

E-LEARNING SYSTEM

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Abstract

E-Learning System offers online training for the employees of the company. Every company uses different technologies based on the type of work they do, products they develop and services they offer. Fresher's who are just recruited many not be familiar with the technologies the company is using or the employees already working in the company may not have required level of efficiency in those technologies. It is necessary to train all the employees of the company according to their profiles with different technologies the company uses.

The main aim of the project is to create web interface for E-learning System for the employees of the company. In order to use this system the employees needs to register as member and can start using services. The registered users have more access to system and can make use of training system more efficiently then unregistered users. The registered users will have access to master library where all the materials and videos of different courses are available. The users can enroll into different levels of different courses and get trained by downloading and studying the materials available .The users can also schedule for a test for the courses and levels they are registered into. Records are created for the level and course they re passed so that admin they view them. Creating a web interface will help the employees to study easily, manage their courses efficiently and can also check their performances.

It also aims for developing reports for each users in the E-Learning System so that the users can see their performances and the admin can also recommend him/her to appropriate project's based on the performance of the employee in the technologies he/she is registered into.

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Chapter 1 - INTRODUCTION

The current project mainly develops a website for E-Learning System which offers online training for the employees of the company. Registered employees of the company for E-learning system are the intended users of the website. Users can login and they have full access to the E-Learning system .They can make use of master library and can download materials of the courses available in pdf format and watch videos also. There are other functionalities that user can perform like enroll into courses, drop the courses, take tests online. All the information associated with users is saved in the form of records. Reports are also generated in the form of graphs which depicts user's average performance. Privileges are varied between registered users and unregistered users. Unregistered users have restricted access to the system where as registered users have more access then unregistered users. Admin has privileges to update the scores of the users, who took tests, create an event regarding E-learning and post on news board, create a list for the courses with list of employees who have been performing good in them. Reports are also generated by the admin in order to see the performance of the employee in the courses he/she is enrolled in.

It has to maintain the progress, performance of the user their courses, scores so that they can be used for future reference. It also have to store courses enrolled, test dates of the users so that the users can efficiently manage their courses. Good way of handling this so that employees of the company and admin can benefit is to create online system where accounts can be created by users and admin and management becomes easy and effective. A website should be designed in orderly and user-friendly manner which be helpful and easy for the users to read materials online, watch videos related to courses, schedule and take tests. Taking these metrics into consideration the website developed is hence user-friendly.

Users are allowed to schedule for the tests based on the level they are trying to schedule for. If they are trying to schedule for the low levels and if they are not already passed then they are allowed to take a test. They are given permissions to schedule for higher levels only if they are passed in low levels. Also users are not allowed to schedule for more than two tests a day.

Once the user's takes a test the application calculate their scores and displays it to them and also sent them to admin who is responsible for updating user's scores. The admin updates the scores and level as passed only if the user scores are matching the benchmark that is set.

The application also allows the registered users to post their reviews, questions in the forum and participate in discussions. The users can also see the post's posted by other users. The user has the facility to email the admin with any sort of questions.

The major concern of the E-learning system is to generate the performance of the employees in the form of graphs and then admin creates list of employees for all the technologies who have been performing well in them. If this has to be done manually it requires lot of tedious effort from the admin. Database is designed in order to store these data in an orderly manner from which it can retrieve information quickly without taking much time of the users. In the absence of an online system it is highly impractical to maintain data.

ASP.NET with C# is used for designing the website. HTML, HTML5, CSS and jQuery are used to enhance the features of the website. SQL Server database management system has been used to store all the information for Kansas State Research and Extension.

The rest of this paper first discusses related work in chapter 2, and then describes our implementation in chapter 3. Chapter 4 describes the rules and Jakob Nielsen's guidelines followed in designing user interface. Chapter 5 describes the security implemented in the website. Chapter 6 describes how we evaluated our system and presents the results. Chapter 7 presents our conclusions and describes future work.

Chapter 2 - RELATED WORK

Website can be designed in any number of ways. Choosing a methodology of developing a website depends on the requirements, performance and ease of working on an application. In a broader sense, there can be many approaches in developing a website. It is not necessary that every web application should have a proper architecture which contributes in performance. Structure of the application is important for greater performance. While considering the web application, developing a website is quite easy with ASP.NET framework as it reduces the amount of code required to build large applications. It is complemented with a rich toolbox and designer in the Visual Studio integrated development environment. The implementation of website which is proposed for developing e-Learning System is beneficial.

(2010)ASP.NET is preferred for developing this website for several factors. It is purely server side technology. ASP code executes on the server before it is sent to the browser. The pages are written with HTML and C# code together and hence easier to maintain. Also offers built in security features through windows authentication. Maintenance of program makes easier as the content and program logic are separated. It also makes easy deployment and needs no registration of components because the configuration information is built in with ASP.Net. Web Server continuously monitors the pages, components and applications running on it. If there are any memory leaks, infinite loops and any other illegal activities, it immediately destroys those activities and restarts itself.

The database that is used to store all information related to website is SQL Server . ASP.net works easy with SQL Server which runs faster and counters large volumes of users without having performance problems. It provides database access and database design tools from within Visual Studio .Net. It supports cascading style sheets (CSS) and also JavaScript for developing enhanced features. E-Learning System is developed with C# programming language which provides a type safe, object oriented version of the C programming language. In JSP deployment of servlet is a pain and there is a long deployment process in restarting the server whereas ASP.Net has automatic deployment. IDE used is Visual Studio 2008 developed by Microsoft, which helps to build various ASP.NET web applications and XML Web services by providing various development tools. also helps in building console as well as GUI applications

that can be in native code combined with managed code for all platforms that can be supported by Windows, .Net framework etc. There are several built in tools which include a forms designer which can also be used to build GUI applications, web/ class/ database designer etc.

E-Learning GUI is developed using HTML, ASP Controls, CSS and jQuery have been used. jQuery UI provides abstractions for low-level interaction and animation, advanced effects and high-level, theme able widgets, built on top of the jQuery JavaScript Library, that you can use to build highly interactive web applications.

Designing database is crucial for developing web applications. Many applications use SQL Server, MS Access or Oracle for database management. Challenging part here is to select a database suitable for the application. All these vendors made enhanced manageability of their database server. The database that is chosen is SQL Server . SQL Server is a sophisticated self-managing database.

It provides the ability to seamlessly manage hundreds and thousands of systems located across counties from a single point of control.

Database design counts to the performance of the request for every user. All the relations defined in the e-Learning system are in third normal form, which eliminates redundancy in database and makes it consistent. E-Learning system needs to update information on day to day basis. It requires database that can handle large amounts of data. To handle these issues, SQL Server is chosen which best helps to obtain best performance and scalability

Chapter 3 - IMPLEMENTATION

3.1 System Design

Based on the requirements, the different components, modules, interfaces and interactions of the system have been designed

Class Diagram :

A class diagram showcases the basic types being built in the system. It forms a prototype for the application being developed. It encompasses the system's classes, attributes, operations and the relationship between these classes.

Class diagrams are designed each for Administrator and User.

