
Search	
Enter Package ID	
Make Booking	Logout Back

Package_Id	Package_Name	PFrom	PTo	Rate
102	Summer Special	Kansas City	Bloomington	234.0000
103	Package2	Malasiya	Singapore	10000.0000
104	Brazil	Malaysia	Brazil	300.0000
105	Singapore	Singapore	Malaysia	100.0000
106	Fall Mania	Delhi	Hyderabad	123.0000

The user can then search for a specific package of his choice. From the drop down list available to the user, the user can select a place of his choice and then hit the search button on the page. If there is a package in the database with the choice of the customer, he can then view the results on the following page:


PackageSearch - Microsoft Internet Explorer
http://localhost/Kansas%20Air/PackageSearch.aspx
KANSAS AIR
PACKAGE BOOKING

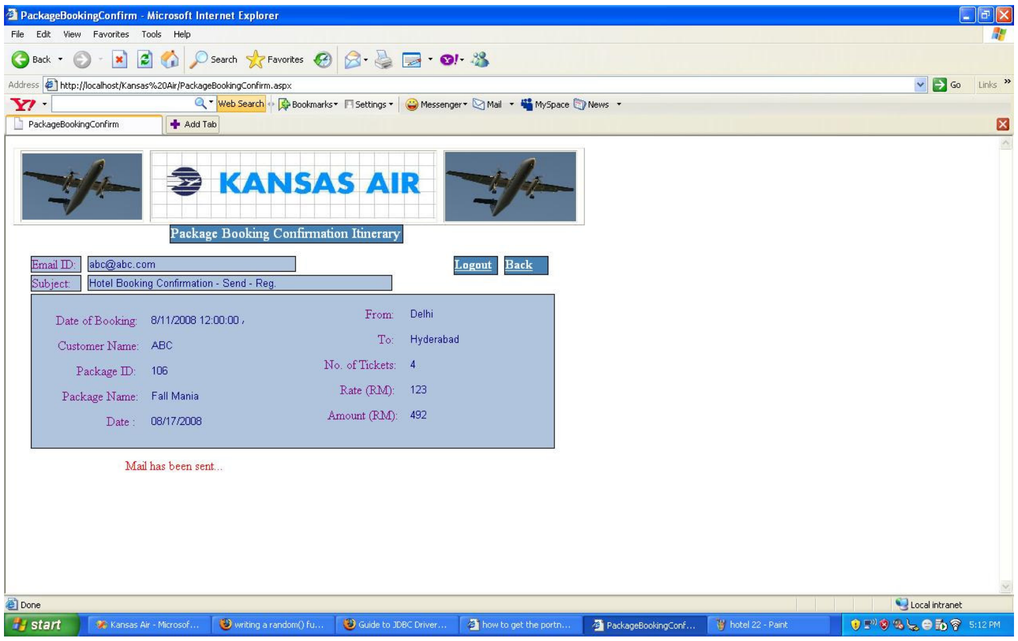
Customer ID	abc@abc.com
Customer Name	ABC
Package Location	Hyderabad
Date of Journy	
No of Persons	
Search	
Enter Package ID	
Make Booking	Logout Back

Package_Id	Package_Name	PFrom	PTo	Rate
106	Fall Mania	Delhi	Hyderabad	123.0000

Fig: Package Search results

Then by filling in the required details on the page, like the date of journey, number of persons, etc, he can then click the make booking button on the page and then the user would be directed to a confirmation page, which is as follows:

Figure 28 - Package Confirmation page


PackageBookingConfirm - Microsoft Internet Explorer
http://localhost/Kansas%20Air/PackageBookingConfirm.aspx
KANSAS AIR
Package Booking Confirmation Itinerary
Logout
Back

Email ID: abc@abc.com
Subject: Hotel Booking Confirmation - Send - Reg.

Date of Booking:	8/11/2008 12:00:00	From:	Delhi
Customer Name:	ABC	To:	Hyderabad
Package ID:	106	No. of Tickets:	4
Package Name:	Fall Mania	Rate (RM):	123
Date :	08/17/2008	Amount (RM):	492

Mail has been sent...

The customers can logout from the system after this process by clicking the logout button on the PackageBooking.aspx page shown above.

