

DISS
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1789

Test Your Skills

Online Examination System



SADIA ARSHAD
SHAKILA KOUSAR

This project is submitted to computer Center Quaid-e-Azam University in
Partial Fulfillment of requirements Of PGD (IT)

COMPUTER CENTER
QUAID-E-AZAM UNIVERSITY
ISLAMABAD

2006

MF N-8-984

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DEDICATED

To our parents and Teachers who encouraged and
Supported us throughout our educational career.

FINAL APPROVAL

This is to certify that we have read the project submitted by Sadia Arshad and Shakila Kausor. It is our judgment that this project is of sufficient standard to warrant its acceptance by the Quaid-e-Azam University for the Post Graduate Diploma in Information Technology after approved by sir Abdul Subhan (Project supervisor) of session 2005 – 2006

External Examiner:

Name:

Signature:

Supervisor:

Signature:

Sir Abdul Subhan
Computer Center
Quaid-e-Azam University
Islamabad

PROJECT BRIEF

| | |
|---|---|
| PROJECT TITLE: | TEST YOUR SKILLS Online examination system |
| ORGANIZATION: | Quaid-e-Azam University |
| UNDERTAKEN BY: | Sadia Arshad, Shakila Kausor |
| SUPERVISED BY: | Sir Abdul Subhan |
| SESSION: | 2005 -2006 |
| SOFTWARE TOOLS & Technologies: | HTML, MS-Word ASP Fire works-MX IIS 5.0 Dreamweaver-MX Microsoft Access Adobe Photoshop-6 |
| DATE OF COMMENCEMENT: | 2 nd March 2006 |
| DATE OF COMLETION: | 2 ND June, 2006 |
| OPERATING SYSTEM | WINDOWS XP |

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With the humble and sincere words, we thank to Almighty Allah, the compassionate and merciful, who bestow on us the ability to complete this project. We would like to owe our thanks to our parents who's spiritual, moral and financial support let us not feel any kind of difficulty over the due course of our degree. Special thanks to our teachers Sir. Abdul Subhan(project supervisor) and Sir. Anees-ur-Rehman for their constant guidance, constructive criticism and sympathetic attitude in completing this project. We are extremely indebted to all our teachers for their continuous guidance and moral support to complete our PGD (IT) we can never forget the favors and friendly behaviors of our class fellows.

Shakila Kausor

Sadia Arshad

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Chapter 1

Introduction

To

Test Your Skills



ONLINE EXAMINATION SYSTEM

This chapter gives a comprehensive view of the Project introduction, utility of the project in addition to this, demonstration of all features binding the site, are also provided.

This chapter includes:

- ❖ *Executive Summary*
- ❖ *Abstract*
- ❖ *Existing System*
- ❖ *Proposed System*
- ❖ *Project Features*
- ❖ *Benefits of online examination system*
- ❖ *Flaws of Existing System*

Executive Summary

Considering the today's need we have developed an online examination system? We term the project as "Test your skills". Which offer's different online quizzes, Where the students first login and register themselves in order to avail different services, without registration of any user, user can navigate through the site i.e. view different quizzes and results as far as registered user are concern they can receive News letters form our site by subscribing their e-mail address.

User can give the online skill tests and get the certificate on its qualification. There are ten quizzes or skill tests each of them consists of twenty questions, the quizzes item become more complex as the quizzes number increases and they are basically consists of multiple choice question and the user select the best fit answer from each quiz or description, the user is given some time to answer the question asked and then after that when the user submit the quiz the result will automatically generate.

In order to have a record of the students we have also maintained a database, which contains the different tests and student's personal information and the result of previous tests they have given. All the results

And record of Students will be held in a database that can be navigated using web interfaces that can be controlled by the Administrator. Administrator section is totally different that contains different administrative task related to the features of the System/Web Site.

Our project consists of different features, which are as follows.

- User Registration, Login, Validation and modification
 - Quizzes
 - Results
 - Certificate Generation
 - News Letters
 - Related Administrative Task
-

Abstract

Internet has revolutionized our lives completely. From the way we communicate to how we shop and retrieve information. It has become one of the most important learning aids to the traditional education. With its advent every thing goes online. From your business to your education all these activities are being conducted on net. The concept of home learning is increasing day by day. Virtual universities are being established which offers full flash degree courses online where students gets the stuff makes the self study and gives the paper online and gets the degree. Even the online group discussion among the Students from different parts of world and the professors are conducted, this helps the students to learn from wide variety of people. With the server-based course, the students learn according to their own schedule.

Now many institutions offer online skills tests or online quizzes, which will test your intelligence to see how smart you are. An online skills test gives you the greater opportunity of self-discovery, self-improvement, self-directedness and self-assessment.

Students in the 21st century demand life-long learning on a mouse-click. Adult students who have family or job responsibilities increasingly enroll in online programs. This enables them to get additional qualification from a university without having to move to a new location, and it helps them fit the educational work into their busy lives .The educational market has become Globalize and it certainly has recognized and dominantly accepted the widespread trend towards gaining additional qualifications through online education.

Existing system:

Presently many educational institutions have online examination system where the students login to the site and give the tests of their field at any time they wish and get the results.

Proposed system:

Considering the today's need we have developed an online examination system. We term the project as "Test your skills". Which offer's different online quizzes, Where the students first login and register themselves in order to avail different services, without registration of any user, user can navigate through the site i.e. view different quizzes and results as far as registered user are concern they can receive News letters form our site by subscribing their e-mail address.

User can give the online skill tests and get the certificate on its qualification. There are ten quizzes or skill tests each of them consists of twenty questions, the quizzes item become more complex as the quizzes number increases and they are basically consists of multiple choice question and the user select the best fit answer from each quiz or description, the user is given some time to answer the question asked and then after that when the user submit the quiz the result will automatically generate.

In order to have a record of the students we have also maintained a database, which contains the different tests and student's personal information and the result of previous tests they have given. All the results and record of Students will be held in a database that can be navigated using web interfaces that can be controlled by the Administrator. Administrator section is totally different that contains different administrative task related to the features of the System/Web Site.

Project's features:

Our project consists of different features, which are as follows.

- User Registration, Login, Validation and modification
 - Quizzes
 - Results
 - Certificate Generation
 - News Letters
 - Related Administrative Task
-

User Registration, Login, Validation & modification:

This feature is related to the validation of the user for login, user registration, and modification in user's registration information. When the user enters information for login it will initially check, is it valid user or not. If valid then allow him/her to login other wise a message will be generated displaying that invalid user. When new user enters his/her registration information it will initially check, is the information given is valid or not or user name is already exist or not. User can modify/edit his personal or registration information after successful login.

Quizzes:

This feature facilitates the users to give the quizzes of their own choices by selecting the appropriate answers. There are ten quizzes or skill tests each of them consists of twenty questions, the quizzes item become more complex as the quizzes number increases and they are basically consists of multiple choice question and the user select the best fit answer from each quiz or description, the user is given some time to answer the question asked and then after that when the user submit the Quiz. All the answer given by the users will be matched with the choices stored in the database and will update the result automatically.

Results:

This feature provides the results to all the users with online test, scoring and recording are not separate steps. As each quiz is scored result is entered into a student database. When all the scoring is done, the entire recording is done as well. Not only are the individual student's results available, but summary statistics and previous results of all the students are available as well.

Certificate Generation:

This feature provides certificates to the students. After the completion of their quizzes with an approximately 80% score or better (verified by administration managing “Test Management System” on the internet), admin can print a .pdf formatted certificate and sign it to certify a user.

News Letters

This feature is related to the registered users. The registered User will first login and then subscribe his/her email address in Order to receive our site News Letter of following main Categories via email address.

Related Administrative Task:

This feature related to the maintenance and modification of different records related to User e.g. quizzes, results, certificates generation, news letters etc. By using this feature Administrator can add new records and can delete and modify the existing records of all the features. Students take tests online and supervisors, can login to see what tests they've taken and their performance on each. All they have to do is login to our test management site. The Database and site maintenance will be done by administration.

Benefits of online examination system

➤ **Unlimited Use:**

All the users at a specific location can learn and access the lessons at once. It is not limited to a certain number of individuals.

➤ **Employees Learn on Their Own Schedule:**

With the server-based course, the students learn according to their own schedules.

➤ **Higher Retention:**

With the server-based class, students learn individual lessons with higher retention because they rework them utilizing many different exercises and then take online quizzes to ensure learning has taken place.

➤ **Security:**

Online examination system is more securable:

- (a) The person whose name is associated with the test is indeed the person who took the test
- (b) The students were not exposed to the items before taking the test.

➤ **Time saved:**

In addition, once they have made up the quizzes, they spend no time scoring, recording, or providing feedback. That's all done automatically. Before walking into the class

➤ **Prompt results generation:**

Students can get their results as soon as the scoring is complete instead of waiting for the next time the class meets.

➤ **Previous results:**

Online examination systems not only have the record of individual student's results but also have a summary statistics and previous results of all the students.

➤ **Increased efficiency:**

Online administration of tests, offers increased efficiency as well as making feasible options that are not usually feasible with paper-based testing.

➤ **Self-directed:**

Adult students are often very self-directed. The individuals take the initiative, with or without the help of others, in diagnosing their learning demands, formulating learning goals, choosing and implementing appropriate learning strategies, and evaluating learning outcomes.

➤ **Self-assessment:**

Online learning environment allow user to self-assess his/her progress (for example an e-portfolio could fulfill this function).

➤ **Distance:**

The online learning environment reduces the distance between students and instructors, for example by including discussion boards.

➤ **Self-organization:**

In online examination system students set their learning goals and priorities at a distance and motivate themselves at a distance and they manage their time in online classes in general.

Benefits of proposed system:

"Test Your Skills" online examination system is a security base system and all the users accessing to the features will be restricted by password. This system will respond to the users at any time he/she wants. Online examination system will provide complete flexibility to the users in the selection of lessons or quizzes. When the user submits the quiz then the result will be automatically generated and the question which will not be correctly answered by the user, their correct answer will also be displayed. Online examination also generates the certificate to the users who get more then 80% marks. Online examination system also facilitates the users with weekly, monthly and occasionally news letters which contain a lot of information about computer technology, articles, seminars etc.

Flaws of existing system:

The existing system doesn't provide the complete guidance to users in rectification of their wrong attempts, beside this, there is nothing courageous for users like Certificates, to raise their interest in getting knowledge. Existing system also has no such supportive way to update the users with current news like new computer technology, exhibitions, seminars etc, so as to keep users well aware of the latest computer technology.

Chapter 2

Risk Management plan



This chapter gives a comprehensive view of the activities Of the Risk Management plan, Roles and Responsibilities, tools and Risk Documentation.

This chapter includes

- ❖ Introduction (Risk Management System)
- ❖ Purpose of Risk Management System
- ❖ Roles and Responsibilities
- ❖ Risk Documentation
- ❖ Activities
- ❖ Risk Management Tools

OVERVIEW

1. Introduction (Risk Management System)

Despite much research and progress in the area of **Software Project Management**, software development projects still are not achieving the target of delivering desired systems on time, within the available financial resources and desired quality. Much of the failure in achieving those targets could be avoided by managers proactive planning for dealing with risk factors rather than waiting for problems to occur and then trying to react on the time of occurrence. Usually this reaction is too little and too late, because by the time the problem is fully recognized, the schedule has already been disturbed, a considerable amount of resources has been utilized, and the product quality has suffered due to introduction of errors. Risk management has been proposed as a solution to for overcoming errors appeared insight into potential problem areas and to identify these problems, address and eliminate them before they can create any problems in the project. In order to implement a successful risk management program, project managers need tools to help them reduce risks. Risk Management helps project managers in identifying risks in earlier phases of the project cycle, defining risks in earlier phases of the project cycle and defining risk containment actions. The system should support Risk Assessment during the initial phase of the development as well as during project delivery phase.

A good measurement program helps managers:

- Communicate unambiguously throughout the organization.
- Identify and correct technical and management problems by focusing on early discovery of errors.
- Make key tradeoffs by assessing the impact of decision.
- Defend and justify decisions by providing data to explain how issues are prioritized and managed.

Using these as the evaluation criteria a detailed search and evaluation of the Risk Management System available in the industry was made.

2. Purpose

The purpose of this document is to describe how we can perform the job of managing risks for online testing. It identifies risks which may occur in the project, defines roles and responsibilities for participants in the risk management process, the risk management activities that will be carried out, the schedule and budget for risk management activities and tools and techniques that will be used during this process.

3. Roles and Responsibilities

3.1 Project manager

The project manager will assign a Risk Officer to the project, and identify this individual on the project's organization chart. The Project Manager and other members of the Project Management team will meet every week to review the status of all risk resolving efforts, review the exposure assessments for any new risk items, and redefine the project's Top Ten Risk List.

3.2 Software Quality Assurance involvement

The Project Manager and other members of the project will check about the quality of the project and will assign role for each member of the team for making quality assured software

3.3 Risk Officer

The Risk officer has the following responsibilities and authorities:

- ❖ Coordinating between risk identification and analysis activities
- ❖ Maintaining the project's risk list
- ❖ Notifying project management of the new risk items discovered
- ❖ Reporting risk resolution status to management
- ❖ The Risk Officer should normally not be the project Manager.

3.4 Project Member Assigned a Risk

The Risk Officer will assign each newly identified risk to any member of the project, who will assess the exposure and probability for the risk factor and report the results of that analysis back to the Risk Officer. Project members who have assigned the responsibilities for performing the steps of the mitigation will report progress about the risk mitigation to the Risk Officer biweekly.

4. Risk Documentation

4.1 Risk List

The risk factors identified and managed for this project will be accumulated in a risk list. The Risk list contains the following items:

1. Personal Risk
2. Unrealistic schedules and budgets.
3. Developing wrong software solution.
4. Developing wrong user interface.
5. Continuing streams of requirement changes.
6. Shortfall in extremely furnished components.
7. Shortfall in externally performed tasks.
8. Real time performance shortfall.
9. Wrong assessment of requirements.

The ten risk items that currently have the highest estimated risk exposure are referred to as the project's Top Ten Risk List.

4.2 Risk Data Items

The following information will be stored for each project risk:

- Risk ID
- Classification
- Description

- Probability
- Impact
- Risk Exposure
- First Indicator
- That risk is becoming a problem
- Mitigation approaches
- Owner
- Date due
- Contingency plan
- Contingency plan trigger

4.3 Closing Risk

A risk item can be considered closed when it meets the following criteria:

The planned lessening actions have been completed and the estimated risk exposure of probability time's impact is less than 2.