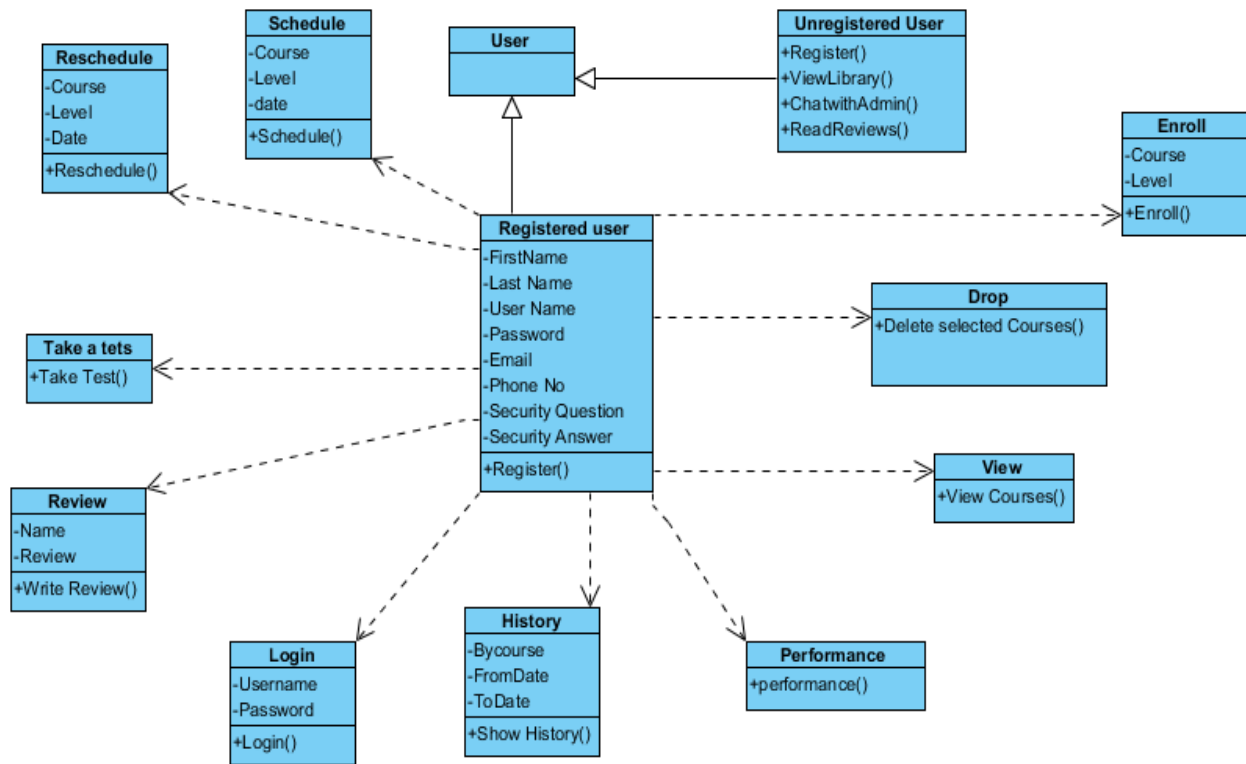


Figure 1:Class diagram from users view (2011)

The class diagram above depicts the important operations that are performed by registered user and normal user. The operations that are performed by the user are showcased as classes.

Based on the type of the user different privileges are given and hence different operations are performed by them and divided into classes. In the above diagram Register class has first name, last name, user name, password, phone number, email address, security question and security answer as attributes which are accepted from user while registering. The user class is defined with all the above attributes. The operation associated with this class accepts the above attributes checks if they are in proper format and registers the users successfully. The above diagram also has user class login which accepts user name and password from the user. The operation associated with this class verifies if user name and password are correct and allows the user to log into the system.

The users who are registered with system can enroll, drop, view the courses. The Enroll class has course and level as attributes which are accepted from the user and the operation associated with will enroll the user into that level of course successfully if the user has not enrolled before. The Drop class in the above diagram shows the enrolled courses. The users can check the courses which they want drop and delete them from their course list. The users can also see their course list at any point with the help of ViewCourses operation in View class. They can schedule test with help of schedule class which accepts course, level and date from the user and operation associated schedules a date for the user. They can reschedule the exam date with help of reschedule class. Reviews class in the above diagram name ,review from the user and operation Write Review posts the review of the user. They can also see their test history, take tests with helps of classes depicted as History and Take a tests in the above diagram.

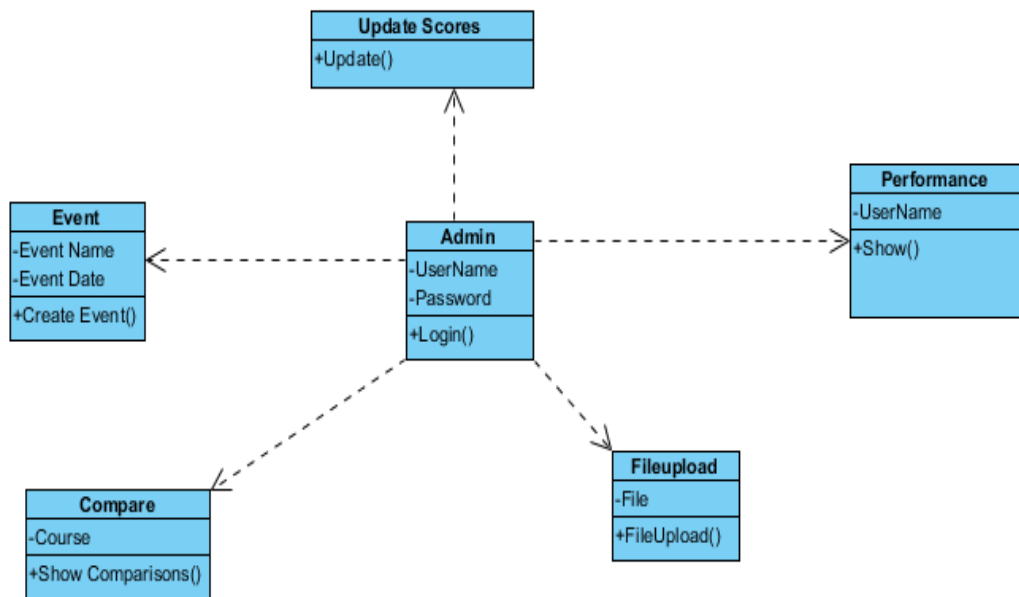


Figure 2 : Class diagram from admin view (2011)

The class diagram above depicts the important operations that are performed by admin. The operations that are performed by the user are showcased as classes.

In the above diagram Admin class has username and password as attributes which are accepted, verified by login operation associated with that class if the user trying to login is admin. Once the user login he updates the scores for all courses and levels who took tests and passed on that day. The admin also upload materials if necessary to that courses that are available. The admin also check the performance of the registered employees for the courses they are enrolled into and add them into the technologies they are doing best. The admin also compares the performances of the employees with each other in each technology. The admin can also create event with help of Event class which accepts name and date of the event and operation Create Event posts the vent created by the admin onto the news board.

3.2 System Architecture

E-learning System is developed using three-tier architecture. It is divided into 3 logic layers as:

- Presentation
- Business logic
- Data

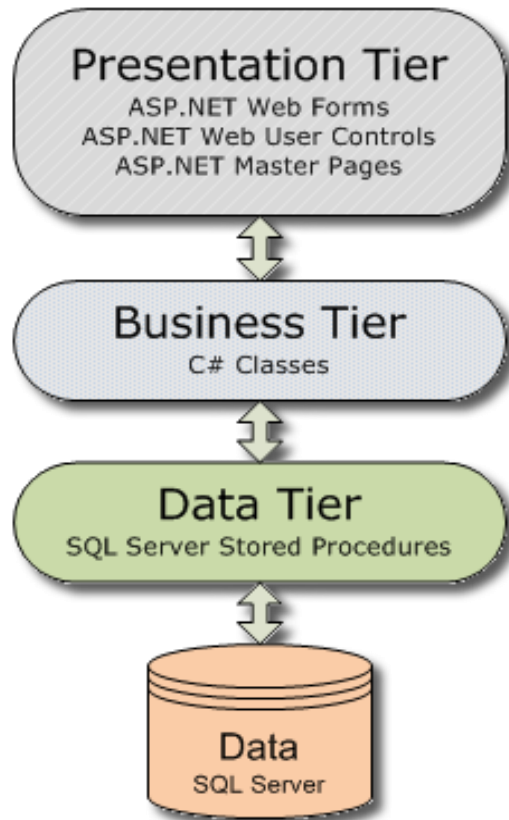


Figure 3: Three-Tier Architecture (2012)

Each layer ideally specializes in one or a handful of functionalities that service the upper layer. Each of these layers is designed such that the layer above does not need to understand nor know the implementation details of any of the layers below it. This has been accomplished by providing well defined layers of abstraction that are not visible to the layers above it.

The advantage of this approach is that even if implementation has been changed in any of the layers, it does not affect the other layers. 3-tier architecture saves hours of development time.

In the divide and conquer strategy each tier is easy to develop. Here each bit is coded only once with powerful re usage. Three simple parts are always better than single complex code.

Presentation Layer:

The presentation layer here refers to the Graphical User Interface of the website. It is responsible for retrieving the data that has been rendered by the other layers. The data is manipulated and presented to the user in an easy to consume format. It includes the following types of software components that perform specific tasks. The combination of below two types of components forms presentation layer. Presentation layer interoperates with the business and data access layers to form the overall solution.

User Interface Components: These components make up user interface of the component. Users interact with these components. The main purpose of this layer is to acquire data from the user and render data to the user. These are also used to validate user login, input masking of the password and using appropriate controls to collect the input from the user such as dropdowns for selecting countries and textboxes to enter the input etc.

This layer also involves managing the visual layouts, styles and general appearance of the application. Also navigation from one page to other is being involved here. Formatting and displaying data in different visual styles. Browsing and organizing displayed data is also done in the presentation layer.

User interface process components: These elements control user interaction. Interface process components are not seen by the user but they perform vital supportive role to user interface components.

