SRI LANKA INSTITUTE OF INFORMATION TECHNOLOGY

Software Requirement Specification (SRS) for Distributed Lecturing and Examination System (DLES)

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Definitions, Acronyms, and Abbreviations

- **SRS:** Software Requirement Specification
- **DLES:** Distributed Lecturing and Examination System
- **OS:** operating system
- **DB:** Databases
- **PHP:** Personal Home Page
- **RAM:** Random Access Memory
- **HTTP:** Hyper Text Transfer Protocol
- **RTMP:** Real Time Messaging Protocol
- **HTML:** HyperText Markup Language
- **SQL:** Structured Query Language
- **UDAI:** Unique Domain authentication ID

Chapter 1

Introduction

1.1 Purpose

This Software Requirements Specification provides a complete description of all the functions and constraints of the Distributed Lecturing and Examination System. The document describes the issues related to the system and what actions are to be performed by the development team in order to come up with a better solution. The expected audience of this document includes the customers of the application and software developers.

1.2 Scope

The Distributed Lecturing and Examination System will be one single module which is used to fulfill all the real world classroom requirements. It will bridge the physical gap between lecturers and students and create a virtual environment which is more convenient to its users (involving parties).All the activities such as downloading, viewing, monitoring, and recording will be transmitted within this virtual environment on real time basis. It can be identified as a complete distance learning website with complete features.

The DLES will have following functionalities.

- Real time lecture conducting/viewing
- Downloading lecture materials
- Real time whiteboard viewing
- Previewing lecture slides
- Recording and storing lecture videos
- Viewing the lecturer/student
- Lecturer and student interaction
- Online examination center with real time monitoring

The main goal of our project is to implement a user friendly web based Distributed Lecturing and Examination System. The successful completion of DLES will offer following benefits:

- **Communicate Naturally :**Excellent communication is at the foundation of effective teaching and learning. Careful listening, a well-modulated tone of voice, and body language that reinforces verbal cues conveys enthusiasm, openness, and interest. DLES brings these components of communication online through follow the speaker video, emoticons, and discussion centered Voice over IP.
- **Seamlessly Integrate with Course Management Systems.**

- **Ensure Comprehension :** Ensure your students understand their lessons by asking for immediate feedback, answering questions, and giving in-depth verbal explanations of complex material.

- **Extend the Classroom :**DLES has been carefully architected to give learners access to teachers, courses, and content beyond the four walls of a physical classroom or campus. Learning objectives are in fact enhanced when teachers enrich their content by using interactive features like instant polling, application sharing, or the electronic whiteboard.

1.3 Overview of the system

Technology is always about building Bridges, Bridges that could take us where we never reached before. It has all ways improved the pattern of our life, the extent of doing things whilst adding more value in forms of convenience and a touch innovation.

The concept of the Distributed Lecturing and examination system, here after will be referred as DLES was the end result of a deep search and an analysis of various methods that could shift the level of Educational Systems and its qualities to a higher level than the prevailing. In modern days even locally we find most students (especially IT related) are provided or do possess sufficient privileges like PCs, Laptops, web cams and most importantly the Internet facility. Having this assumption we seek in to methods to compile these facilities and privileges, knowing there characteristics in depth. DLES could be defined as a compilation of existing concepts like virtual classroom, e-learning, educational networking and e-safe examination systems.

Internet based learning systems and educational systems are no strangers to the current community and has been utmost successful in complying and adopting to elevate the learning cultures. The unique attempt that we are focused is to provide a solution that includes all these features in a more advance manner, inspiring users the convenience of learning without facing any hazard involved in Travelling, Time wastage and costs that do exist to date.

How it works

A Web based application which enables a privileged user to log in to the designed site will provide the services available within. There are two main features / applications which a user must go through.

1. Distributed lecturing system.
2. Distributed examination system.

Distributed Lecturing system

Under this concept a lecturer could conduct a lecture basically from anywhere in the world provided that he/she possess sufficient requirements for DLES at the said time. A live video stream of the lecture will be broadcasted to students (users) on a real time basis & all users who allocated duly by the lecturer can watch the lecture as well as view/share any lecture material as lecture presentations, documents etc..During a given lecture session both the participant & the lecturer could view & monitor the other participants in the classroom. By this feature it allows a user to attend video conferencing among the other users who are currently logged. The system also satisfies urge for questions on both ends & students may discuss among them self too.

Another unique feature of Distributed Lecturing system is its own whiteboard system which enables the lecturer to use his terminal as writing surface. All students may view the content & the writings will be broadcasted to the users on real time basis as well. These features will strengthen the virtual experience of all users and make it a convenient one.