CHAPTER 11 - PROJECT EVALUATION

1. INTRODUCTION

This document mainly focuses on presenting the summary of experiences gained by me as an MSE student during the entire life cycle of the MSE project.

2. PROBLEMS ENCOUNTERED

This section of the project evaluation document describes all the difficulties that I have encountered during my MSE project.

2.1 SOLUTION DOMAIN RESEARCH AND LEARNING

Identifying a technology to work on for my MSE project was one of the basic difficulties that I have faced. But, to be honest, with my growing interest for C#.NET, I decided that it would be the best fit for my MSE project. Since my MSE project **"The Airline Reservation System"** is a web application project C# was chosen for the project. The different advantages offered by C#.NET technology and my craving for the technologies made me choose C#.NET.

2.2 LEARNING ASP.NET AND C# LANGUAGE

Learning and experimenting with new technologies and languages is of great interest to me. I wanted to take up the challenge of learning a new technology and then implementing it. Learning this new technology has taken quite some time for me. I have had a few difficulties finding a good resource for learning .NET. I have learnt .NET through many tutorials available online and also the complete reference book for .NET has helped me a lot. Since all the examples available online were very simple, I had to work hard to implement some of the features in the project.

2.3 SECURITY ISSUES

Installing the software necessary for project took some time for me. I couldn't find the Visual Studio .NET 2003 CD and the Windows XP professional CD for a reasonable price online. I finally found the software that I needed from the CIS department. I also had some problems configuring the IIS server. A lot of research and hard work has helped me figure out the problem.

2.4 JMETER

JMeter installation and set-up was one of the problems I faced during the testing phase of the project. Initially I was able to set-up JMeter, but it kept crashing each and every time I put a heavy load on the server. So, I had to re-install it and then start the testing all over again.

3. SOURCE LINES OF CODE

The source line of code is a very important measure of the software project being developed. For my Airline Reservation System project, I have used a tool called the SLOC Metrics which counts the number of lines of code, based on the directory that we provide for search to the tool. We also need to indicate the types of files that the tool has to scan. So, based on the information provided by me to the tool, the following data was produced by the tool:

The numbers of lines of code in files with extension .cs are: **2310**

The numbers of lines of code in the files with extension .aspx , which is the ASP.NET server page are : **1262**

The numbers of lines of code in the files with extension .resx are: **962**

Thus combining all these , the total lines of code would be: **4534**

Thus nearly more than **50%** of the coding consisted of **C#** coding. Most of the time spent for coding was for C# , since they are the files which have the actual logic to be implemented into the system. Nearly **28 %** of the coding was covered by the **.aspx** files, which are the ASP.NET server pages.

4. PROJECT DURATION

Initially I had planned to complete my MSE project by the end of the July 2008. But due to my health problems and also the availability of the committee members the project would be completed by the end of summer semester.

Initially I had estimated the effort required for the project as 4.56 staff months. In the project plan initially I had put in a total of 22 days for the Phase II of the project, but later on I had some coding problems and I had to extend the deadline for the Phase II of the project by 15 more days.

The following table would best depict the break down and the duration for each phase of the project:

Table 14 - Project BreakDown and Duration

	START TIME	FINISH TIME
Phase I	May 1st, 2008	June 11th, 2008
Phase II	June 12th, 2008	July 21st, 2008
Phase III	July 21st, 2008	Aug 12th, 2008