These are mainly used for managing the control flow through user interface components. Separating the conceptual user interaction flow from the implementation or device where it occurs. Keeping track of the progress of a user in a certain process. ASP.net pages contain the pages which are viewable by the user. They are responsible for separation for application logic and user interface. ASP.net pages have the extension as .aspx. These pages contain the web controls of the application and also the User Controls. User controls are customized controls which can be created specific to the application and are added to the .aspx pages.

Business Logic Layer:

This layer separates the business logic from other modules such as data access layer and user interface. This can be advantageous as the business logic of an application can often withstand modifications or replacements of the other two tiers. In detail, in our application we have properly separated business logic layer and data access layer; the data access layer could be rewritten to retrieve data from a different database, without affecting any of the business logic. This helped us while developing the application as we have split the layers and worked simultaneously.

The sample code written in the business logic is, if there is a Boolean value which displays it to the user as true and the value of it is stored in the database as 1, the conversion from the value 1 to Boolean value true is being done in this business logic layer. Also computing scores of the users are done in the business logic layer.

Data Access Layer:

This layer provides simplified access to data stored in persistent storage as in SQL Server database. Data access layer returns a reference to object complete with its attributes instead of row of fields from a database table. This helped the client modules to be created with higher level of abstraction.

This is handled by creating a class of data access methods that directly reference a corresponding set of database stored procedures. This helps to hide the complexity of the underlying data store from the external world

Instead of using commands such as insert, delete and update to access a specific table in a database, a class and a few stored procedures could be created in the database. The procedures would be called from a method inside the class, which would return an object containing the requested values. The insert, delete and update commands are executed within simple functions like stored within the data access layer.

Business logic methods are mapped to the database access layer. Instead of making a query into a database to fetch all users from different tables the application can call a single method from a DAL which abstracts those database calls.

In E-Learning System application, `mastercourse` is the data access layer which is a class file. It contains methods to all database queries.

Few of the Methods are:

- **Enroll_courses:** This methods add the selected courses by users to user profile. All the courses related to the users are stored in the database associated with users name
- **View_Courses:** The users is displayed all the courses he/she enrolled in the form of grid view
- **drop_Courses:** The users is displayed all the courses he/she is enrolled in. The users can select the courses and he/she wants to drop. This method removes the selected courses from the user profile. Once the users drops the courses they cannot schedule for tests anymore.
- **Schedule_Test :** The users selects the course, level and data for the test and hits schedule. This methods schedules a test for the selected course, level and date.
- **Get_Performance:** This methods shows the users their average performance for all the courses he/she took tests in the form of graphs.

A database connection is created in all these methods, which has the below format.

```
SqlConnection sqlconnection = new SqlConnection();  
sqlconnection.ConnectionString= "Persist Security Info=False;Integrated  
Security=SSPI;database=HRecruiting;server=SWETHU-PC\\SQLEXPRESS;Connect  
Timeout=30";
```

SqlConnection defined in the above statement acts as a variable for performing the database operations. SqlCommand is written to create a command that sends a command to the database.

```
SqlCommand cmd5 = new SqlCommand("update schedule set time='" +  
reschedule.Text + "' where Name='" + name + "' and courseandlevel='" +  
courselevel + "' and status='scheduled';", sqlconnection);
```

This command updates the schedule table when users is rescheduling the test date. cmd5 is the variable that creates a command with the above declared connection.

```
sqlconnection.Open();
```

sqlconnection.Open() opens the connection with database specified in the connection string and cmd5 send the command to the database.

The command that is sent to the database from the server is executed using

```
cmd5.ExecuteNonQuery();
```

ExecuteNonQuery is used for a query that does not return any rows(an update, delete or insert) but instead returns an integer indicating the number of rows affected by the query.

There are also ExecuteReader and ExecuteScalar methods. ExecuteReader is used when the query returns a reader instance that is connected to the resulting rowset within the database, allowing the rows to be retrieved. ExecuteScalar is used for query returning a single value, usually takes the first column of the first row of the resulting row set, and discards all the other values. The DataTable class is used to retrieve row sets or tables stored within Dataset class.

```
sqlconnection.Close();
```

The above statement closes the connection after the operation is performed.

Database:

As mentioned earlier, Sql Server database. It integrates well with visual studio and provides good performance. Tables are physical storage for the data stored in the database. The database is populated with 2700 entries.

Some of the tables used in the database are:

logindetails: This table stores all the login details of the registered users

allcourses: This table stores all the courses of all the users they are enrolled in

Reviews: This table stores the reviews posted by the user.

adminscores: This table stores the scores obtained in particular course and level along with date of attempt and user name

Schedule: This table stores the dates scheduled by the user for particular course and level and also the status of test(scheduled or submitted)

event: This table stores event date and event description which is accessible only by the admin

3.3 Modules

As already mentioned, E-Learning System provides training to the employees of the company for the technologies the company uses. The employees of the company can register and make use of this online training and write tests. The admin based on the performance of the registered users considers them for the technology on which they are doing best and gives them the opportunity to work on those platforms. They are chances that they may be even considered for the hikes by the company based on those results. In order that company can filter out those employees the best solution is to create a web interface where all the details concerning the user like courses, their scores, their average performance can be stored and save them in the database for future use.

3.3.1 Intended Users

Admin and employees of the company who are interested in learning and gaining required efficiency in the technologies that company uses.

3.3.2 Requirements

The website is mainly developed and focused towards employee's of the company and also for the admin of the company. The main purpose is to provide user-friendly website so that employees can use it and manage their courses efficiently and take tests and achieve required levels of efficiency and admin can make use of the test results of the employees and can generate lists of the employee who are performing good and can make a decision to consider them for the project which uses those technologies.

3.3.3 Inputs and Outputs

Input: User enters User Name and Password

Expected output: It redirects to mastercourse page. It displays .all the functionalities that registered user can perform.

Input: click on enroll and select require course and level from the dropdownlists displayed

Expected output: The selected course and level should be added to users profile and successful enrollment message should be displayed.

Input: click on drop and select course and level from the table displayed that shows the registered course of the user

Expected output: The selected course and level should be deleted from users profile display rest of the courses and level that user is enrolled in.

Input: Click on view link

Expected output: Display the courses that user enrolled in user friendly manner

Input: Click on schedule link and select the course, level from dropdownlists and date with help of calendar

Expected output: If the user is not scheduled for more than two tests on the same day and also if the user does not have any test scheduled for the same course and level that user is trying to schedule the user is then allowed to schedule for the test otherwise the user is shown appropriate messages.

Input: click on take a test link

Expected output: It should display the links to the test the user is scheduled for on that day.

Input: click on history and select one of the radiobuttonlist option displayed

Expected output: If the user select by course then it should display all the test dates with the status either scheduled or submitted for the selected course and level.

If users selects bydate then it should display all the test dates with the status either scheduled or submitted for all the courses the user is enrolled in between the selected dates.

Input: click on contact link

Expected output: It should display the contact page where the user can mail the admin regarding any questions. Once the page is displayed the users should be able to email the admin and success message should be displayed

Input: click on review link

Expected output: It should display review pages with all the users reviews and also write a review link. When users click on write on a review it should display two text boxes where users can write a review along with name and can submit a review .

Input: click on show performance

Expected output: It should display the average performance of the user for all courses he submitted the tests in the form of graphs.

The requirements of the E-Learning System are divided into admin module and Registered users modules ,Unregistered users module and developed accordingly. They are described as follows:

Admin module : This module allows the admin to create an event, upload course files, view the performances of the users in the form on graphs, compare the performances of the users for particular course and level.

Registered user module: The registered user has access to full library which has can enroll into different courses, levels, drop them, take tests, can view their courses in the form of tables or in the form of graphs also. They can even write a review and post their questions in the forums and also at the same time can see the reviews and questions posted by other users.

Unregistered users module: The unregistered users can gain full access to online training by registering to the online system. Until they register they can just read only first few levels of materials of courses, can read the reviews, chat with admin regarding any questions, can see the courses available for training and obtain all the details about them ,can get to know more about

learners role, admin role and the access control in the E-Learning System.