5. Activities

| | Task | Participants |
|----------------------------|--|---------------------|
| Risk Identification | State the techniques that will be used to identify risk factors at the beginning of the project and on an on-going basis. This may involve a formal risk assessment workshop, a brainstorming session, and interviews at the beginning of each life cycle phase. Describe any consolidated lists of risk items that will be used to identify candidate risks for this project. | Risk Officer |

| | | |
|--|--|--------------------------------|
| | The Risk Officer will assign each risk factor to an individual project member, who will estimate the probability the risk could become a problem and the impact this risk on either scale of units of dollars or schedule days, as indicated by the Risk Officer) | Assigned Project Member |
| | The individual analyzed risk factors are collected, reviewed, and adjusted if necessary. The list of risk Factors are sorted by descending risk exposure. | Risk Officer |
| | The top ten risks, or those risk factors having an estimated exposure greater than <i><state exposure. Threshold></i> are assigned to individual project members for development and execution of a risk mitigation plan. | Risk Officer |
| | For each assigned risk factor, recommend actions that will reduce either the probability of the risk materializing into a problem, or the severity of the exposure if it does. Return the mitigation plan to the Risk Officer. | Project Members |
| | The mitigation plans for assigned risk items are collected into a single list. The completed Top Ten Risk List is created and made available for the management. | Risk Officer |
| | Each individual who is responsible for executing a risk mitigation plan carries out the mitigation activities | Assigned Individual |
| | Constructive Cost Model (COCOMO) | Risk Officer |
| | The status and effectiveness of each mitigation action is reported to the Risk Officer every two weeks. | Assigned Individual |
| | The probability and impact for each risk item is reevaluated and modified if appropriate for risk management. | Risk Officer |
| | If any new risk items have been identified, they are | Risk Officer |

| | | |
|--|--|---------------------|
| | analyzed as were the items on the original risk list and added to the risk list. | |
| | The Top Ten Risk List is regenerated based on the updated probability and impact for each remaining risk. | Risk Officer |
| | Any risk factors for which mitigation actions are not being effectively carried out, or whose risk exposure is rising, may be escalated to an appropriate level of management for visibility and action. | Risk Officer |
| | If the project will be storing lessons learned about mitigation of specific risks in a database, describe that database and process here and indicate the timing of entering risk-related lessons into the database. | Risk Officer |

5.1 Schedules for Risk Management Activities

Risk
Identification

A risk workshop will be held on approximately 12 May 2006.

Risk List

The prioritized risk list will be completed and made available to **the project team** by approximately 15 May 2006.

Risk
Management
Plan

The risk management plan, with mitigation, avoidance, or prevention strategies for the top ten risk items, will be completed by
Approximately 20 May 2006.

Risk Review

The Risk Management Plan and initial Top Ten Risk List will be reviewed and approved by the Project Manager on approximately 22 May 2006.

Risk Tracking

The status of risk management activities and mitigation success will be revisited as part of the gate exit criteria for each life cycle phase. The risk management plan will be updated at that time

6. Risk Management Tools

6.1 Risk Track Version 5.0

6.1.1 Introduction

Risk Track is a Risk management tool from Risk Services and Technology. It allows the identification of different kinds of risks that may occur during the different phases of software project development. It also allows the specification of the probability of these risks. The interface is more attractive and easy to use. It does not use the rather outdated spreadsheet like interface which the other risk management and management software use. To start a new project, first it provides a screen for project definition where we can specify the project title, creation date, project description, project manager, project leader, risk, mitigation parent and mitigation. Project ID is generated automatically.

We can also add, modify and delete all possible users, phases, risk class, risk cause, attributes, objectives, risk status, and risk types that can occur during the development of the project. After specifying all these, we can add a new risk through the **Add Risk function**.

In the add new risk screen you can give the Risk name, risk ID, and select the risk status, class, cause, type and phase. You can also provide a risk statement and its consequences, the risk probability, At Risk Cost, Risk exposure, mitigation exposure, mitigation exposure, cost allocation, assigned to, date assigned on, assigned by, and action date. You can also add a mitigation using the add mitigation title screen. Here you can give the

mitigation title, the effectiveness, risk exposure, cost of mitigation, mitigated exposure, cost allocation, assignee, assigned by and action date while the mitigation ID, creation date, created by, modification date and date assigned on are automatically generated. There is also a mitigation screen where we can see the cost, slip and effect on performance.

6.1.2 Usability

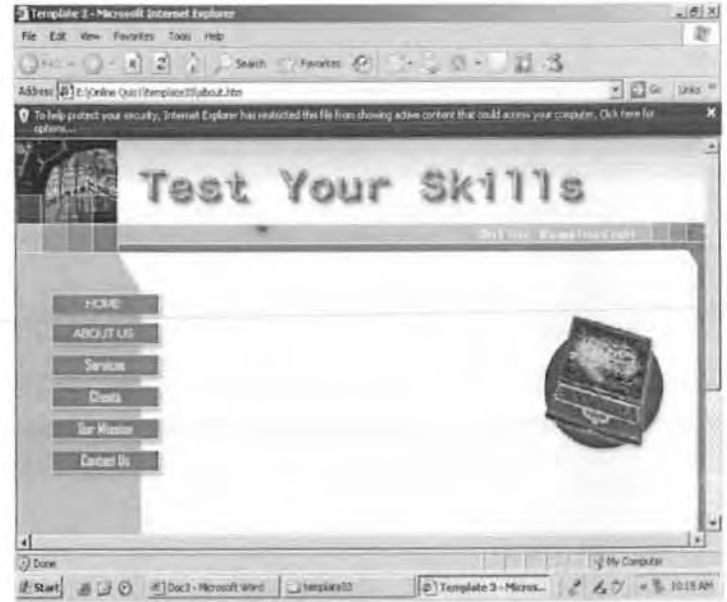
Risk Track is very easy to use software. It does not use the spreadsheet like interface rather it uses a simple interface where you provide input through input boxes and dropdown lists. It generates easily comprehensible reports, which are also a plus point of the software.

6.1.3 Strength

Its strength lies in its ease of use and straight forwardness. It also covers all the phases of Risk Management Process.

Chapter 3

TEST MANAGEMENT PLAN



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This chapter gives a comprehensive view of the activities of the testing, plan of this Web Site

This chapter includes:

- ❖ Testing Plan
- ❖ Team for Testing
- ❖ Decomposition of Modules
- ❖ Level of Testing
- ❖ Description of Plan
- ❖ Test Cases

Product Visualization

Test your skill is an online examination system developed especially for the personal of IT profession who do not have much and convenient Information gathered altogether online (because of no such online application i.e. related to Admissions in Top Universities). So keeping in view the problems of these people we are going to develop a site, which can be used by IT Personals.

The Purpose of this project is to create an Informative site, by which people would have an unlimited access to information and services. We term the project as “test your skills“. In the fierce competitive services industry there is need for an integrated access point to information, services, and ideas. In the new millennium we are going to launch exclusive information and unique program to facilitate our users with the need of the hour.

Software Test Plan

We have a time of eight, so we will take Six days for testing, as we don't require an exhaustive testing.

Team for Testing

Our testing team is composed two members including

| N | Name | Contribution |
|---|-------------------------------|--|
| 1 | Sadia Arshad | User Registration, Login, Validation Modification |
| 2 | Shakila Kausor | News Letters Quizzes |
| 3 | Sadia Arshad & Shakila Kausor | Results, certificates |
| 4 | Sadia Arshad & Shakila Kausor | Related Administrative Tasks |

Decomposition of Modules

We have divided project into different modules for the testing purposes being considering our manpower, resources and expertise. The modules for test your skills are

1. User Registration, Login, Validation and modification
2. Quizzes
3. Lessons
4. News Letters
5. User Info
6. Results
7. Related Administrative Tasks
8. Certificates

Level of testing

We require a medium level of testing for test your skills, so we will perform our testing on this level and try to make it a quality product. We will also try to find as many bugs as we can and try to achieve the goal.

Description of plan

As far as the overall description of our testing plan is concern we have planned it by considering different factors including

- ❖ Nature of product
- ❖ Tool used for development
- ❖ Platform of the product deployment
- ❖ Development and design constraints
- ❖ User consideration
- ❖ Architecture of software
- ❖ Resources constraints

TESTING

1. Introduction

1.1 Product Name

TEST YOUR SKILLS

1.2 Test Cases Developed by

| No | Name | Contribution |
|----|-------------------------------|--|
| 1 | Sadia Arshad | Testing of User Registration, Login, Validation and modification |
| 2 | Sadia Arshad & Shakila Kausor | Quizzes |
| 3 | Shakila Kausor | Testing of News Letters |
| 4 | Shakila Kausor & Sadia Arshad | Testing of Results, certificates |
| | Sadia Arshad & Shakila Kausor | Testing of Related Administrative Tasks |

| 1.3 Document Generated by | Signature |
|---------------------------|---------------------|
| Sadia Arshad | Sadia <i>Sadiee</i> |

| 1.4 Date | | |
|----------|-------|------|
| Monday | May | 2006 |
| Day | Month | Year |

| 2.1 Test Case | | | | |
|---|---|-----------------|----------------------------|-------------|
| Test Case No | 1 | | | |
| Functionality | User Registration, Login, Validation and modification | | | |
| Description | <p>This module is related to the validation of the user for login, user registration, and modification in user's registration information. When the user enters information for login it will initially check, is it valid user or not. If valid then allow him/her to login other wise a message will be generated displaying that invalid user. When new user enters his/her registration information it will initially check, is the information given is valid or not or user name is already exist or not. User can modify/edit his personal or registration information after successful login.</p> | | | |
| Test Results | | | | |
| No | Input | Expected Output | Observed Output | Discrepancy |
| 1. | Login info. | Valid | Login | Nil |
| 2. | Login info. | Invalid | Not login | Nil |
| 3. | Administrator login info. | Valid | Login | Nil |
| 4. | User login | Valid | Login | Nil |
| 5. | New User Registration Info | Valid | Registered then Login | Nil |
| 6. | New User Registration Info | Registered | Not Registered (Try Again) | Nil |
| 6. | Edit User Registration Info | Update | Try Again | Nil |
| General Observations | | | | |
| <ul style="list-style-type: none"> ❖ Being a database project, storage of Administrator and User info was very critical and significant. ❖ The client is particularly interested in friendly user interface and correct output. ❖ The user will initially be checked, is he/she valid or not. If valid then allow the user to login and use his/her account. ❖ If new user registration, the information entered by the user will initially be checked is user name entered is already exist or not and all the information is valid or not. If valid then allow the user to be registered and automatically login to use his/her account. ❖ Already registered can edit his/her personal profile after successful login along with additional services. | | | | |

| Tested By | |
|-------------|--------------------|
| Name | Sadia Arshad |
| Designation | Developer |
| Date | 3/4/2006 |
| Signature | sadia <i>Sadia</i> |

2.2 Test Case

| | |
|---------------|---|
| Test Case No | 2 |
| Functionality | User Services |
| Description | This module is related to the registered users that provide several services. These services includes, Private Messenger, View Members Profile etc. |

Test Results

| No | Input | Expected Output | Observed Output | Discrepancy |
|----|-----------------------|-----------------|---------------------|-------------|
| 1. | Private Messenger | Inbox | Messages | Nil |
| 2. | Delete Messages | Deleted | Deleted | Nil |
| 3. | Reply | Select Message | Message Sent | Nil |
| 4. | Block Member | Select Member | Member Blocked | Nil |
| 5. | View Member's Profile | Select Member | Members Profile | Nil |
| 6. | Log Off | Close Account | Log Off Source Page | Nil |

General Observations

- ❖ Each and Every Registered User has its own Private Messenger.
- ❖ Every Registered User can manage its own Inbox.
- ❖ Every Registered User can block any Site Member in order not to receive any message from him/her.
- ❖ Every Registered User can reply directly to the sender.
- ❖ Users as they login can log off in order to make their account secure.

Tested By

| | |
|-------------|--------------------------------------|
| Name | Shakila Kausor &Sadia Arshad |
| Designation | Developer |
| Date | 10/4/2006 |
| Signature | Shakila, sadia <i>Shakila, Sadia</i> |

2.3 Test Case

| | |
|----------------------|---|
| Test Case No | 3 |
| Functionality | News Letters |
| Description | This module is related to the registered users. The registered User will first login and then subscribe his/her email address in order to receive our site News Letter. The email address will be automatically shown in the subscription field. User can change the subscription email address also. |

Test Results

| No | Input | Expected Output | Observed Output | Discrepancy |
|----|---------------|--------------------|-----------------|-------------|
| 1. | Email Address | Subscribed | Subscribed | Nil |
| 2. | Email Address | Already Subscribed | Subscribed | Nil |
| 3. | Email Address | Unsubscribe | Unsubscribe | Nil |

General Observations

- ❖ New users email address will be subscribed.
- ❖ New users email address will be added in the database and subscribed.
- ❖ Already subscribed users will get the message if they try to subscribe their email again.
- ❖ Users can unsubscribe their email address.

Tested By

| | |
|--------------------|----------------------|
| Name | Shakila Kausor |
| Designation | Developer |
| Date | 22/4/2006 |
| Signature | Shakila <i>Sadiq</i> |

2.4 Test Case

| | |
|----------------------|--|
| Test Case No | 4 |
| Functionality | Results, Certificates |
| Description | This module is related to provide online help/support to the users. Registered Users can submit their quizzes in the related subject. All the users either registered can view all their results in the quizzes. At the mean time users can also select the results by time and date. Users can also search with in the results. Search consists of By user name Search, By roll # Search etc. |

Test Results

| No | Input | Expected Output | Observed Output | Discrepancy |
|----|----------------------------|------------------------|--------------------------|-------------|
| 1. | Select quiz | Selected quiz | Quiz Active Topics | Nil |
| 2. | Select Active quiz | Selected quiz | Users Posts | Nil |
| 3. | Select result by Date/Time | Result By Date or Time | Active Topics and Posts | Nil |
| 4. | Post New Result | Select Result | Database will be updated | Nil |
| 5. | Post Reply | Select Result | Database will be updated | Nil |
| 6. | Result Search | Search by Category | Search Results | Nil |

General Observations

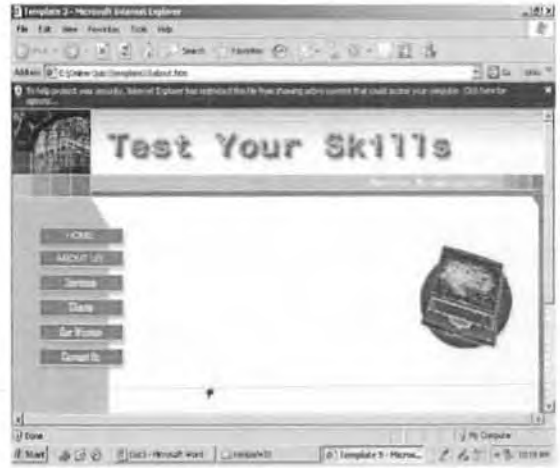
- ❖ Users can jump from one quiz to another by selecting any quiz.
- ❖ Users can select any topic from selected quiz to view its result.
- ❖ Users can select quiz by order of date and time.
- ❖ In order to post a new topic User must be a registered user.
- ❖ Subject and Body will be initially checked as, as it is valid or not. If valid database will be updated.
- ❖ Registered users can post reply to any quiz.
- ❖ These posts will be assumed to be answers to that topic or may that user need extra help on that topic.
- ❖ Users can search the results category wise such as by name Search, by roll # Search.
- ❖ Results will be displayed accordingly based on Database search.