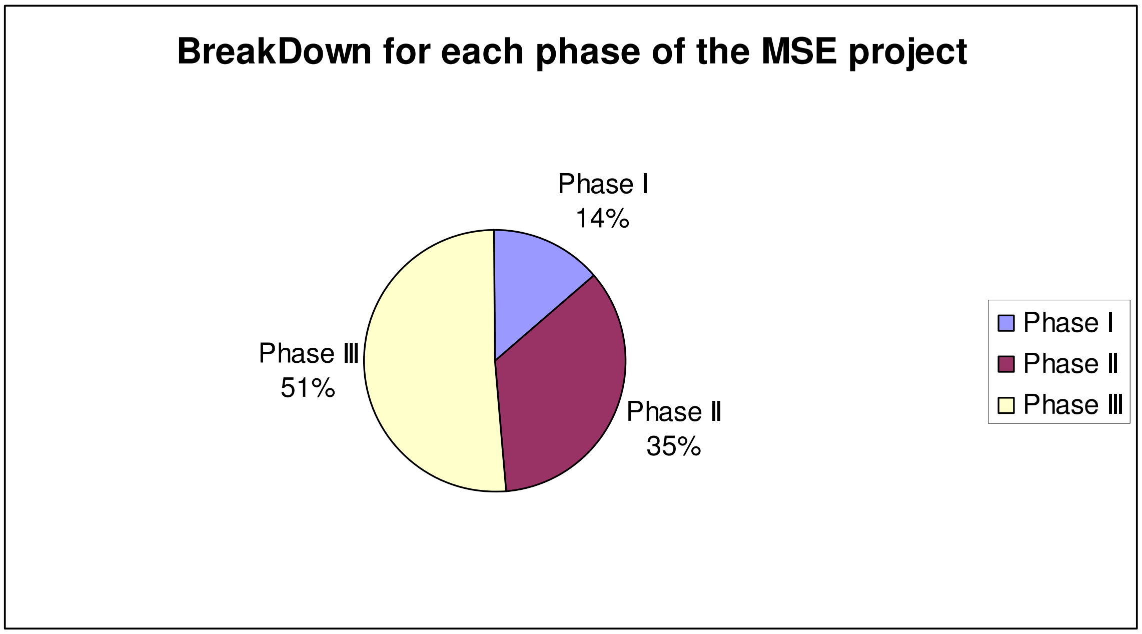
The breakdown of activities in each phase would also be presented in a table as follows:

Table 15 - : Activities and allotted time for all the Phases of MSE project

	Phase I hours	Phase II hours	Phase III hours	Total Hours
Research	25 hours	20 hours	40 hours	**85 hours**
Design	16 hours	22 hours	20 hours	**58 hours**
Coding	0 hours	80 hours	110 hours	**190 hours**
Testing	0 hours	0 hours	25 hours	**25 hours**
Documentation	20 hours	30 hours	30 hours	**80 hours**
Total Hours	**61 hours**	**152 hours**	**225 hours**	**438 hours**

The pie chart diagram showing the breakdown of each phase of the project would be as follows:

Figure 29 - figure showing the task breakdown for each phase



5. LESSONS LEARNT

My MSE project has been one of the rewarding experiences I have had. I have learnt a lot of things in the entire course of my Project. My desire to learn one of the fast evolving technologies like C# and .NET has been satisfied. I have learnt the various coding techniques in C# and .NET. In all the projects I have done till now, I have either taken up the front end or the back end responsibility. But, this is the first project where I have taken up both the front end and back end responsibility. I have experienced a situation similar to the real-time work environment, where programmers and developers work under pressure and a specified deadline. Being new to the technology I had some difficulties with the coding part initially. Going through the entire life-cycle of the software development has given me a lot of knowledge and experience which will be useful for my future. I have also improved my coding skills through this project.

The MSE project has also helped me realize that documentation for a project is as equally important as the coding of the project.

Testing the Airline Reservation System project has helped me gain a lot of knowledge about the stress and load testing of the web applications. Even though I had a lot of problems initially getting JMeter to respond to a request, I was able to figure out the procedure with some research online. On the whole, I would like to thank my committee members for guiding

REFERENCES

The following references have been used by me, during all the phases of the MSE project:

1. **http://www.w3schools.com/**
2. **www.msdn.microsoft.com**
3. Apache J Meter **- http://jakarta.apache.org/jmeter/**
4. **http://mse.cis.ksu.edu/ -** For MSE Project Portfolio.
5. IEEE Recommended Practice for Software Requirements Specifications - IEEE Std 830-1998
6. SLOC Metrics Tool for .NET framework 1.1 **http://www.softpedia.com/get/Programming/Other-Programming-Files/SLOC-Metrics.shtml**
7. **http://www.devarticles.com/c/b/SQL-Server/ -** SQL server 2000 help
8. **http://www.sitepoint.com/article/sql-server-2000-database -** SQL server 2000 help
9. SQL Server 2000 download - **http://www.microsoft.com/downloads/**
10. **http://www.c-sharpcorner.com/**
11. IEEE Standard for Software Test Documentation IEEE 829-1998
12. **http://www.mhhe.com/engcs/compsci/pressman/information/olc/COCOMO.html**
13. Smart Draw software for the Gantt Chart
14. Wikipedia