Chapter 4 - USER INTERFACE

While designing the user interface, Jakob Nielsen guidelines were followed and implemented. The rules followed and implemented are:

- **There should be title in every page**
All the pages in website have proper titles. This helps the user to know on which page the user is in and what information he can expect on the page.
- **The site purpose should be made clear**
The purpose of the site is made clear. When user visits the website for the first time, from the slide show and the introduction; the user can understand that the site is related to tracking their purchased products online.
- **The user should find what they need once the user enters the website**
Once the user is clear of what the website is for and when user tries to login after registering the user can easily find what he is looking for. No unnecessary data is presented that makes the user search in the whole page what is looking for.
- **The images should be descriptive (alt tags)**
All the images that are used in the website have alt tags. When hovered over the image there will be tag describing the image which helps the visually disabled people who are using the website.
- **Navigation must be well defined**
All the navigations are properly defined by giving appropriate names to the hyperlinks when navigating to another place from particular place.
- **Navigation must be smooth and clear**
Navigations in the website are made as simple as possible. The user is directed properly to the user intended page. The number of navigations that user need to make, to go the required page is kept as minimal as possible.
- **Only important information must be displayed on the screen when pages open**
When pages open, only required information is displayed so that user is not frustrated and he does not have to search for the required information. When user navigates to particular page only the information required by the user pertaining to the page is presented. Also the information is presented in such a way that it is easy to understand.
- **Cluttering of data must be avoided**
As our websites displays record which may be in large number depending upon the options selected by the user paging is implemented to avoid cluttering of data and confusion to the user. By paging only few number of records are neatly displayed on the current page and to view the other records user can go to the next page/previous page.

1. Home Page : When users enters the website the site purpose is made clear with short description of purpose of site and smooth navigation to the other pages is also provided



Figure 4: Home Page

2. Login Page: All the registered users use their user name and password to login into the system. If they enter wrong credentials error message is displayed else they are redirected to their learning system. When users click on Login in Homepage appropriate information where user need to enter user name and password are displayed without user searching for it.



Figure 5: Login Page

3. User Learning System: After successful login user is redirected to important information page where user can perform different actions like enrolling ,scheduling.



Figure 6: User Learning System

4. Enrolling into courses: While user is enrolling into courses dropdown lists are provided with appropriate descriptions so that the user is not confused. Also, once user enrolls successfully, conformation message is displayed

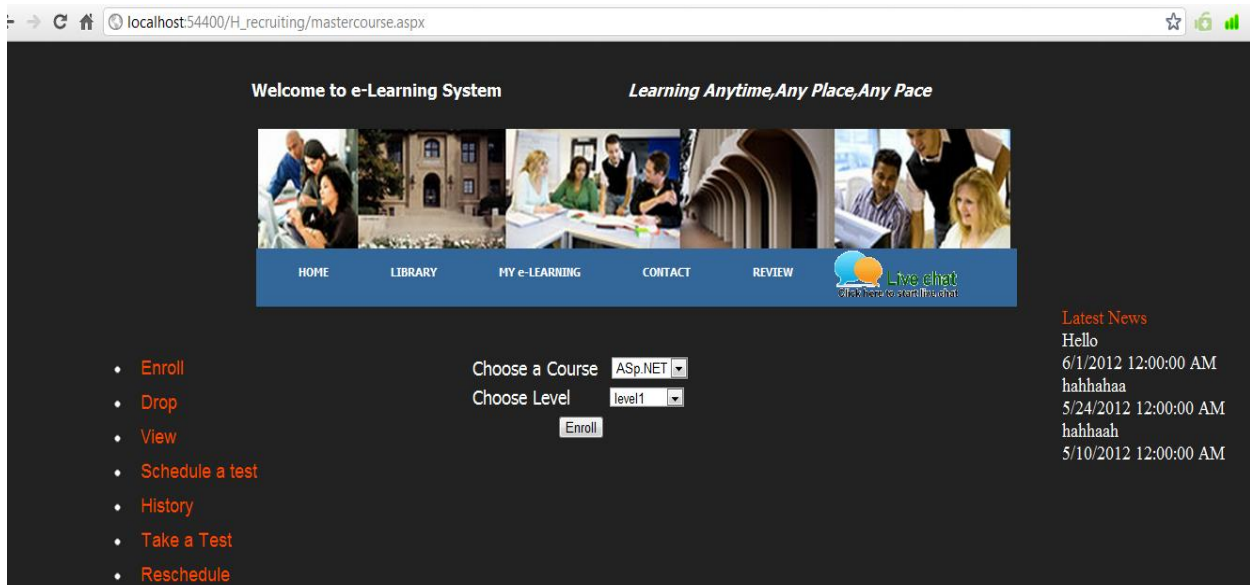


Figure 7: Enrolling into courses

5. User seeing performance in form of graph: The Graph displays the average performance of user for all the courses enrolled he/she into with scores and course name in user friendly manner

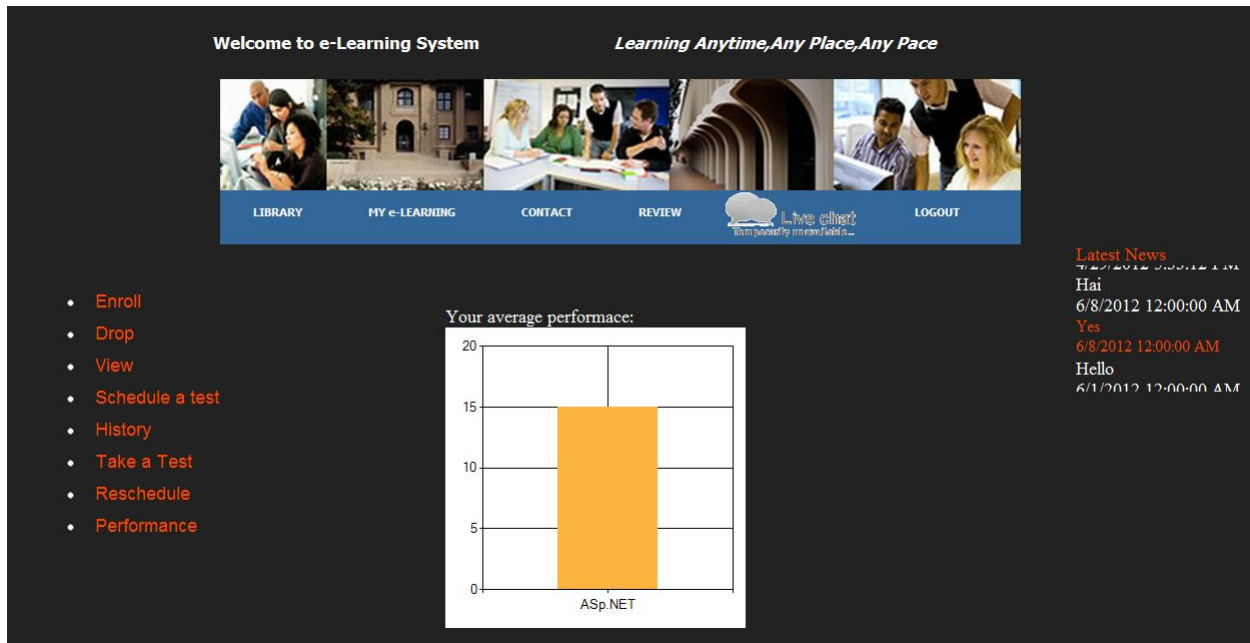


Figure 8:Performance in form of graph

6 Test's History of user ByCourse: When User clicks on History there are two options displayed. ByCourse and Bydate. When Bycourse is selected all the test dates of user only for that course are displayed and no other irrelevant information is displayed.



Figure 9:History ByCourse

7. User seeing the enrolled courses: The courses user is into are displayed in the form of table with no cluttering of data and navigations to the other page from this page are also provided.

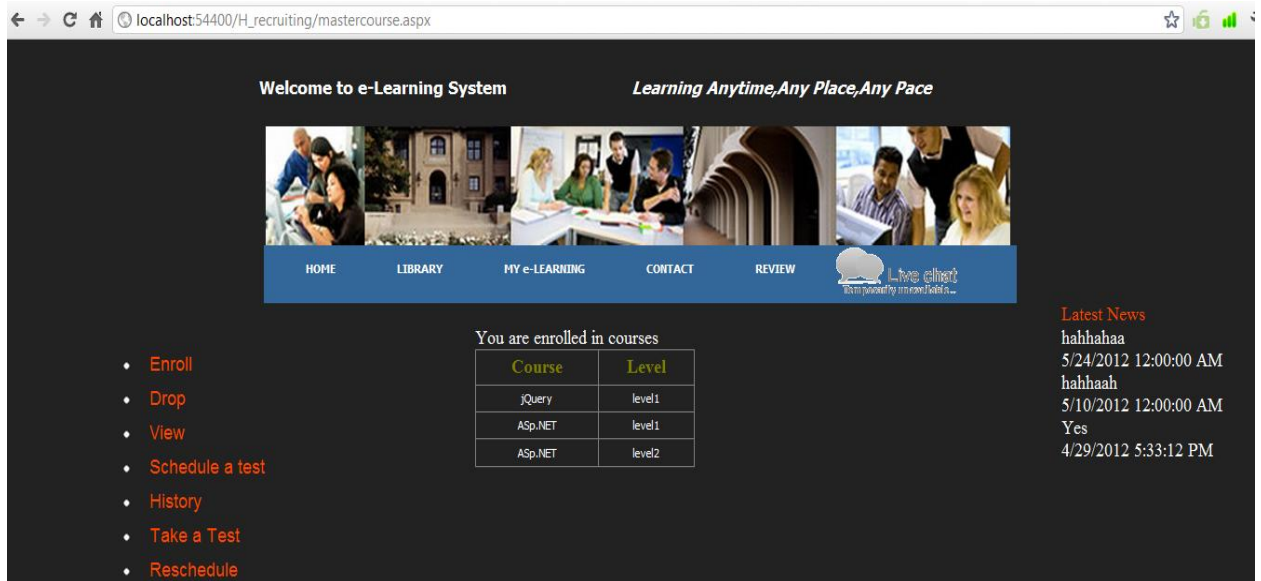


Figure 10: Viewing enrolled courses

8. Contact form: User can contact admin and mail admin regarding any questions using contact form. All fields with appropriate description required to mail admin are provided avoiding confusion for the user