Tested By

| | |
|--------------------|-------------------------------------|
| Name | Shakila Kausor & Sadia Arshad |
| Designation | Developers |
| Date | 3/5/2006 |
| Signatures | Shakila, sadia <i>Shakila Sadia</i> |

Chapter 4

Software Design Specification



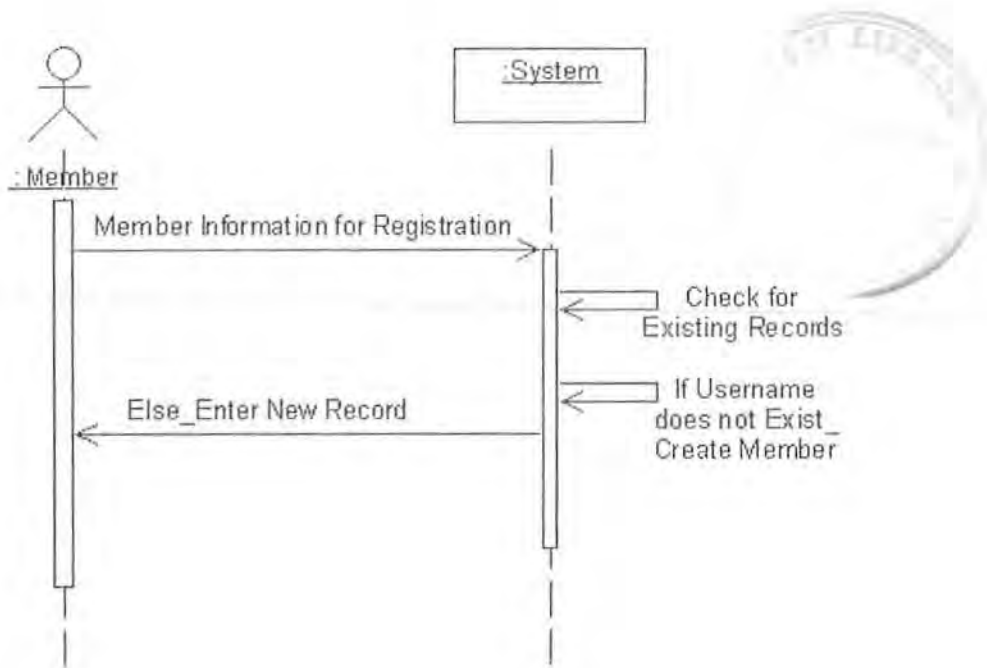
www.it-ebooks.info

This chapter gives a comprehensive view of the flow and description of the data in the graphical format using Sequence diagrams and Collaboration diagrams of the Use Cases described in the previous chapter.

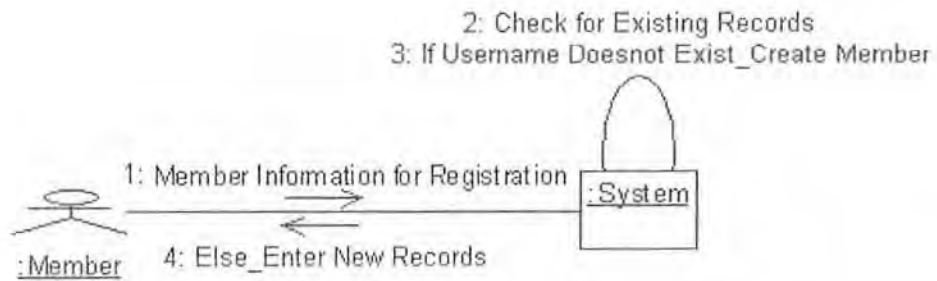
This chapter includes:

- 1.Sequence diagrams
- 2.Collaboration diagrams

Sequence Diagram:



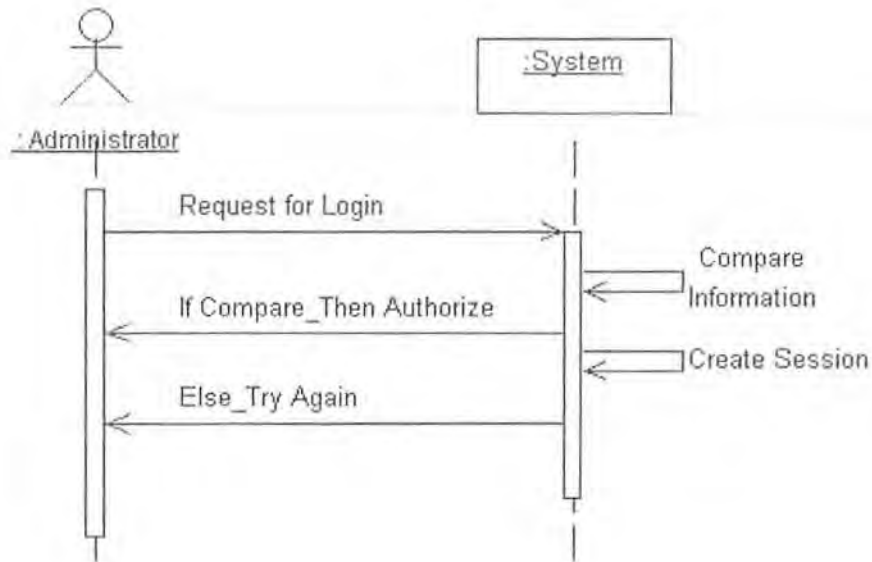
Collaboration Diagram:



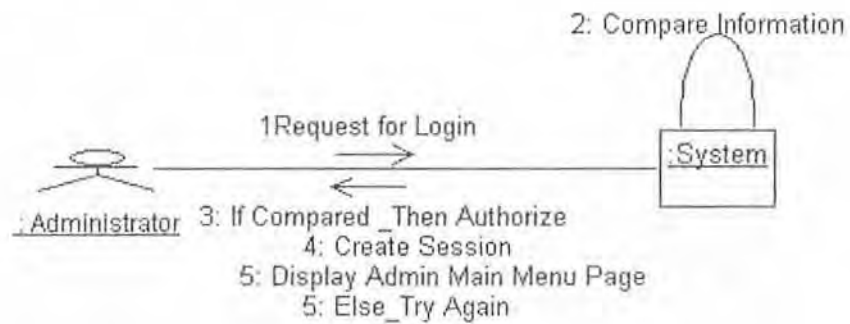
2. Login:

2.1 Admin Login:

Sequence Diagram:

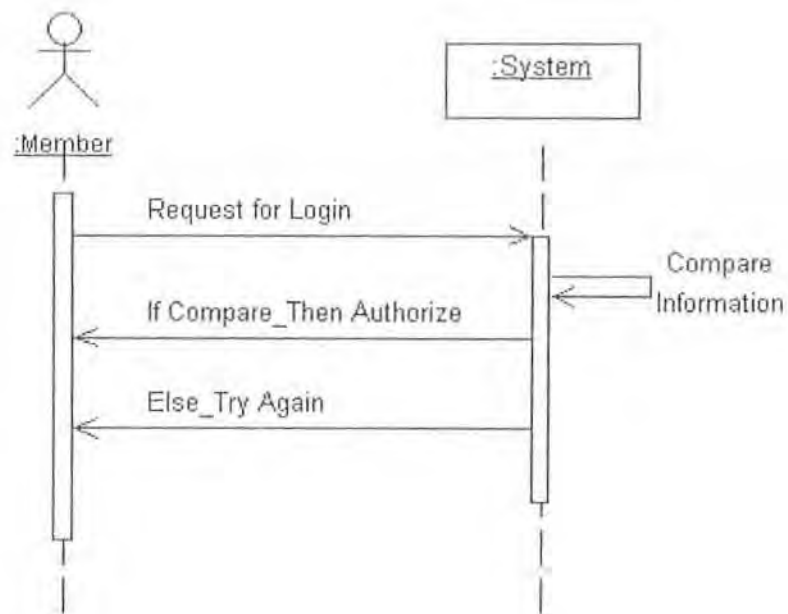


Collaboration Diagram:

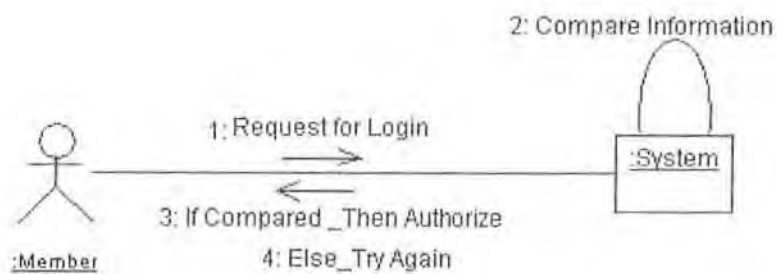


2.2 User Login:

Sequence Diagram:



Collaboration Diagram:



3. News Letters Use Cases:

3.1. Admin News Letters Use Cases

3.2. User News Letters Use Cases

3.1. Admin News Letters Use Cases

3.1.1 Delete/ View all Subscribers

3.1.2 Send/Email News Letters

3.2. Users News Letters Use Cases

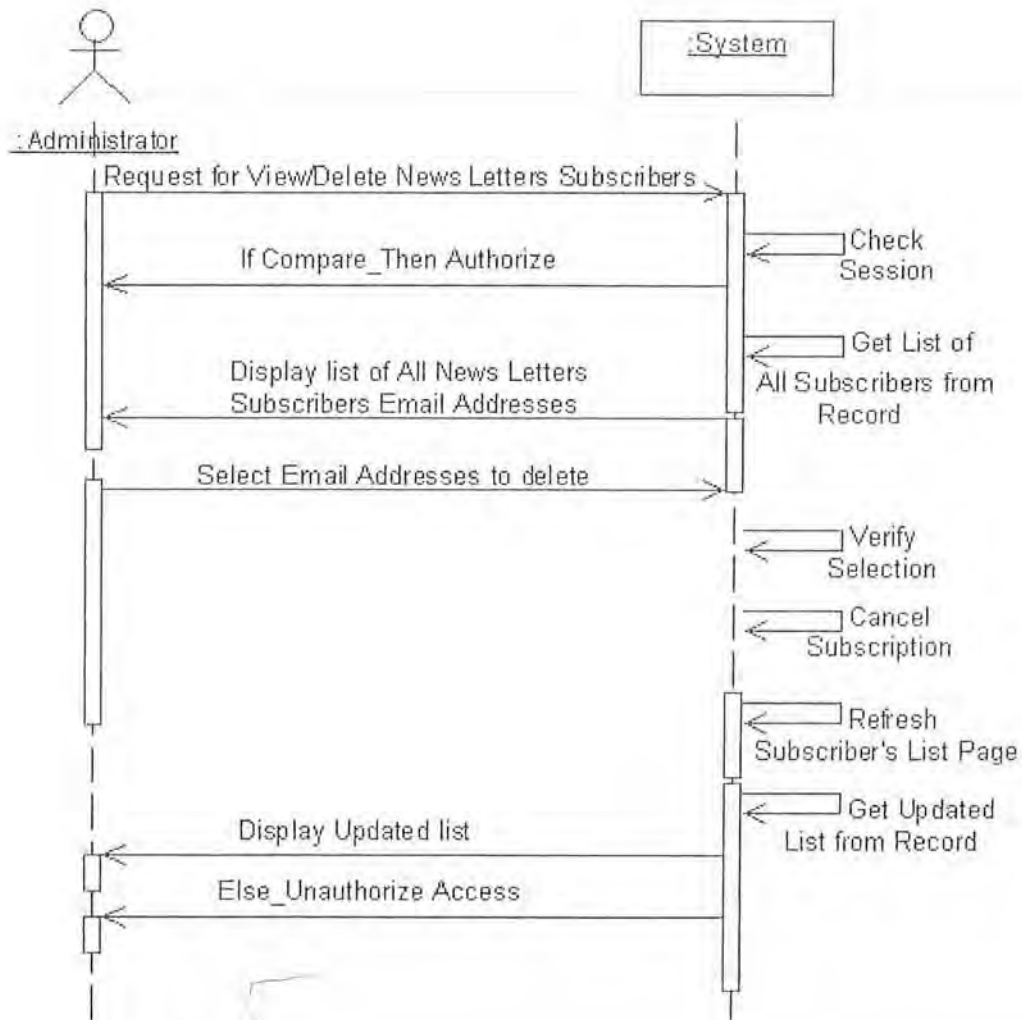
3.2.1 Subscribe News Letters

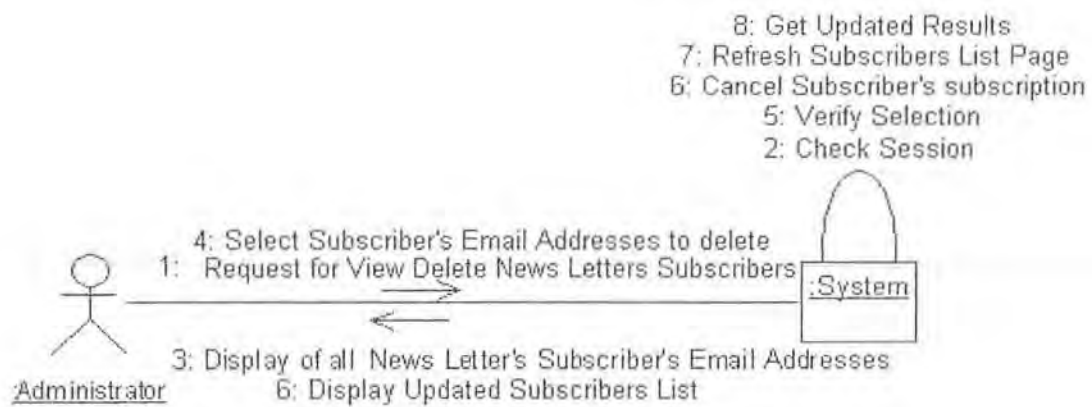
3.2.2 Unsubscribe News Letters

3.1 Admin News Letters Use Cases

3.1.1 Delete/View All Subscribers

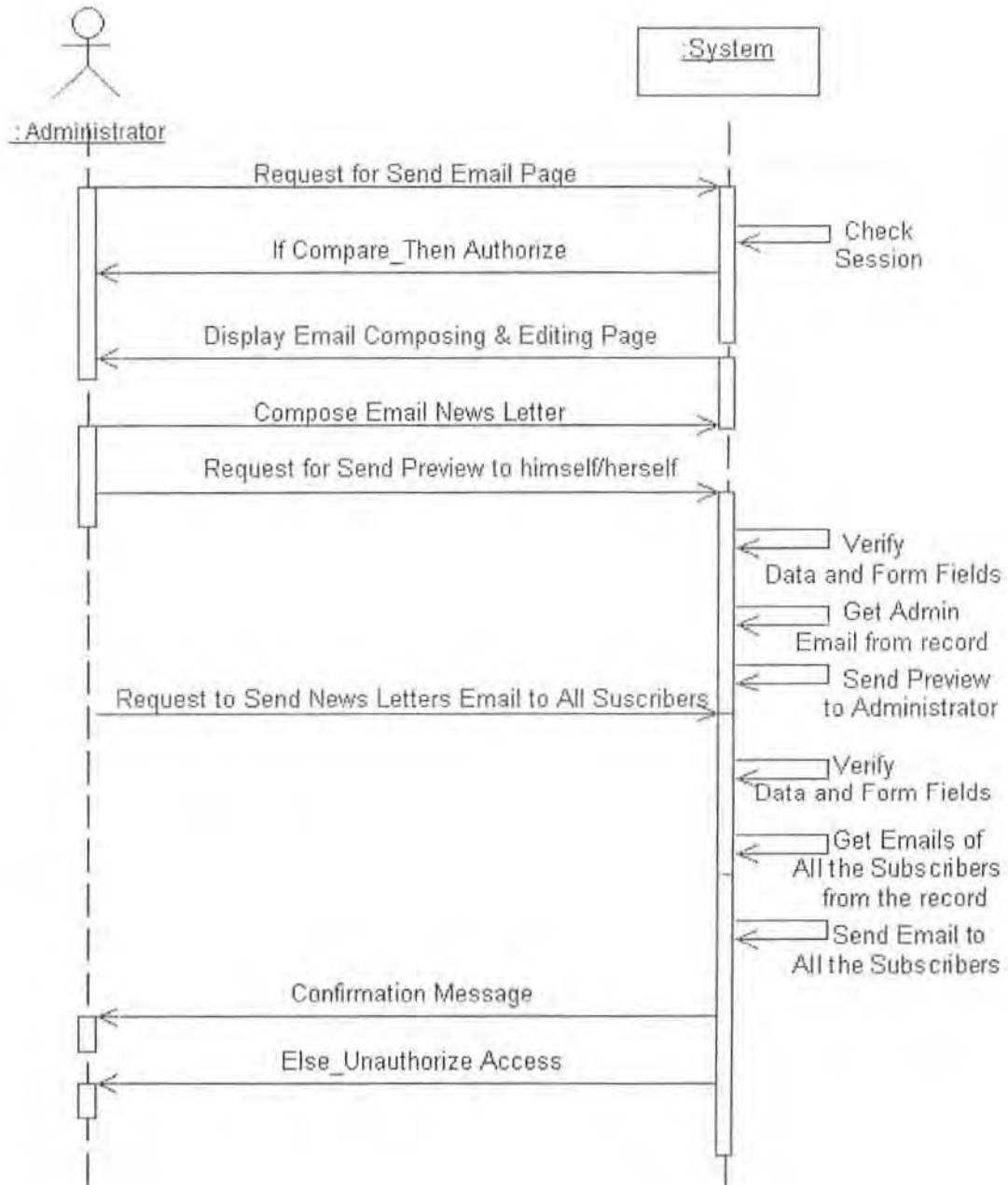
Sequence Diagram:



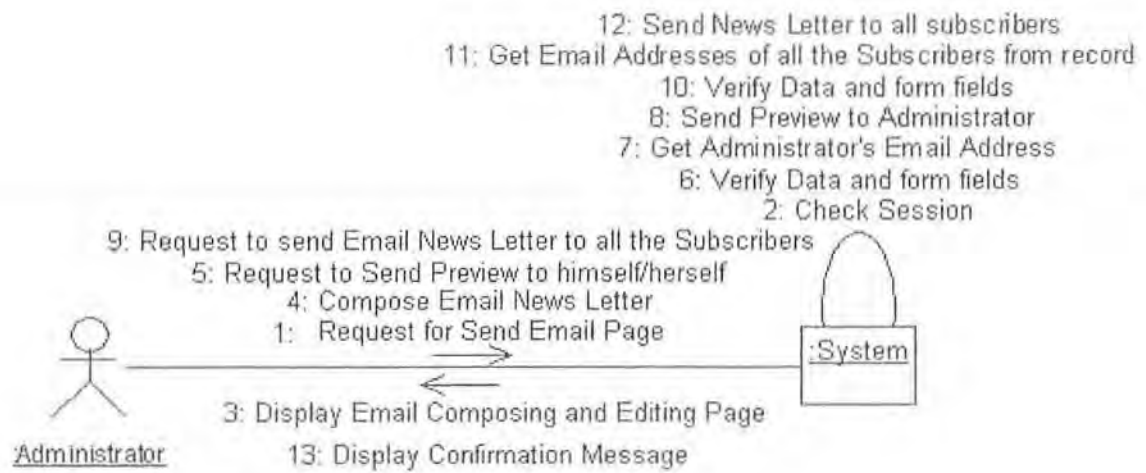
Collaboration Diagram:

3.1.2 Send/Email News Letters

Sequence Diagram:



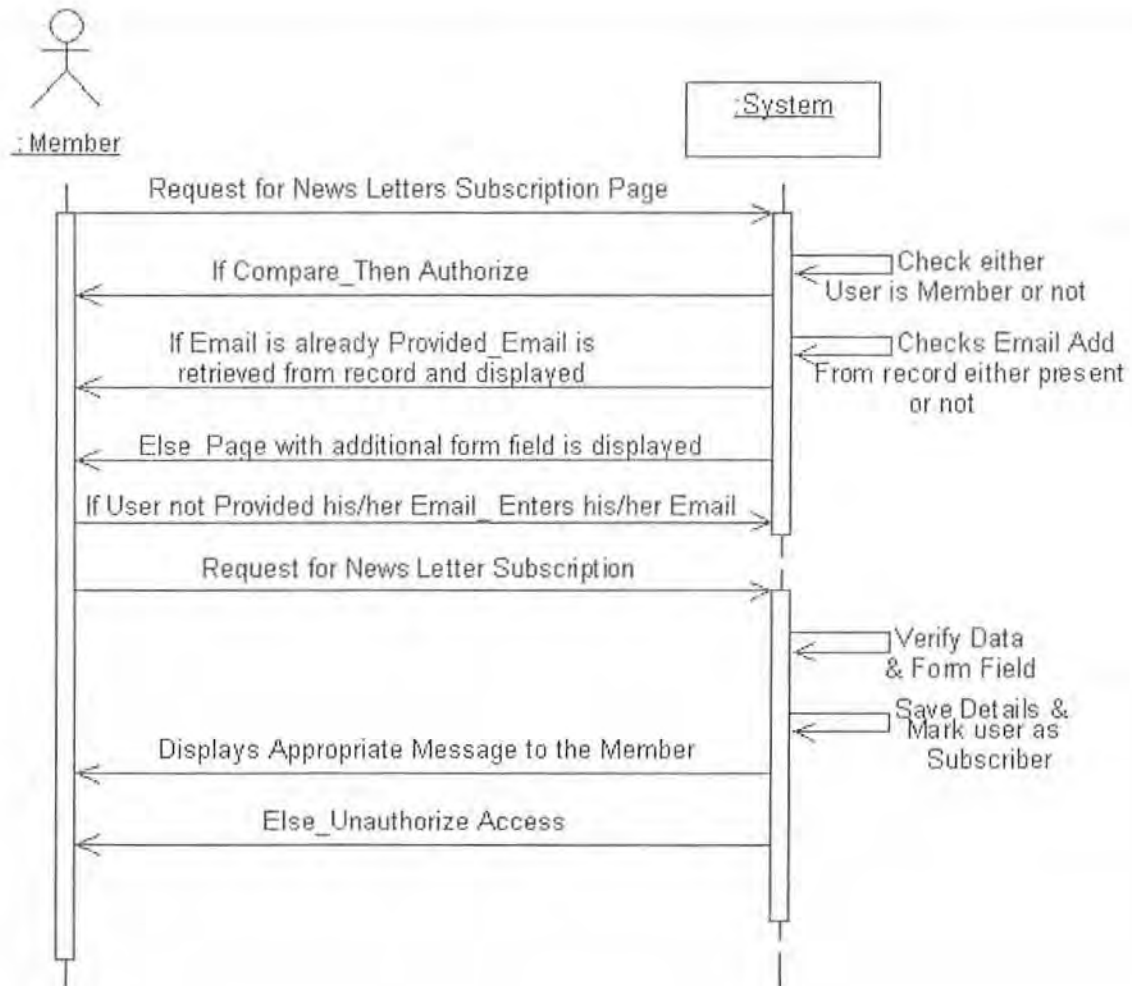
Collaboration Diagram:



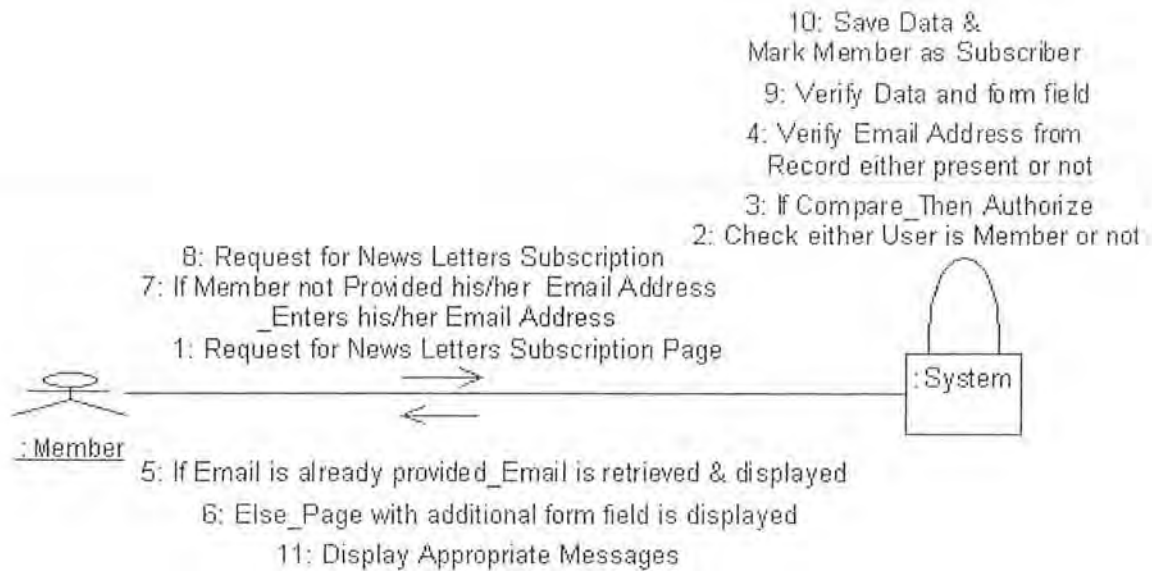
3.2 Users News Letters Use Cases

3.2.1 Subscribe News Letters

Sequence Diagram:

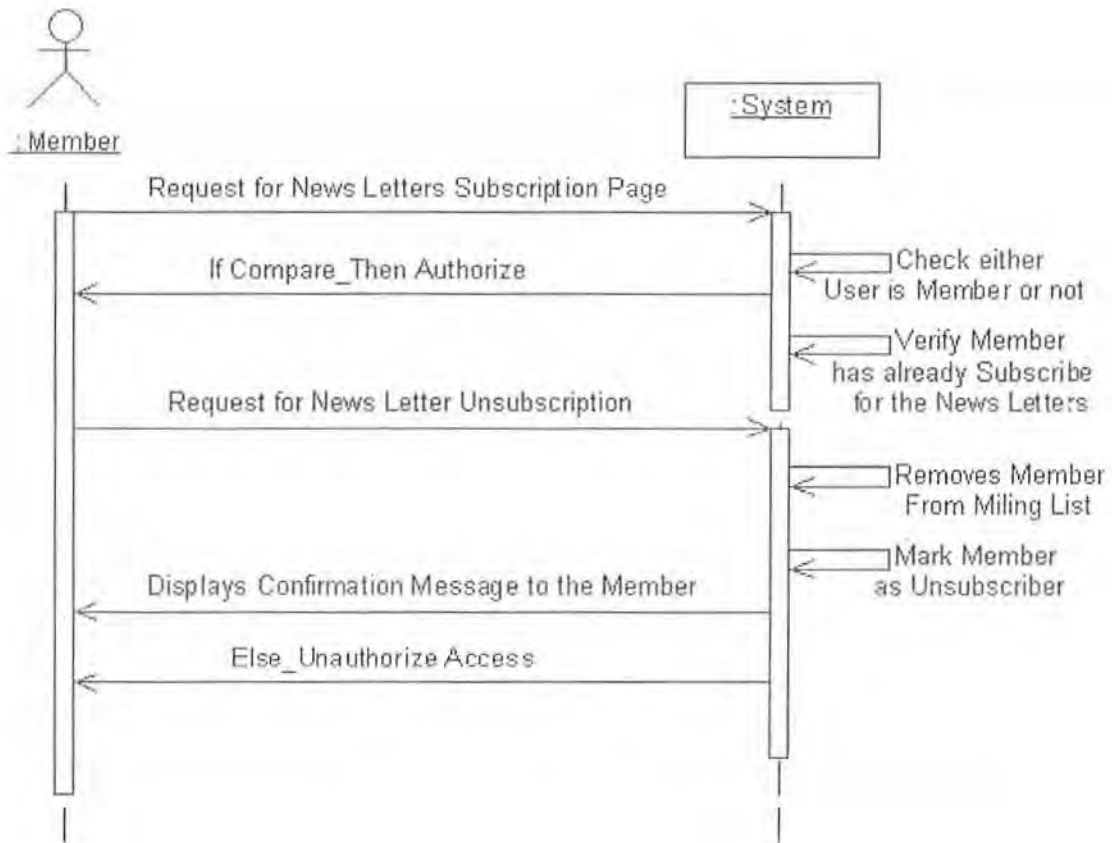


Collaboration Diagram:

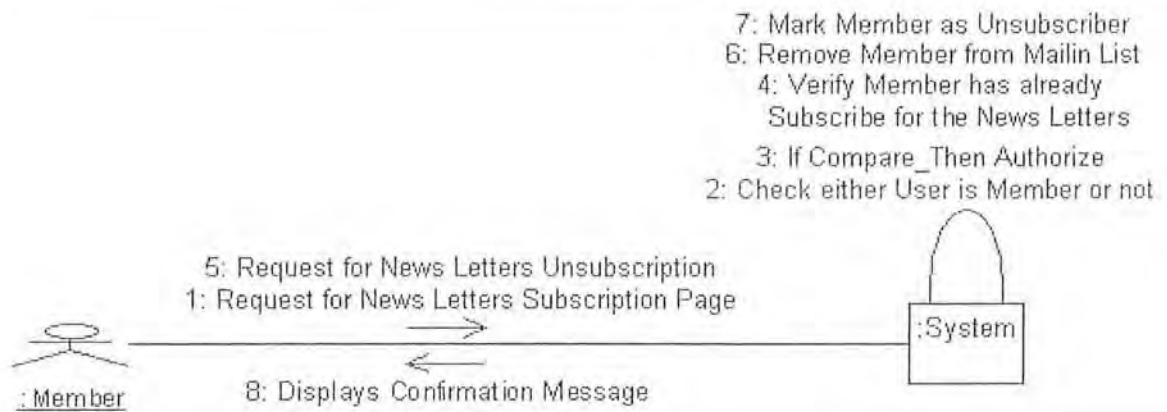


3.2.2 Un Subscribe News Letters

Sequence Diagram:



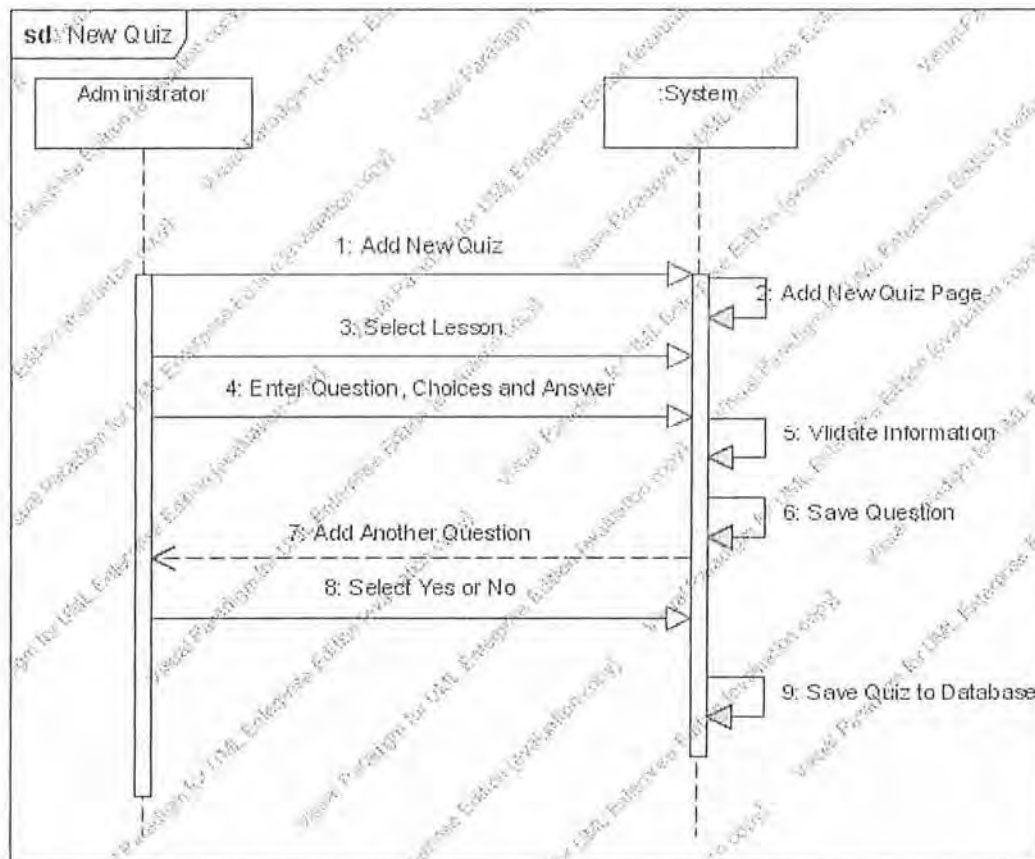
Collaboration Diagram:



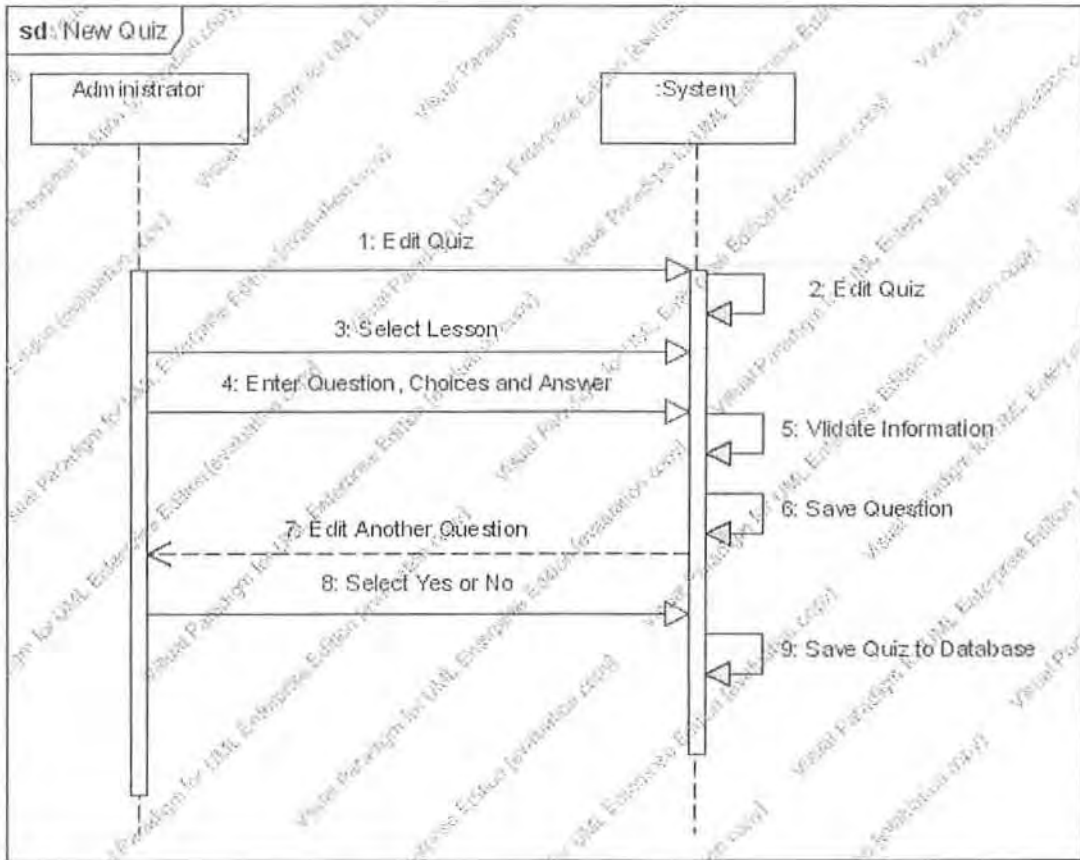
4 Admin Quiz Section:

Sequence Diagrams:

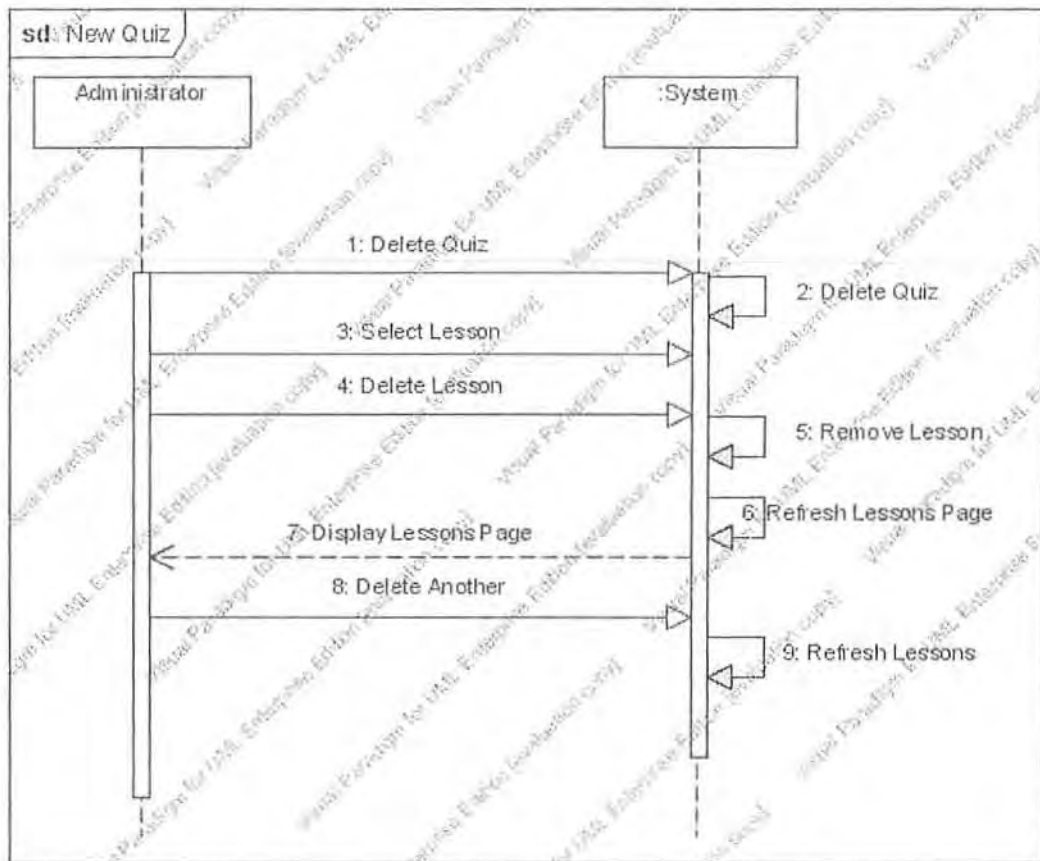
Add New Quiz:



Edit Quiz:

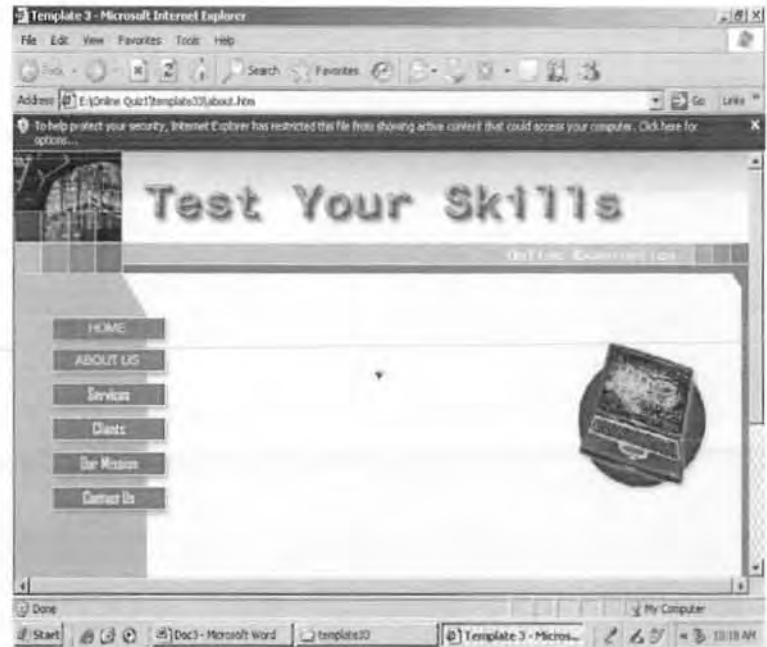


Delete Quiz:



Chapter 5

Database Description



ONLINE QUIZ

This chapter gives a comprehensive view of the database description, database connectivity along with short description of table.