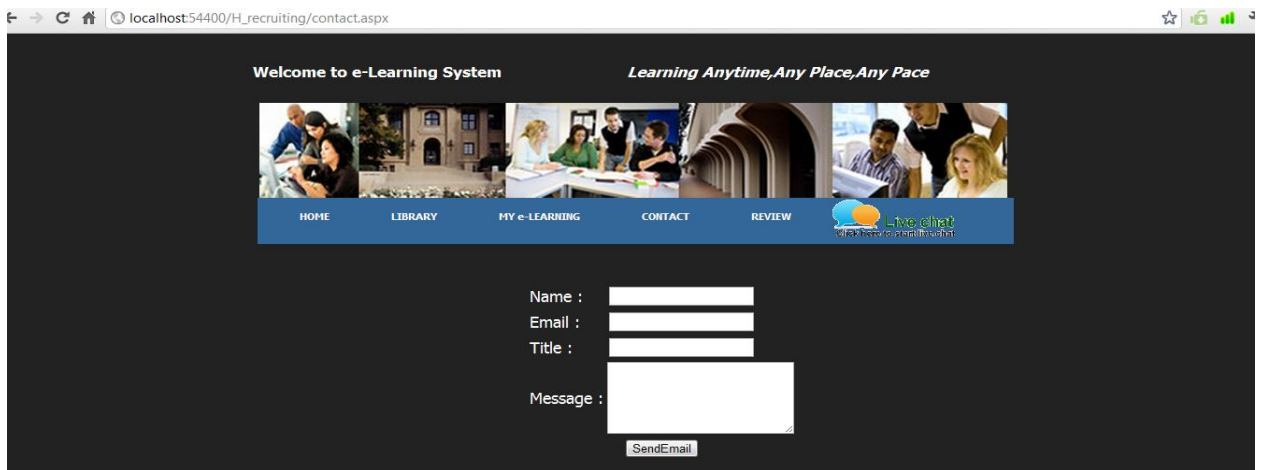


Figure 11: Contact form

9: Admin Page: After successful admin login, admin is redirected to admin homepage where scores are updated, events are posted, files are uploaded displaying only required functionality.



Figure 12:Admin Page

10:Admin file upload: When admin is uploading the file if file is chosen is displayed, after uploading confirmation message is displayed for admin and smooth navigation to other functionalities are also provided

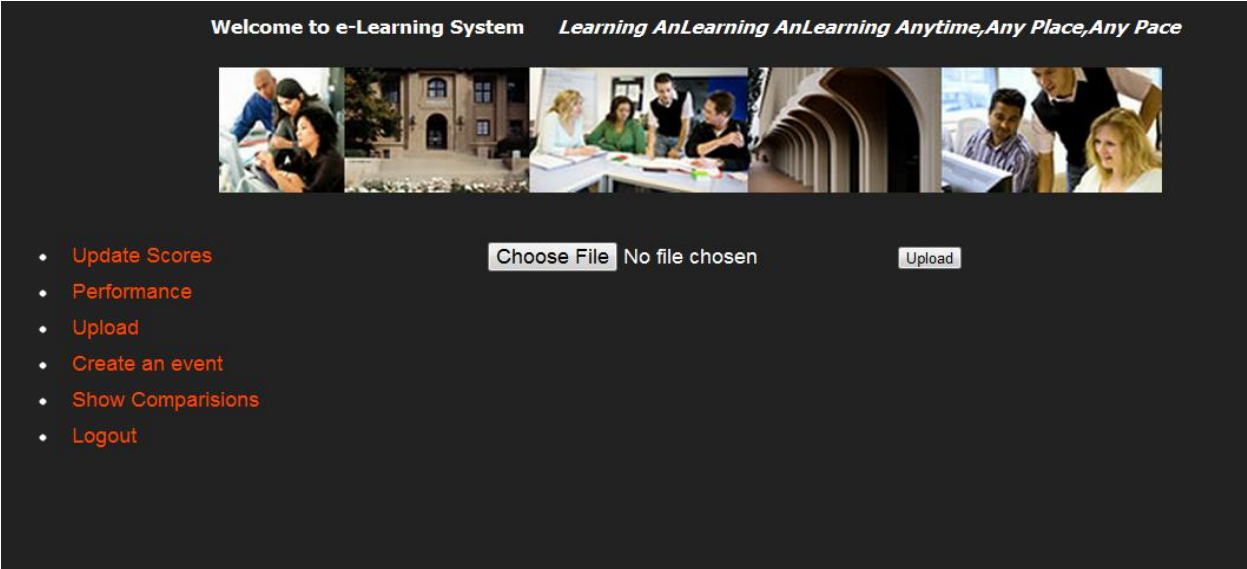


Figure 13:File upload by admin.

Chapter 5 - SECURITY

Security is an important part of any website. Securing the website ensures that unknown users do not access any personal and confidential data present in the website. Though in our website we do not display any personal information of the users, it is important to maintain privacy of the user's data like his purchases details. For us the primary security issue was to make sure that only genuine, i.e. the users who were registered with our website only are logging in and using the services.

Security is implemented in three ways in our website:

- Login Authentication
- CAPTCHA
- Security Question

Login Authentication:

A user needs to enter his username and password to login to this website. This information is then sent to the server, which checks if the user has registered with the website and also has entered correct username and password. The login authentication is implemented in order to see that the website is protected and being used only by valid users.

CAPTCHA: (Completely Automatic Public Turing Test)

CAPTCHA is implemented in websites as a type of response test for the user accessing the website. It helps in ensuring that a genuine human user is only accessing the website, not a robot.

In our website CAPTCHA has been used in two places: once when user is registering with the website and second, when the user logs in to authenticate him if he enters his password wrongly.

CAPTCHA is implemented in the registration page to prevent any automated program or robot filling out the form and trying to access the website. Also, CAPTCHA is implemented in the login page. While logging in, if user enters the wrong password, he is asked to verify himself by entering correct CAPTCHA and correct password and try to log in again. By this we can make sure that it the same user who registered with the website.

Security Question:

Security question is another form of security to the website, which authenticates the user when he is trying to change any of his details like password. This security question can be selected by the user during registration and he can enter a security answer, with which we can authenticate the user later on.

Before changing the personal details or the password the user needs to answer the security question. His details will not get changed until he enters correct answer. This ensures that only valid users are making changes to their accounts.

Chapter 6 - EVALUATION

Software testing is the process of executing a program to find the errors in the application. It is nothing but validating and verifying that a software program is working as expected and is meeting the technical as well as business requirements. This can be implemented at any time in the development process. There are many types of testing software i.e. Unit testing, black box testing, performance testing, stress testing, regression testing etc. Unit testing and load testing are performed for E-learning System application.

6.1 Unit Testing

Unit testing refers to those tests that verify the functionality of a specific section of the code, usually at the function level. In an object oriented environment this is usually at the class level and the unit tests include the constructors and the destructors. The primary goal is to take the smallest piece of testable software, isolate it from the rest of the code and check if it is behaving exactly as expected. Each unit is tested separately before integrating them into modules to test the interfaces between modules.

This application has been tested individually for each view and made sure that each module is generating the desired output for the corresponding input. There are various modules involved in the application like viewing worksheet, editing worksheet, retrieving the profile information from the database etc.

Below are the few test cases and their results:

	Test Module	Input	Test Case	Expected Result	Test Result
1	Login	Enter user name and password	Enter wrong user name and password	Should display error message	Passed
2	Registration	Entering all required fields	Not entering few required details	Should display required fields message	Passed
3	Schedule a test	Enter course, level and date	Not entering date	Should displays error message	Passed
4	History	Select Bycourse or Bydate	Selecting course not registered	Should display error message	Passed
5	Reschedule	Enter course, level and date	Selecting course and level that is not selecting	Should displays error message	Passed
6	Show Scores	Select Course	Select level and	Should display	Passed

		and level	course for which user does not have any scores	message	
7	Performance	When clicked on performance graph should appear	Click on performance with no users scores	Should not display graph and display message	Passed
8	Reschedule	Select Course, level	Select Course and level for which no dates available	Displays message	Passed
9	Create an Event	Event name , event date	Not entering event name or vent date	Display message	Passed
10.	Schedule a Test	Select Date,course,level	Selecting a test date where there are more than two tests	Display message not allowed	Passed
11	Enroll	Select Course, Level	Selecting course and level already registered	Display message	Passed

12	Drop	Click on drop	Click on drop without registering any courses	Display message	Passed
13	Admin	Update scores	Click o update scores when no one took tests	Display message	Passed
14	Admin	File upload	Upload files of different extension	Display not acceptable	Passed
15	Take a test	Click on take a test	Click on take a test other then date scheduled for that course	Test should not appear	Passed

Table 1:Test case and Results

6.2 Performance Testing

Performance test is used to determine the effectiveness of the application. Performance of the application effects when number of users are accessing the website. Hence performance test determines how fast some aspect of the system performs under a particular workload.

The performance of a website comes into picture when some hundreds or thousands of users are accessing the website and performance testing ensures that all the users are getting efficient results in less time. By performance testing we can estimate the maximum number of users accessing the web site simultaneously and by means of these testing results one can

analyze the measures to further improve the performance of the application. The tool for performance testing and the testing results are described below.

6.2 .1 Tools for Performance Testing

The website has been tested for its performance by the tool Apache JMeter, “which are open source software and a pure java based application. JMeter has been designed to load the test functional behavior and measure performance. This can be used to test performance on static and dynamic resources such as files, databases and queries and more. It can also be used to simulate heavy load on a server, network or to test the strength or to analyze the overall performance under different load types.

6.2 .2 System Configuration

Operating System	Windows 7-64 bit
RAM	6 GB
Processor	Intel core i3
Processor Speed	2.53 GHz

Table 2: System Configuration

6.2 .3 Test Plan Results and Evaluation

The results would show the response times as well as throughput, when increasing the number of users accessing the application at the same time.

This test considers the pages which use less database hits in the page and compared results with the pages which have more database content to be retrieved

Test 1: Login Page:

The performance of the login page is tested initially with 500 users, looping 1 time, ramp period 1 sec

Graph Results

Name: Graph Results

Comments:

Write results to file / Read from file

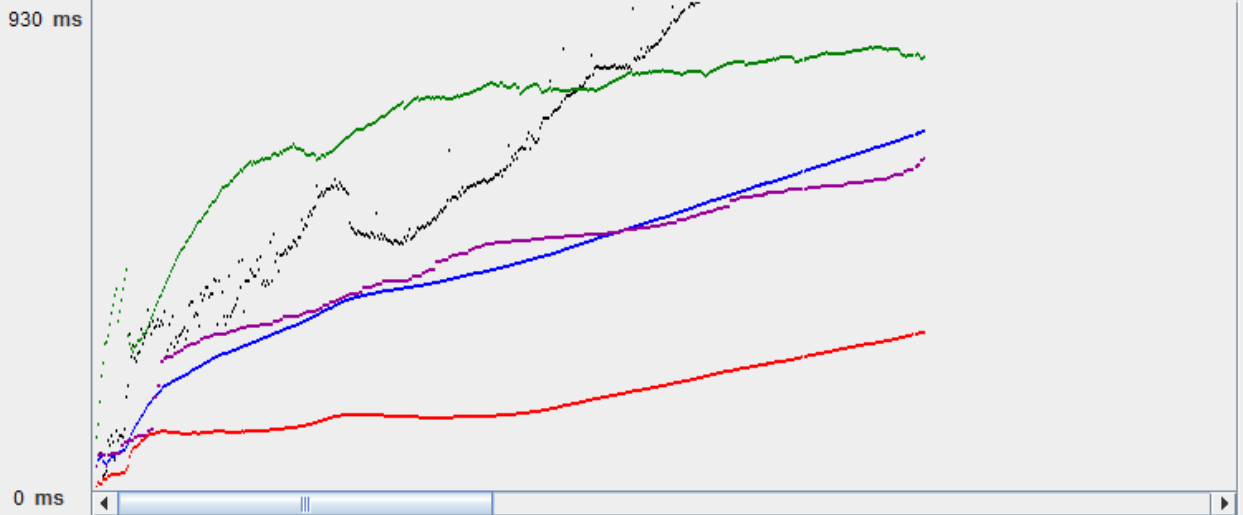
Filename

Browse...

Log/Display Only: Errors Successes

Configure

Graphs to Display Data Average Median Deviation Throughput



Then number of users are increased to 1000 from 500:

Graph Results

Name: Graph Results

Comments:

Write results to file / Read from file

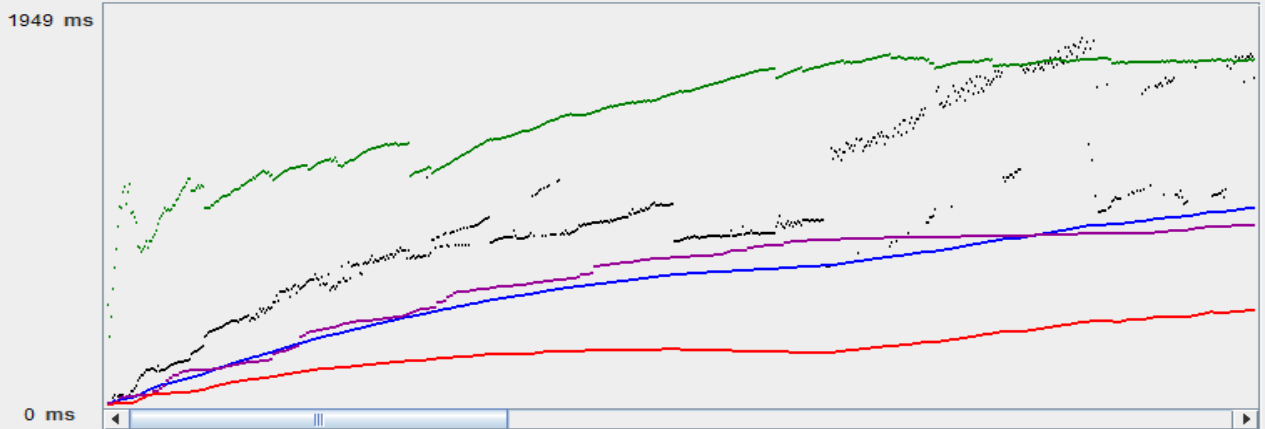
Filename

Browse...