This chapter includes:

- ❖ Database Description
- ❖ Platform (OS)
- ❖ Database Connectivity Type
- ❖ Short Description of Tables
- ❖ Data Dictionary

| Data Base | | |
|------------------|---|--|
| Name | Examinations | |
| Introduction | It contains all the information regarding Test your skills. It maintains the records of Users, Administrator, News Letters, quizzes, results, certificates etc. | |
| Platform | Windows XP | |
| Connectivity | OLEDB | |
| References | | |
| No | Table Name | Description |
| 1. | Administrator | This table stores the information of Administrator. |
| 2. | User info | This table is used to store all the information related to User. |
| 3. | LessonID | This table is used to store all the information related to lessons. |
| 4. | Marks | This table is used to store all the information related to the results of participant. |
| 5. | Quiz | This table is used to store all the lessons. |
| 6. | Newsletters Configuration | This table contains all the configuration record of the News Letters Section. |
| 7. | NewsLettersMailingList | This table is used to store all the subscribed email addresses. |
| 8. | Results | This table is used to store all the results along with its full details. |
| | Certificates | This table is used to store all the certificates along with its full details. |

Data dictionary

| Administrator | | | |
|----------------------|------------------|-------------|-------------------------------|
| FIELD NAME | DATA TYPE | SIZE | DESCRIPTION |
| LoginID | Text | 10 | Id of the Administrator |
| Password | Text | 10 | Password of the Administrator |

| User info | | | |
|-------------------|------------------|-------------|-----------------------|
| FIELD NAME | DATA TYPE | SIZE | DESCRIPTION |
| User ID | AutoNumber | Long | Id of the User |
| Username | Text | 20 | User name |
| User code | Text | 70 | User name code |
| Password | Text | 20 | Password of the User |
| User email | Text | 50 | Email address of User |
| Signature | Memo | | Signature of User |

| Active User | | | |
|--------------------|------------------|-------------|------------------------------|
| FIELD NAME | DATA TYPE | SIZE | DESCRIPTION |
| IP | Text | 30 | IP Address of Logged IN User |
| User ID | Number | Long | Id of the User |
| Login | Date/Time | Current | Last Login Date |
| Active | Date/Time | Current | Current Login Date |
| OS | Text | 15 | OS of the User |
| Browser | Text | 15 | Browser used by the User |
| Hide | Yes/No | T/F | Hide User Information |

| Newsletters Configuration | | | |
|----------------------------------|------------------|-------------|---|
| FIELD NAME | DATA TYPE | SIZE | DESCRIPTION |
| Website name | Text | 35 | Web site name to be Shown on News Letters |
| Website address | Text | 60 | Web site add to send with each News Letters |
| Website_email_address | Text | 50 | Web site Email to be send with News Letters |
| Test_email_address | Text | 35 | Testing Email add to send News Letter on it |
| Mail component | Text | 10 | Type of Mailing Component |

| | | | |
|----------------------|--------|---------|---|
| Mail server | Text | 50 | Outgoing SMTP Mailing Server |
| Bg colour | Text | 12 | BG color for Mailing List Module |
| Text colour | Text | 12 | Txt color for Mailing List Module |
| Text type | Text | 55 | Txt type for Mailing List Module |
| Text size | Number | Integer | Txt size for Mailing List Module |
| Links colour | Text | 12 | Links color for Mailing List Module |
| Visited_links_colour | Text | 12 | Visited Links color for Mailing List Module |
| Active_links_colour | Text | 12 | Active Links color for Mailing List Module |
| Welcome message | Memo | | Welcome Message to New Subscribed User |
| Welcome format | Text | 10 | Format of the Welcome Message |

| NewsLettersMailingList | | | |
|------------------------|------------|------|--------------------------------|
| FIELD NAME | DATA TYPE | SIZE | DESCRIPTION |
| Mali | AutoNumber | Long | Id of the subscribed Email Add |
| Email | Text | 40 | Subscriber's Email Add |
| ID_Code | Text | 30 | Subscriber's Email Add Code |

| Quizzes | | | |
|--------------|-----------|---------|---|
| FIELD NAME | DATA TYPE | SIZE | DESCRIPTION |
| Question no | Long | 40 | Auto generated no for each different question |
| LessonID | Number | 10 | Gives id of the lesson |
| Question | Text | 100 | Contains question for the quiz |
| Quizz_name | Text | 51 | Name of the quiz |
| Answer | Byte | 60 | Contain the correct answer of the above given three choices |
| Date Started | Date/Time | Current | Starting date of the quiz |
| Choice1 | Text | 22 | Contains answer choice 1 |
| Choice2 | Text | 22 | Contains answer choice 2 |
| Choice3 | Text | 22 | Contains answer choice 3 |

| Results | | | |
|-------------------|------------------|-------------|--|
| FIELD NAME | DATA TYPE | SIZE | DESCRIPTION |
| User_ID | AutoNumber | Long | Id of the User |
| Username | Text | 20 | User nick/name |
| User code | Text | 70 | User name code |
| Quiz Name | Text | 20 | Contain the name of Quiz in which user appears |
| Right | Integer | 10 | No of right answers in quiz |
| Wrong | Integer | 10 | No of wrong answers in quiz |
| Skipped | Integer | 10 | No of skipped questions in quiz |

| CERTIFICATES | | | |
|---------------------|------------------|-------------|-------------------------------------|
| FIELD NAME | DATA TYPE | SIZE | DESCRIPTION |
| User_ID | AutoNumber | Long | Id of the User |
| Username | Text | 20 | User nick/name |
| User code | Text | 70 | User name code |
| Marks | Integer | 20 | Marks of the User |
| Percentage | Integer | 10 | Percentage of marks of the User |
| Time | Date/time | 25 | Show time of issuing of certificate |
| Grade | Text | 50 | User's grade in quiz |
| Remarks | Text | 45 | Remarks about result of user |

Chapter 6

System Requirement Specification



ONLINE
SOFTWARE

This chapter gives a comprehensive view of the activities of the Software Requirement Specification.

This chapter includes:

- Introduction
- General Description
- Specification Requirements
- Maintenance Plan

1: Introduction

1.1 Purpose

The purpose of this document is to describe the functionality of an Informative Web Site naming Test your skills. This document will serve as a baseline on which the proposed system will be developed and implemented. This document will also describe the scope and boundaries of the system. All the requirements of the user will be documented here and the proposed system will meet all the requirements which are being described in this document.

1.2 Scope

This document will encompass all the functional and non-functional requirements of the user. The users define hardware and software constraints and interfaces will be the part of this document. The performance issues and limitations of the software will be established.

1.3 Overview

This application provides functionality to a person that he first registers as a site member in order to avail different services. Without registration of any user, user can navigate through the site i.e. view all the quizzes, News but as far as registered users are concern, they can receive News Letters from our site by subscribing their Email Address and can use the Online Support Forum, Private Messenger etc. User's validation is done through Login ID and Passwords in order to implement the

security. Administrator section is totally different that contains different administrative task related to the features of the System/Web Site.

2: General Description

2.1 Product Perspective

This application is a three-tier application, means it runs from a server. The product should be able to be run from a remote server with an Internet connection or from the local machine without an Internet connection. The current hardware that is running the software is a Pentium 733, running Windows XP.

2.2 Product Functions

The application will perform following functionalities.

- ❖ User registration/Subscription
- ❖ News Letters
- ❖ Quizzes
- ❖ Results
- ❖ Administrative Tasks
- ❖ Database validation
- ❖ User validation
- ❖ Certificates

2.3 User Characteristics

Following is the description of the users, which will interact with system and perform data manipulation activities.

Administrator

- Overall control of the application
- Database administration
- Configure News Letters Components

- All the related administrative tasks such as Add, Edit, and Delete in all the components including quizzes etc.

User

- Submit/post comments at different news
- Send any message to any site member using private messenger.
- Can reply to any message (if allowed by the sender).
- Inbox where many messages can store from 25 to 100 as specified by the Administrator. The users can also delete messages.
- Etc.

2.4 General Constraints

2.4.1. The Product

- Must Browser independent
- Windows based application
- Must have clear help/error messages

2.4.2. Hardware Constraints

- Monitors: 800*600 minimum resolutions at 256 colors minimum.
- Memory: Approximately 64 megabytes.
- I/O: One or two button mouse and standard 101-key keyboard.
- CPU: At least 600 MHz should be on the computer.

2.4.3. Guidelines

- Text should be kept to a minimum to increase readability.

- Color choice should be appropriate to accommodate users with color-blindness.

3: Specification Requirements

There are two types of specification requirements:

- ❖ Functional Requirements
- ❖ External Interface Requirements

3.1: Functional Requirements

We divide our functional requirements into two categories:

3.1.1: Functional Requirements of Administrator

3.1.2: Functional Requirements of Users

This section describes the basic functional requirements of the system with respect to different users.

3.1.1: Functional Requirements of Administrator

3.1.1.1 Administrator Login

Introduction

This function is used to login the Administrator. This function gets information from the user and authorizes them to access the resources, which can be used only by the Administrator.

Inputs

- a) Administrator ID
- b) Administrator Password

Processing

This function will be used for validating the Administrator for login and granting them privileges for their registered resources.

Output

The output of the function is based upon the user given information. If the user gives incorrect information for login, he will be requested to try again; else he will be logged in.

3.1.1.2 Administration of lessons.

Introduction

This function will provide the opportunity to the Administrator to Add new lessons against which users can select a best-fit option among the multiple choices.

Inputs

- ❖ Question Statement
- ❖ Choice 1-7
- ❖ Selection of choices
- ❖ Submission of quiz
- ❖ Result display
- ❖ Reset of quiz
- ❖ New quiz
- ❖ Lessons configurations

Processing

This function will provide the opportunity to the Administrator to Add new lessons against which users can select a best fit option among the multiple choices. In the Add new lessons Administrator must enter a description or Questions along with minimum four choices or maximum seven choices. In the Amend or Delete lessons section Administrator simply selects the lessons and Delete it. Administrator can delete more than one lesson in the mean time. The lessons Configuration Section includes Background color, Text color, Font Style, Font Size, Small Font Size, Table Background Color, Table Border Color, Links, Visited Links, Mouse over Links.

Output

- Form to Enter new lessons along with its choices (Approx. 2 and max. as entered by administrator up to 7)
- Check boxes to select appropriate option to the given lesson.
- Form to Configure lesson Application.

3.1.1.3 Administration of News Letters Module

Introduction

This function will be used to Send Plain Text E-mail to Mailing List Members, Send HTML E-mail to Mailing List Members, View or Remove Mailing List Members, Configure Mailing List Application, and Change the Mailing List Colors and Text type. The Administrator will do this all.

Inputs

- ❖ Subject and Message Body in Plain Text Email
- ❖ Subject, Optional (Font Type, Font Size, Font Color, Format Toolbar, Add Hyperlink, Add Image) and Message Body.
- ❖ List Of Mailing List Members with checks boxes.
- ❖ Mailing List Configuration Values
- ❖ Mailing List Colors and Text Format Values

Processing

This function will provide the opportunity to the Administrator to Send Plain Text E-mail to Mailing List Members, Send HTML E-mail to Mailing List Members. In both formats of sending E-mail to Mailing List Members, there is options for the Administrator to Send Preview of the News Letter to himself, and Send to all Members. View or Remove Mailing List Members Section basically consist of all the Members Subscribed E-mail Addresses with the check boxes, in order to selected by the Administrator to remove from the Mailing List.

Configure Mailing List Application provide the opportunity to the Administrator to choose E-mail Component to use (CDONTS, CDOSYS, JMail, AspEmail, or AspMail), Outgoing SMTP Mail Server (NOT needed for CDONTS). You only need this if you are

using an e-mail component other than CDONTS. It must be a working mail server or the script will crash, Website name: the name of your website or Company Name, Web address path to mailing list script

The web address to this mail list script including web site URL, Your Web Sites E-mail Address

Without a valid e-mail address you wont be able to send e-mails from this script, Preview E-mail Address: This is the e-mail address you want to send a test e-mail to so you can view what the e-mail will look like before you send it to all your members, Conformation/Welcome E-mail: If you would like a welcome message sent to new members then type your message that will be e-mailed to them in the Message Box. Change the Mailing List Colors and Text type Section includes Background color, Text color, Font Style, Font Size, Small Font Size, Table Background Color, Table Border Color, Links, Visited Links, Mouse over Links.

Outputs

- Form to Send Email to All Subscribed Members
- Check boxes to select appropriate Mailing List Member to Delete
- Form to Change Mailing List Colors and Text Type

3.1.1.4 Administration of Results Module

Introduction

This function will provide the opportunity to the Administrator to Set up new result and categories - including security settings, Change the default admin username and password - highly recommend, Setup and turn on and off result of quizz, Configure the result - turn on and off result functions and change the result logo, Set result moderators, Configure time and date settings - also change the time displayed by the result to your local time.

Inputs

- ❖ Select result of each quiz
- ❖ New result against each quiz (Only Registered Users)

- ❖ Font, Size, Color of the result
- ❖ Result
- ❖ Result Search

Processing

This function will provide the opportunity to the Administrator to Set up new result and categories - including security settings that are Add, Amend, Delete any result's and result categories, alter result details, set result permissions, lock results, password protect results, etc.

Change the default admin username and password - highly recommend for higher result security

Configure the result - turn on and off result functions and change the result logo.

Configure time and date settings: Change the format of dates and times in the result or change time/date settings to your local settings if the server is in a foreign country to your own.

Outputs

All the results against each quiz seen by any users.

3.1.1.5 Administration of certificate Module

Introduction

This function will provide the facility to interact with the concerned personals.

Inputs

Email Inputs such as To, from and Message Body etc.

Processing

This function will provide the facility to the users by which they can Contact the Developers and Administrator Using the website for issuing of certificate and can submit their suggestions or can even ask for some special facility (e.g. for information about specific user...).

Outputs

Issuing of certificates.

3.1.2: Functional Requirements of Users

3.1.2.1 User Registration / Subscription

Introduction

This function will be used for registering Users for different classes registered by the Administrator.

Inputs

- ❖ User Name (id)
- ❖ Password
- ❖ Email
- ❖ Address
- ❖ Location
- ❖ Signature

Processing

This function will get information from the user and stores it to the database. It also contains the input i.e. Add to Active User Lists, and Auto Login during registration also.

Output

The out from this function will be a form to get user Personal Information. After submitting user Information Newly Subscribed user's Menu Page will appear.

3.1.2.2 User Login

Introduction

This function is used to login the Users. This function gets information from the user and authorizes them to access the resources, which can be used only by the registered users.

Inputs

- a) User Name (ID)
- b) User Password

Processing

This function will be used for validating the Users for login and availing different services.

Output

The output of the function is based upon the user given information. If the user gives incorrect information for login, he will be requested to try again; else he will be logged in. After login the User can avail any service i.e. reserved for the registered users.

3.1.2.3 Quizzes.

Introduction

This function will provide the opportunity to the users to give the quizzes of computer studies by selecting appropriate answer of their own choice.

Inputs

- ❖ Choice (Radio button i.e. Answer to any question for the latest Topic)
- ❖ Question Statement
- ❖ Answer1
- ❖ Answer2
- ❖ Answer3
- ❖ Answer4

Processing

This function facilitates the users to give the quizzes of their own choices by selecting the appropriate answers. User can submit their quizzes and can see the results. The Administrator will record all the Topics and related questions.

Output

The output of the above function will be to increment of one in the choice number the user selected and to store it in database and also displayed to the users.

- Pop-up Window for View results (i.e. in percentage in graphical format)
- In the same Pop-up Window option for View Previous quizzes Results

3.1.2.4 News Letters**Introduction**

This function will be used to subscribe the Email Address of the registered users in order to send those Our Site News Letters.

Inputs

- Email Address

Processing

This function will get the information from the database i.e. Email Address of the registered user. This Email Address can be change there, if user wants to receive News Letters at his other mailing address. If user already subscribes his/her email address system will give him the message else confirmation of subscription will be displayed.