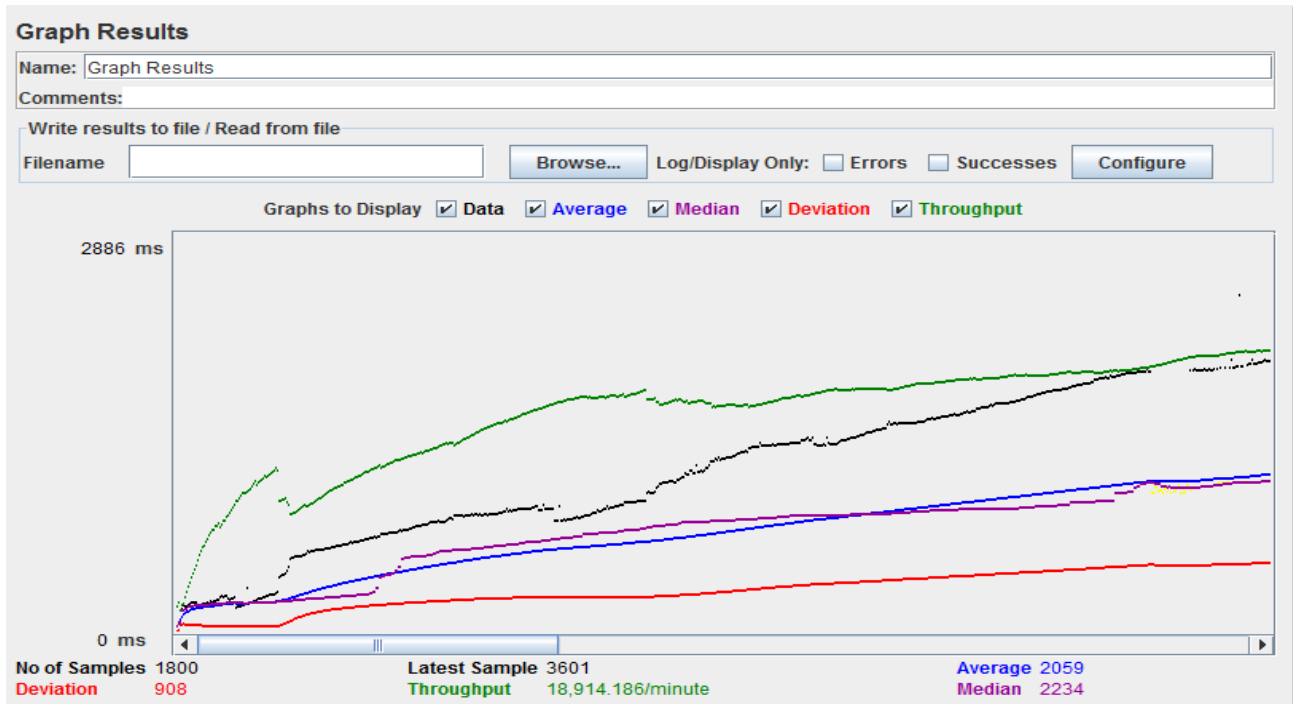
Log/Display Only: Errors Successes

Configure

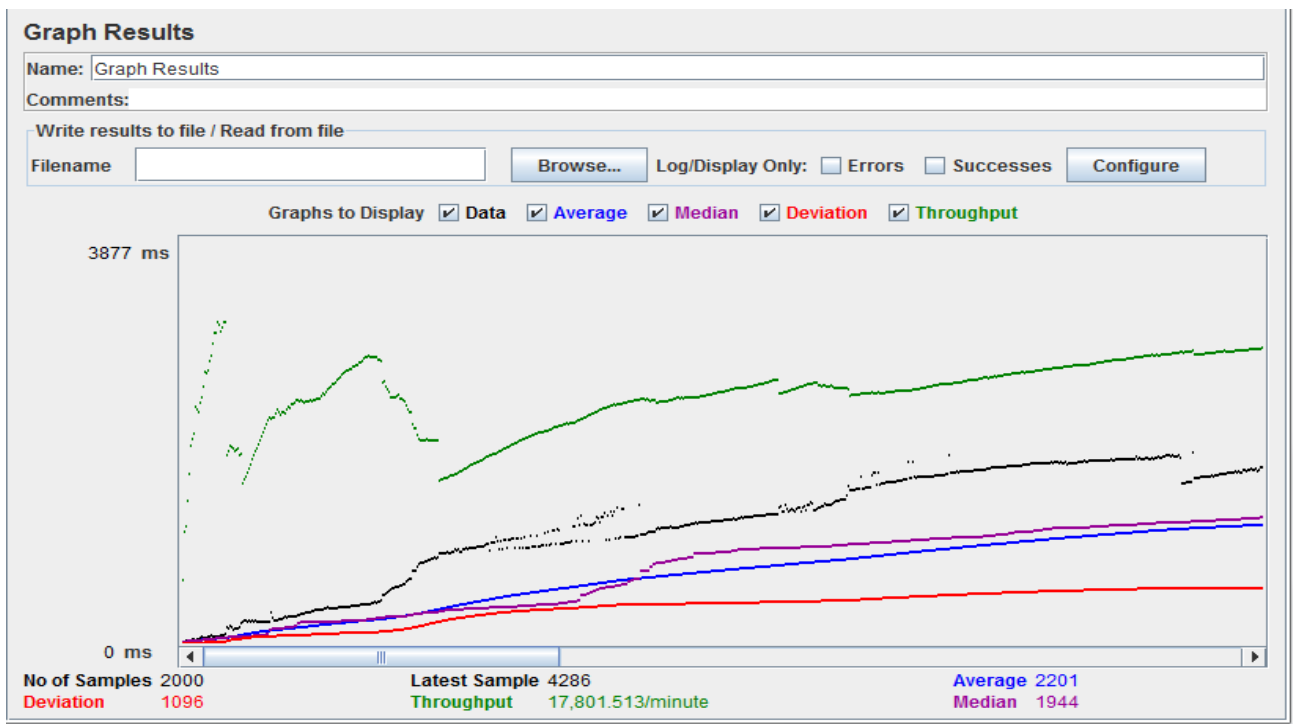
Graphs to Display Data Average Median Deviation Throughput



Then number of users are increased to 1800 from 1000



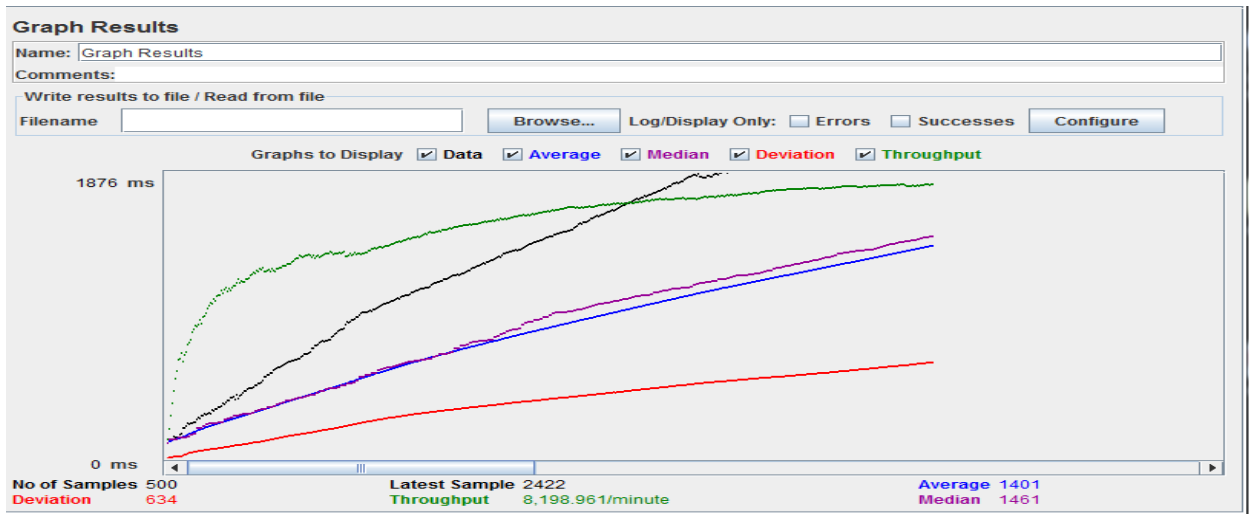
Then number of users are increased to 2000 from 1800



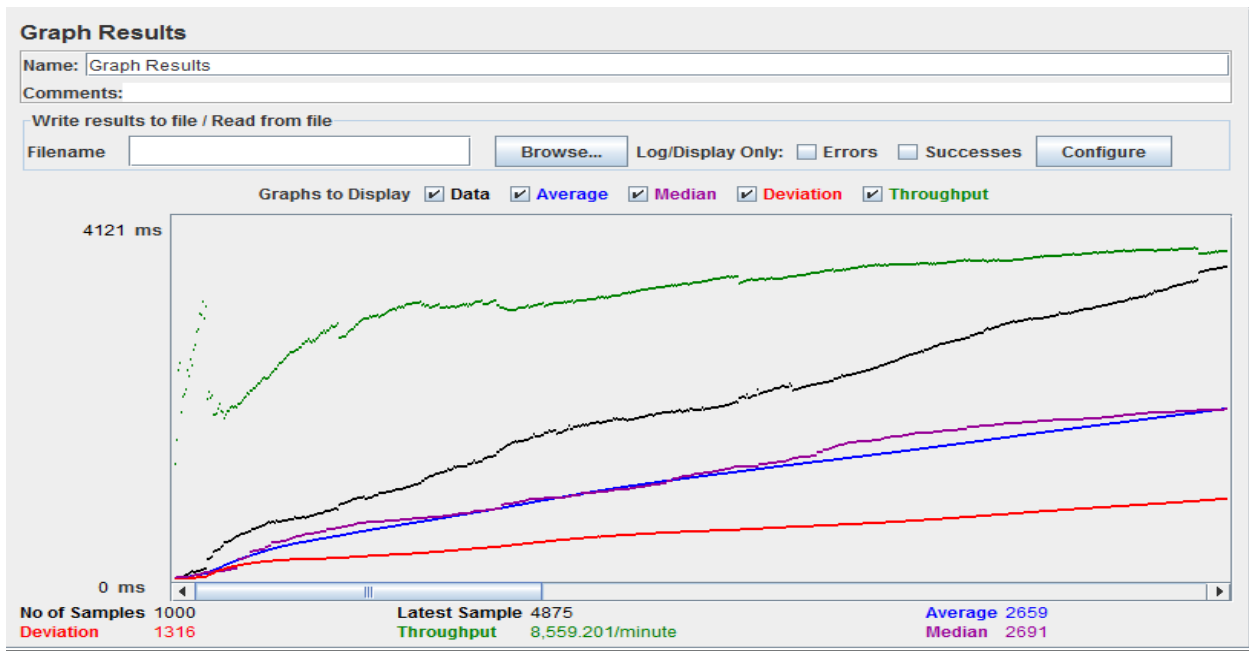
From the above results for Login page we can observe that when number of users are increased from 1800 to 2000 the throughput decreases and average response time increases and system becomes unstable at that time. Hence it can support up to 1800 number of users