Outputs

Newly subscribed users will be added and new Users will be then able to receive the News Letters.

3.1.2.5 Results

Introduction

The function will be used to provide results to the user. Users can submit their quizzes in IT and can see their results, as they required.

Inputs

- Select result By date or Time
- New result against each quiz (Only Registered Users)
- Font, Size, Color of the result
- Result
- Result Search

Processing

This function will used to provide results to the users. Registered Users can submit their quiz in the related subject, which will be answered with in 3 hours. All the users registered can view their results in the quiz. At the

mean time users can also select the results by time and date. Users can also search with in the results. Search consists of By name Search, By roll # Search etc.

Outputs

All the results against each quiz for user

3.1.2.6 Certificates

Introduction

This function will provide the facility to interact with the concerned personals.

Inputs

Email Inputs such as to, from and Message Body etc

Processing

This function will provide the facility to the users by which they can Contact the Developers and Administrator Using the website for issuing of certificate and can submit their suggestions or can even ask for some special facility (e.g. for information about specific user...).

Outputs

Issuing of certificate.

3.1.2.7 Form Validation

Introduction

This function will check different form fields for their validation.

Inputs

- Different form field values

Processing

This function will be used for checking validity of the data entered by the user. If the values entered by the user are not valid then different message boxes will be displayed with different messages with focus on the field, which need some change. After getting correct information, this information will be stored for further processing.

3.1.2.8 Database validation

Introduction

This function will check the validity of the data to be inserted into database.

Inputs

- Different form fields
- Passing criteria

Processing

This function will store the data into database after if it has been validated successfully.

This function will compare the required field length, the data type and any constraints implemented on database for submitting data to database.

3.1.2.9 User validation

Introduction

This function will check validity for authenticating the registered users of the system.

Inputs

- Administrator or User ID
- Password

Processing

This function is used for secure login. The values entered by the user are first validated on the form. Then these values are compared with the records in the database related to these users. If the information entered by the users is as, as it is in database against their record, then they can access the secured pages designed specially for registered users.

3.2 External Interface Requirements

3.2.1 User Interface

The user interaction with the system has to be through forms designed for each module.

Movement within the controls (entry area) will be performed through tab key and it will be done horizontally i-e, left to right.

3.2.2 Hardware Interfaces

Hardware interface will be provided through the network connectivity between server and Client.

3.2.3 Communications

All system processes are explained in detail in functional requirements and that will be the base of actual system. After approval of requirements document no additional requirements will be added.

A beta version of the system will be submitted for testing and to remove the bugs.

3.3 Design Constraints

3.3.1 Standard Compliance

- 1: The system is browser independent and can be run on Browser.
- 2: The system is Windows Based System.

3.3.2 Hardware Limitations

For server: RAM required (recommended) = 128 MB

Hard disk = at least 20 GB

Processor = Pentium II

For client: There is no limitation of hardware for the client machine.

3.3.3 Others

3.3.3.1 I/O Volume

The data entry screen will not be too heavy. Forms having a lot of inputs will be divided into multiple sheets. The data required from other modules will come automatically.

3.3.3.2 I/O Rate

Input/output of the system will be lesser, if the user of the system enters the information in time.

3.3.3.3 Defaults

The system will provide appropriate defaults where possible.

3.4 Performance Requirements

This system will respond to the user depending upon the time in which the user will add the data to the appropriate form.

3.5 Attributes

3.5.1 Security

Role base security will be implemented. Access to some features will be restricted by passwords. Administrator and user will select his/her password once and when want to login, its validation will be checked.

3.5.2 Maintainability

The system will be Browser independent and can be run properly up to three years in Windows Based Environment. During this time the company will be responsible for the maintenance.

3.6 Error and Error messages

Descriptive error message will be provided.

The system will have context sensitive help.

3.7 Consistency

The system will show uniform behavior on all the screens that are concerned to the users. There will be no variations from section to section for the users.

3.8 Error Tolerance

All errors will be trapped and conveyed to the user through proper messages.

3.9 Simplicity

Forms will be designed according to the workflow of the actual process and thus will be easy for the final users to use.

3.10 Documentation

Technical and user documentation will be providing with the system.

3.11 Coding Standards

Hungarian notation will be used for coding.

3.12 Test with code review

Internal code reviews will be conducted to test the coding standard.

3.13 Other Requirements

3.14.1 Data Base

3.14.1.1 Location of Data

Data will be stored on remote server and client will be attached to the server for data access via Internet.

3.14.1.2 Database Size

Total number of records could go up to any number depending upon storage capacity.

3.14.2 Training

3.14.2.1 Level of Training

There is only one level of user.

Administrator

3.14.2.2 Time Frame

To use the system properly a user will require approximately two hours.

3.14.2.3 On Line Help

On line help will be provided with the system. In addition a user guide will also be provided.

4 Deliverables

Requirements Specification Document (RSD)

Initially an RSD will be delivered to the client and the client will be responsible to sign it off. After the acceptance of the RSD, the actual software development will be started.

4.1 Installation Software

The software that will be designed and implemented according to the requirement specification document will be delivered to install. Beta version will also be delivered in the mean time for testing.

4.2 User Training

Three hours workshop will be held at PYRAMID to train the users.

4.4 User Guide

A user guide will be provided with the software so that the user can easily understand the system and learn how to use its different options in a quick and proper manner.

Chapter 7

Tools and Technologies



CHAPTER 7

*This chapter gives introduction
Of the tools and technologies
used to develop this Web Site
(Test your skills)*

This chapter includes:

- Dynamic Web Pages
- Dynamic VS Static Web Pages
- Active Server Pages (ASP)
- Server Side Scripting
- Client Side Scripting

7.1 What Is A Dynamic WebPages?

If you surf around the Internet today, you will see that there are a lot of static web pages out there. A static web page is essentially a page whose content consist of some HTML pages that was typed directly into a text editor and saved as an HTM or HTML file. Thus the author of the page has already completely determined the exact content of the page.

Static web pages are quite easy to spot, some time you can pick them out by just looking at the content of the page. The contents (e.g. text, images hyperlink etc) and appearance of the static web page is always the same regardless of who visit the page, or when they visit, or how they arrive at the page, or any other factors.

7.2 Static Pages Vs Dynamic Pages

- ✓ Lets think for a moment how a static, pure HTML page finds its way into a client Browser
- ✓ A web author writer pages composed of pure HTML, and save it within an HTML file.
- ✓ Some time later a user type a page request into a Browser, and the request is passed from the Browser in to the web server.
- ✓ The web server locates the .html page.
- ✓ The web server sends the HTML stream back across the network to the Browser.
- ✓ The Browser processes the HTML and displays the page.

7.3 The Limitations Of Static Web Pages

If we want to enhance our page so that it displays the current time or a special message that is personalize for each user. It will not be possible using HTML alone.

7.4 Active Server Pages (ASP)

So far we have analyzed the difference between static and dynamic web pages , but we have barely mentioned the active server pages (ASP) , here is a simple definition of ASP.

Active Server Pages is a technology that allows for the programmatic construction of HTML pages just before they are delivered to the Browser.

In other words ASP we can write a set of instructions that can be used to generate HTML, just after the web page has been requested by a client, and just before it delivered. It is a perfect tool for any HTML write to add to the toolkit, because it gives us the power and flexibility to generate fresher HTML and ultimately to reduce more spectacular, interactive, personalized, up-to-date web pages.

How can we describe ASP? It is not a language like other high level languages like (Pascal & C++) although it does make use of existing scripting languages such as VB Script and Java script, more ever it is not really an application like Front page and MS Word, Instead we describe ASP using rather a more ambiguous term technology.

7.5 ASP Code Is Browser Independent

ASP code is always executed on the web server, and generates pure HTML. The client machine does not need to provide any kind of ASP support at all. Infact the web Browser handles .html pages an ASP page in exactly the same way because from the Browser point of view, the process involves the sending the page request to a web server and receiving a stream of pure HTML.

The Browser is blissfully ignorant of any ASP processing that might be happening on the server, it only ever get to see pure HTML, so dynamic ASP pages are just view able in internet explorer, Netscape Navigator and other Browsers as their static .html counter parts.

7.6 Advantages Of Using A Server Side Technology

We have stressed that ASP is processed on the web server to generate HTML. While HTML is processed solely on the Browser, so what see what are the main advantages of performing actions on the web server first? Here are some main advantages of that:

- ✓ Allow you to run programs in programming language that are not supported by your Browser.
- ✓ Enable you to program dynamic web applications Browser independently, without recourse to client side programming features such as Java applet, Dynamic HTML, Active X control, all of which are Browser specific.

- ✓ Can provide the client (Browser) with data that does not reside at the client.
- ✓ Often makes for quicker loading time than with client side dynamic web technologies such as Java applet or Active X controls, because at the end you are actually downloading a page of HTML.
- ✓ Provides improper security measures, since you can write code, which can never be viewed, from the Browser.

That is not to say that the ASP pages are perfect e.g. they increase the workload on the server so if your web site becomes popular you may need to invest more hardware, but this is true, server-side functionality outweighs any disadvantages.

7.7 Virtual Directories

How does this relationship work? In fact it can work by creating a second directory structure on the web server machine, which reflects our web site.

The first directory structure is what we see when we open windows explorer on the web server these are known as physical directories (e.g. c:\My document)

The second directory structure is the one that reflects the structure of the web site. This consists of a hierarchy of virtual directories. We use the web server to create virtual directories, and to set the relationship between the virtual directories and the real directories.

Virtual directory is in fact a nickname or alias for a physical directory that exists on the web server machine. The idea is that when the user browses to the web page that is contained in the physical directory on the server. They don't use the name of the physical directory to get there instead; they use the physical directory nickname.

To see how this might be useful, consider a web site that publishes news about many sporting events. In order to organize this web site carefully the web master has to build a physical directory structure on the hard disk, which looks like this.

Now to visit this web site in order to get the latest news on the javelin event in the Olympics: If the URL of this web site were based on the physical directory structure, then it would be something like this:

<http://www.oursportsite.com/sportsnews/atletics/field/javelin/default.asp>

It's the Webmaster who can understand this directory structure, but its fairly unmemorable web address! So to make it easier for the user, they web master can assign a virtual directory name or alias to this directory its act just like a nick name of this directory

Let's assign the virtual name javelin news to the c:\inetpub\...\javelin\directory. Then the URL of the latest javelin news would be as:

<http://www.oursportsite.com/javelinnews/default.asp>

Not only thus this saves the user from long and wide URLs but it also serves as a good security measures, because it hides the physical directory structures from all the web site visitors.

7.8 Microsoft FrontPage

It comes as a part of MS office 2000 suite. It is one of the tools for creating and designing web pages but it does not offer all functionality of visual Interdev. It is ultimately a weaker but easier application to use.

It offers three views of the web page. The normal vie gives a WYS? WYG page creation view, which allows you to write pages without having to code to HTML explicitly. The HTML view allows you to write your code explicitly and the preview tabs gives a quick view of what a page should look like in a Browser.

Again a normal and a preview tabs are unable to process any ASP. In order to view the results of ASP script in Front page select file view in the Browser to see what your processed Asp will look like.

7.9 Notepad

Certainly helps in sustaining its popularity it does not highlight the ASP in any way and also it doesn't generate any extra code even having less additional functionality. It is still very popular in use due to its simplicity and less complexity in Windows 2000.

Notepad offers a “Goto” feature, which helps in quickly moving around the document using the line number.

It does not really matter which editor is to be used. We will avoid any attempt to provide a tutorial on additional tools at its beyond the scope of this book.

7.10 Identifying a Script

How do we identify the script when it is embedded in a small or large amount of pure HTML? Because the ASP which will be enclosed in a special tag `<%.....%>` e.g. if we want to print a time on a web page we will use the following piece of code:

The current time is `<%=time %>`

Every thing within `<%` and `%>` this tag is assumed to be the ASP and a sent to the ASP script host for processing.

But there are other kinds of scripts , what are not ASP code , but which still need to o be distinguish from the HTML and the text in which they are embedded . For this reason HTML provides a special tag called `<script>` tag e.g.

```
<SCR IPT LANGUAGE =VB SCRIPT RUNAT=SERVER>
```

Response. Write time

```
</ SCRIPT>
```

Any thing that lies between the opening and the closing tags `<SCRIPT>` and closing tag `</SCRIPT>` is dispatched for processing to the appropriate script engine, according to the instructions given by the `SCRIPT` tags attributes.

7.11 Server-Side Scripting

A script that is interpreted by the web server is called a server side script . A server side script is an instruction set that is processed by the server and which generates the HTML is sent as a part of the HTTP response to the browser.

As we have gathered by now ASP is server side scripting, however it is not true to say that all server side scripting as not ASP as we will elaborate in the following section.

If we are going to place any kind of server side script so that the server can identify them as a server side scripts and hence arrange for them to be interpreted correctly.

There are two ways to label server side scripts

- ✓ Use the `< %...%>` server script delimiters, which denote ASP code.
- ✓ Use the HTML `< script>` tag specifying the `RUNAT=SERVER` attribute within the tag. If a tag look this is found within an ASP file, then it is treated as an ASP. If such a tag is found within an .html file, then it is treated as a non-Asp client side script.

We must highlight an important difference here namely that the choice of HTML or ASP for the suffix of the web page file is not trivial. It really does have a bearing on how your code is processed. If you have any ASP at all, you can label it, using either of the techniques used above. However in order to ensure that it is processed as an ASP then it must be included as a part of the ASP file.

Within an HTML file, it is only possible to use the `<SCRIPT>...</ SCRIPT>` tags. Script contained within these tags will be interpreted as non-ASP script. If you try to include any ASP script within these tags or if you write `<%...%>` into an HTML file, then the script will not be executed and your web page would not look the way you intended .

7.12 Client-Side Scripting

The script that is interpreted by the browser is called a client side script. A client side script is also an instruction set but is not processed by the web server. Instead it is sent to the Browser (as part of the HTTP response) and is processed by the Browser, the Browser on the monitor then displays the result.

Client side scripting is not directly related to ASP at all, it involves scripting that will be processed by the Browser. When a web page source contains a client side script, it does not attempt to process the script; instead, it simply downloads the script to the Browser as part of the HTTP response, and assumes that the Browser will know how to deal with it.

When the Browser receives the HTTP response, it needs to process the HTML contained within, which describe how it is to display the page. The Browser must also take care of the client side script that when downloaded as part of the page.

7.13 Advantages of Client-Side Scripting

- ✓ The main advantage of client-side scripting over pure HTML is that it allows the developer to create the more functional, interactive web pages.
- ✓ Response time is often quicker because the script is interpreted on the Browser machine, there is no network involves and there is no round – trip to ask the server to calculate things.
- ✓ Executing script on the Browser reduces the web server's workload as less script will be executed on the server, and it can be more advantageous when lots of people use web site.

7.14 Disadvantages of Client-Side Scripting

The main disadvantage of client side scripting is that we can't depend on the functionality of the Browser to support the script we write. If you have two different client machines hosting two different Browsers, and you view a page containing client side scripting on each independently then you can reasonably expect the results to be quite different. This means that the client side scripting is Browser specific because some browser does not support certain scripting language e.g.

- ✓ Recent version of Internet explorer comes with script engines for both VBScript and Jscript, where as the older version of the Browser by default come with the older version of the scripting engines.
- ✓ Netscape navigator comes with Java script engine only so there is no support for VBScript.

Another potential disadvantage of client-side scripting is that the code in your client-side scripts is completely visible to the user. By selecting view source option in the Internet explorer will show how the HTML source code plus client – side scripting used in that page. If you want to keep your client – side script to be hidden then you will have to use complex encryption techniques.

7.15 Alternatives to ASP

What other technologies could do the same job as ASP? Or if Microsoft provides ASP then what are the non-Microsoft alternatives?

ASP is only one of several technologies that can be used to create more dynamic and interactive web pages. Microsoft is not the only organization pulling in the direction of interactive web sites many of its competitors are also chipping away at the boundaries of interactive web capability.

Interactive web sites can be build with a combination of languages and technologies you can use any one of these alone, or any number of them together and they are all independent (in the sense that you do not have to learn one technology before you can learn another). Some exist on the client side while other on server side.

7.16 What Is Active Server Pages Object Model?

In the Active Server Pages programming model, there is a wide range of functionality that is access able to the programmer. ASP helps us to track the site of a user dynamic generate HTML output and take data from forms to be inserted into a data base. All of the functionality makes ASP a rather complex beast. Microsoft was task with finding the best compromise between offering a simple programming model and providing access to all of the power that ASP provides. These objects were then related together into what is known as an object model.

An object model is a representation of a set of objects and there relationships to one another. These relationships can take to form of containment, where one object is embedded inside of another or they can take the form of a parent child relationship, where one object has a set of child objects associated with it.

7.17 Object Model Structure

Seven objects make up the core of Active Server Pages. These are known as the built-in objects. These objects are:

- ✓ Server Object
- ✓ Application Object
- ✓ Session Object
- ✓ Request Object
- ✓ Response Object
- ✓ Object Context Object

✓ ASP Error Object

Each of these objects interacts with the different parts of the ASP system. This chart shows how they are related to each of them, and how they are related to the client and the server.

7.17.1 The Server Object

The server object is an object that provides a home to a miscellaneous ragbag of properties and methods that can be send in almost every Active Server Page. While seemingly unrelated, these methods and properties are in fact abstractions of the properties and methods provided by the web server itself. This object will allow you to do things such as:

- ✓ Set the amount of time a script can run before an error occurs.
- ✓ Take a user supplied string and encode it into an HTML format.
- ✓ Convert a Virtual path to a physical path on the server.
- ✓ Take a user supplied string and encode it into the proper format for a Uniform Resource Locator (URL) string.
- ✓ Create an instance of an Active X component. Change the course of execution by jumping to another page using the transfer and execute properties.

These method and properties are provided as utility functions for you to use in your pages. They are not directly used to affect the display of the page, but they still provide value able support in creating Active Server Pages

7.17.2 Application Object

As the web is moving from just serving up pages to providing access to dynamic information from a wide range of systems, the site that a user must access are beginning to look more like a traditional desktop application.

Since these pages are functioning together as an application, naturally the developer would want some control over the application as a whole; this is the responsibility of an application object. Let's just introduce the few things that it does. With this object one can:

- ✓ Be notified when an application is first started, so that you can perform some startup processing.
- ✓ Be notified when an application is ending, so that you have an opportunity to perform functions to enable the application to close down clearly.

There is the one instance of an application object for each web application running on the web server. There may be many clients accessing the same application. They each can get a reference to the same application object. Next we will look at an object that is unique to each client of an application.

7.17.3 Session object

There is one application object for each application on the web server. Every client accessing that application can get a reference to it. Each of these clients opens a session therefore each of them has a reference to a unique session object. The session object will allow you to:

- ✓ Be notified when a user session begins, so that you can take an appropriate action for a new client.
- ✓ Be notified when a client has ended their session, this can either be caused by a time out or an explicit method called Abandon.
- ✓ Store information that can only be accessed by the particular client through out the session.

The session object is the most powerful object for continuity when using an application in Active Server Pages. One of the problems that has existed in creating web-based applications is that the connection between the client and the server is stateless. The web server itself has no mechanism for tying a request for a page by a client back to a previous request of the page by the same client. This means that each request that one-client makes of a web server is treated independently from the rest. While this allows for a very efficient and fast web server, it makes writing application nearly impossible.

Think of it this way if you are writing an application using a standard web server, then every request to the server must carry along with it every thing that you have done

related to the application up to this point. Since the web server has no way of sending and retrieving that information, it is up to you provide it every time you make a request to the server. Sounds pretty cumbersome? Well with the session object Active Server pages allow you to store and retrieve information about the client accessing your application.

7.17.4 Request Object

When a web Browser or other client application asks for a page from a web server, this is called making a request. Along with the actual page the client wants, it can send a great deal of information to the server as well. The request object is responsible for packaging up that information to make it easily accessible to the ASP application. The client asks the server to create an HTML page by requesting an ASP script. When the server sees this request, it interprets this type of page as an active Server page. All of the information that the client is sending along with the request is then packaged into the request object. This information is then accessible to the actual ASP script that is used to construct the page.

The information is cauterized into five sets of information. Since each set of information can include multiple individual pieces of information, each set is stored as a collection. In a collection each piece of information is sent as a name-value pair.

The collection holds information about:

- ✓ The values that are provided in the URL that are send by the client. In the URL the client can include name value pairs of information after the file name. This information is stored in the collection called query string.
- ✓ If the client is sending request, then the values of the form elements are stored in anothe4 collection the form collection.
- ✓ If the web server itself has a greater deal of information about the request, response and the general information about the server itself. These are called the HTTP server variables. This information is made available as a collection as well.
- ✓ If the client is sending any cookies along with the request, these are included in their own collection.
- ✓ In addition, if the client is sending any security certificates to the server, then these are included in there own collection.

By using the information that is included with the request, along with the script code in the active server pages script file, the server can dynamically generate a page for the client to display. In order for the client to display the information, the server needs a mechanism to replay the data back to the client. This is the job of the response object.

7.17.5 Response Object

The primary features of the Active Server Pages are the ability to dynamically create web pages. The basic task needed to execute this feature is the ability to tell the client what information to displays. There are a number of different ways to shape what the client will display. The response object exists to provide an efficient interface to control the output to the client.

The response object provides the ASP script with a set of interface that allows the script to control what information is being sent back to the client. For now we will just touch the some of the functions that the response object provides.

With the response object the ASP script can:

- ✓ Insert information into the page being sent back to the client.
- ✓ Select instruction to the Browser to create cookies on the client.
- ✓ Send the client to another page via a redirection.
- ✓ Control whether the page is sent as it is created, or it is completely build and then sent at one time.
- ✓ Control the various properties of the page such as the HTML header or the type of content.

These interfaces give the designer of the script the ultimately flexibility to decode how the information is presented back to the client.

7.17.6 Object Context Object

The object context object helps you to develop application out of components. It does this by allowing you to handles transaction from within an ASP page. A transaction is a single unit of work that must either succeed in its entirety or if its fail, must be

undone completely – returning the system to the state it was before the transaction was started.

When using applications made of out of components, its common to use transactions. If for example an action handled by a particular component fails then you'd want details of the failure and be able to take an alternative course of action. If he user tried to change the details of their bank accounts and then bombed out mid – track it would be logical to want track back to what the bank to what the bank account details were previously, before trying to change the details again or continuing on alternative course.

The second type of application that uses transactions would be one that features data processing. If some one makes an other alternative to a data base via a web page and somebody else make another alternative at the same time, you need to be able to accept one alternation, while canceling or postponing, the other. The management of these types of transactions was handled in HS 4.0 and PWS 4.0 by a piece of software known as Microsoft Transaction Server (MTS). How ever with HSS and Windows 2000, the functionality of MTS is now integrated directly into part of the windows 2000 operating system known as COM+.

The object context object allows access to MTS in order to start or terminate a transaction. We don't want to go into how it does now, this hope fully gives you an over view of this useful object.

7.17.7 ASP Error Object

The ASP Error object contains the detail of any error generated by an ASP script or by an ASP-DLL itself. Previously there was no facility in ASP for storing details of errors that occurred. ASP Error object with help from the server. Get last error method; allow more complex customized handling of error messages. It directs the user to a standard error page or to user created page depending on the option selected in MMC.

7.18 Active Server Components

Active Server components are components or DLL that come freely with ASP (as opposed to components that are wended by third parties). There are ten common

components provided by Microsoft with IIS 9.0 90(although different versions of the installation can add or remove components), and many more are available from third parties. Here is a brief summary of the components and what they do:

- ✓ The AD rotator component do exactly what you might expect, it is a rotator for the Ad's that appear on your page. More specifically we use this component by supplying with a list of images, it will arrange for one of the image to be displayed on the page each time the age is requested.
- ✓ The Browser capability components references a file called browscap.ini which details the e'very version of every Microsoft and Netscape Browser every created it uses this information to determine whether or not the browser currently used supported frame, tables and so.
- ✓ The content linking component uses a text file to manage (and provide) links for a sequential set of web pages. It allows the administrator to provide extra information about each page in the sequence, and keeps the link in an orderly list so that they can be easily mentioned. For example, it can be predetermined order used to guide a visitor through a sequence of pages in a
- ✓ The Content Rotator component is a slimmed –down version of the Ad rotator component, which just displays text.
- ✓ The content component creates an object that persists for the lifetime of n application and can be used to store, increment or retrieve a value. Coupters are manually set, unlike page counter e.g. which are set automatically, and persist until deleted.
- ✓ The logging utility component allow your application to be able to read from your LLS log file which monitor who has been connecting to your site
- ✓ The my info component is used to store personal information about the server administration.
- ✓ The page counter components provide a page counter, which increments by one each time a page is accessed. This is an automatic process, rather than a user defined one.
- ✓ The permission checker component can be used to monitor whether a certain user has been given permission to read or execute a file.

The tools component provides a set of properties that are loosely grouped under the catchall heading of miscellaneous utilities, include checks to see if a certain file exist exists or if a certain user is the owner of the site.

7.19 Universal Data Access

Any persisted collection of information is a data store. We might want to access the data contained within and use it in our web pages and other applications we are particularly interested in how we can access data stores from our ASP pages, and use there data to influence the appearance and content of our dynamic web pages.

So the question is one of how to access the data contained within these data stores. There is a problem with using ODBC here generally, the information contained within each of the other media does not fit neatly into a data base type format and more often than not, ODBC can't help us to get at that kind of data.

In other words the notation of database access is not enough to fill the dreams of universal data access; we need a way of getting at the other forms of the data too, so how can we get at the contents of your data stores quickly and easily?

Microsoft UDA strategy has yielded a technology that has the potential to access the data contained in any kind of data stores. This technology is known as OLE-DB

7.20 What Is ADO's?

You might like to think of the Active X Data Objects (ADO) as being the interface of OLE-DB. ADO is a set of objects that allow programmers to program their data access login from languages and scripting languages. ADO is a high level model than OLE-DB, which means that it simplifies some of the complexities of programming which OLE-DB thus, ADO is much easier to use than OLE-DB.

How thus ADO fit into over all structure? The ADO layer sit neatly between the application itself and the OLE-DB layer.

In this sense we can think of ADO as being as application-programming interface. ADO is a superset of DAO and ADO is much easier to understand.

7.21 ADO Features

- ✓ Access to all type of data. Various data sources including Email, text files ISAM/VSAM databases and all ODBC data sources.
- ✓ Support Free threading-ADO supports multiple client connections through multiple threads in such away that these threads don't interfere with each other.

- ✓ Support asynchronous queries. This basically means that after an SQL query is submitted to the data base server, the control then immediately returns to the calling application, allowing the user to complete the query, the results are then sent to the client.
- ✓ Support client side and server side cursors –Cursor is a mechanism that allows access a navigation of the data in a record set. They are implemented as a client side or a server side. Traditionally, frequently updated record set is implemented as a server side while read only record set is implemented as a client side.
- ✓ Support disconnected record set – After a record set is returned on a execution of a query, it is stored as a client side cursor and the active connection is closed. After changes have been committed to the record set the connection is re established and all up dates are sent in a batch to the data store. . This helps in reducing network traffic in a great extent.
- ✓ Support commands as a common method – The unique feature of ADO is that when a command is executed, a connection is first established internally before that commands get submitted for execution. Compare this to a traditional object model like DAO/RAO where a connection has to establish explicitly before a command can be submitted.

7.22 ADO Architecture

In the ADO model there are five objects

- ✓ Connection
- ✓ Command
- ✓ Record set
- ✓ Record
- ✓ Stream

The connection object sets up the connection to the data source. First the data source name, its location, user id, password is stored in a connection string object, which is passed to the connection object to establish a connection to the data source.

The command button is used to execute the SQL commands, queries and stored procedures.

When a query is executed it returns results that are stored in the Record set object. Data in a record set is manipulated and then updated to the database.

Records allow you to handle data kept in semi structured storage (such as files in a directory structure) as through they were record in a database.

The stream object is used to access the contents of the node, such as an Email message, or a web page.

7.23 ADO and ASP Are Different Technologies

Don't fall into the trap of assuming that ADO is a part of ASP or that it is designed specifically for use with ASP. It is true to say that ADO is the ideal tool to use for achieving data access from ASP pages and that ADO is shipped as part of the HS 9.0/ASP 3.0 package. But ADO is more generic than that. If you are planning to write other data – dependent applications such as Visual Basic, Java, VC++, there is nothing to stop you from using ADO in those applications too.

In fact you can use ADO with any COM compliant programming language, so where does ADO come from? In fact ADO is one of a suite of components, which are known collectively as the Microsoft Data Access Components (MDAC). This sort of components has enjoyed a release schedule that is separate to that of HS/ASP.

REFERENCES

Following are the books and sites which are concerned for completing this project

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