Test 2: mastercoursepage:

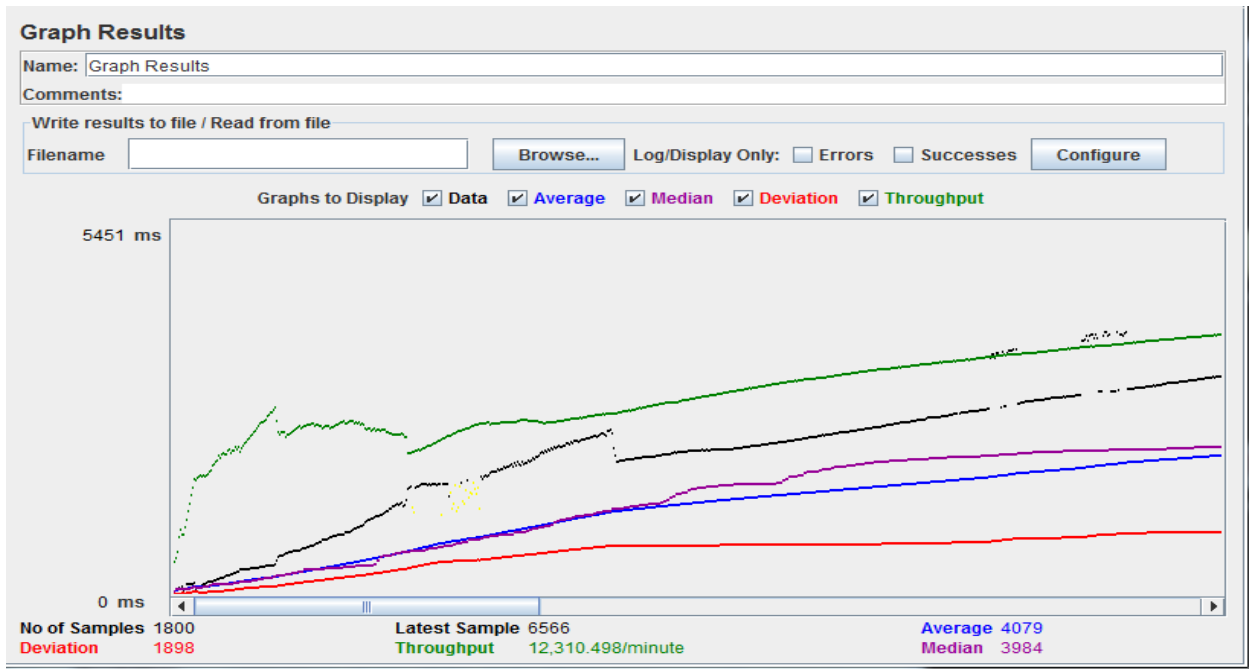
mastercoursepage is initially tested with 500 users:



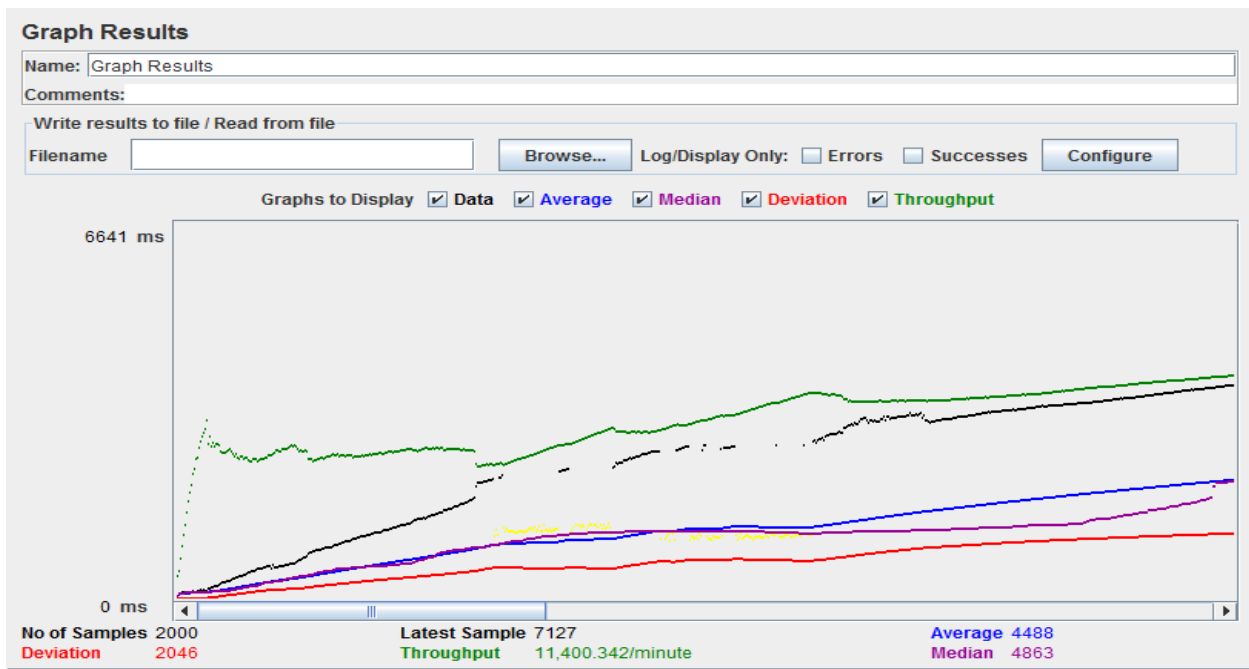
Then number of users are increased to 1000 from 500



Then number of users are increased to 1800 from 1000



Then number of users are increased to 2000 from 1800



From the above results for Login page we can observe that when number of users are increased from 1800 to 2000 the throughput decreases and average response time increases and system becomes unstable at that time. Hence it can support up to 1800 number of users.

Chapter 7 - CONCLUSION AND FUTURE WORK

7.1 Conclusion

The unregistered users, registered user and admin have different privileges

The following are the operations that unregistered can perform:

Register: They can register for E-Learning System

Chat With Admin: They can have conversation with admin to know more about the training system

Read the Reviews: They can read the reviews posted by the current users and see the conversations going on.

See the materials: They can just see the materials of low levels of all technologies

The following are the operations that registered users can perform:

Enroll: They can enroll into different courses and also into different levels

Delete : After they are enrolled, if they wish drop the courses they can drop the courses

Schedule a test :They can schedule for at most 2 tests a day

Performance: They can see their average performances of all the courses they are enrolled into in the form of graphs

History : They can see the tests that are scheduled between certain dates

Contact: They can contact the admin via email with any questions they have.

The following are the operations that admin can perform:

Update Scores: Test scores of users who took tests are updated daily by the admin for all the courses

Create an event : The admin creates and posts any events related to training system on to the news board so that the users can see and attend it.

Upload Materials: The admin can also upload any updated materials to the courses.

Compare Performances: The admin compares the performances of different registered courses of the employee and add him/her to the database related to that technology on which they were doing best so that they are assigned those projects

7.2 Overall Experience

The current application, E-Learning System which is a .Net web application has been developed using ASP.NET 3.5, SQL Server and C# Programming language. jQuery, HTML,HTML5 CSS for implementing UI . It has been a great pleasure for me to work on this challenging project. This project provided me a good practical knowledge of various things like programming in C#.net web based application and writing SQL queries to retrieve information from SQL Server database. It also provided me a good knowledge about the latest technologies like HTML 5 in web based applications. This learning experience helps me a lot in providing guidance to working in my future projects involving these technologies. This application also gave a deeper insight into ASP.Net controls such as Grid views, List Views, data lists, charts and also building applications on visual Studio 2008.

7.3 Future Enhancements

- The scope of the application is designed for few technologies. It can be extended to support more technologies
- A feature can be added where users receive emails once scores of the test are updated.
- The current project is developed in .Net 3.5 framework but can be moved to .Net 4 framework. It can also be developed using MVC architecture to add more enhanced features in easier way.
- It can also developed as mobile application so that users can access it from everywhere.

Chapter 8 - REFERENCES

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