Distributed Examination system

The distributed examination system will use the same platform or mechanism as mentioned above but would provide e-safe, more consistent & reliable examination system which can randomly select questions from a pool of questions and generate exams as & required by a lecturer. Since it requires high level of security, many modernized methods such as sequentially monitor capturing will be in use. In order to reduce the cost involved in developing we will be moving in to open source programs & will be able to finally benefit the users on the same cost effect.

In order to design the web surface we use PHP and JavaScript & will use Flash with action script which uses real time massaging protocol for client end application development.RED5 media will be the interacting server & MY SQL will be used database development.

With all these facilities we look forward to bridge the infinite dream of modern education & would believe the concept would make some noise in the industry.

Overview of the SRS

The next chapter, the Overall Description section, of this document gives an overview of the functionality of the product. It describes the informal requirements and is used to establish a context for the technical requirements specification in the next chapter.

The third chapter, Requirements Specification section, of this document is written primarily for the developers and describes in technical terms the details of the functionality of the product.

Both sections of the document describe the same software product in its entirety, but are intended for different audiences and thus use different language.

Chapter 2

Overall Descriptions

The growth of the internet has turned the world into one global village. Geographical separation is not a hindrance for people around world to meet each other. Distributed networking concepts have become popular and people are advancing in the direction of social networking.

Even though various social networking concepts exist, the Distributed Lecturing and Examination System (DLES) is built on the educational purposes. The current educational systems require students to attend the classes and lectures by physically attending the class. The time and the cost consumed during the transportation are vital resources which cannot be taken back. Time is an essential factor considering the rapid growth of business and technology. Every minute wasted is vital. So is the financial factor in the challenging economy.

Sometimes students may live far away from universities or schools. Travelling for classes is a problem for them. In case a student gets sick, he may need rest at home but he might miss important lectures. Distributed Lecturing and Examination System (DLES) is the ultimate solution for all the described scenarios above.

Distributed Lecturing and Examination System (DLES) is a combination of distributed networking and social networking concepts. The universities and classrooms would not be

physical anymore. The essence of internet would make virtual classrooms online where students can attend by just sitting right in front of the personal computers. All the facilities of a real lecture will be provided with this virtual system and they would be explained one by one. Students and lecturers will be the users of the system and after end of courses student would be evaluated using the secure online examination system.

Although there are few distributed educational products available, they are not free of charge. They all are software packages developed by various software vendors for commercial purposes. Distributed Lecturing and Examination System (DLES) will be a total web based solution which would be a gigantic educational social networking site and will mark the new era of the social networking world. DLES would be free of charge so that anyone can join, conduct and attend classes.

The main feature of the system is live video conferencing. The class will be referred as "Smart Class" and will include lecturer and all the students. Each person can see and interact with each other. Each class would contain the virtual classroom, class course web and class examination center which would conduct online exams.

How it happens

Class can be created by anyone. The creator of the class automatically becomes lecturer and he can assign more lecturers. All the students and lecturers must first register with the website. Each user can maintain his own profile. Once a lecturer creates a class, a unique ID is assigned and he can give out aliases which may help for students to search the class. The built in search engine will be a useful tool when student needs to find a specific class. Each class will be categorized according to the subject the class going to teach. Once a class is created, a link will be placed in the lecturer's profile which directs to his class. Once students find the class on the DLES system, they can send requests to enroll in the class. Lecturer may approve the students he wants to attend the class. Once the class request is approved, student's profile will also contain a link to the class. Student can easy attend the class once the student login to the system. Class will have one smart class web page which allows all real time media activity of the class.

Lecturer may assign class schedule and notifications will be sent to the students regarding the class times and durations. We will be implementing SMS based notification system for class notifications as well. Students can attend the class once the class punctually at home by just sitting in front of the personal computer. User will require webcam, microphone and speakers (or headset) to attend the real-time virtual classroom. Each classroom is integrated with a course web. This would contain all the lecture materials transferred during the lecture and after that. Student could download them and go through as they prepare for exams.

Examination system comes into action at the end of selected number of classroom sessions by the lecturer. Lecturer may assign exam schedule and students must login to the system during the specified time period. Notification mechanism will be implemented for the examination system as well. Lecturer controls the entire exam and he can supervise each and every student taking the exam. He will see each person taking on the exam and we will be monitoring the screen of the exam taker to check if he copies from some other document.

The following are the special features of the DLES.

- **Real time split screen user videos**

  All the class users' videos would be viewed by each and every class user. For example, lecturer would be able to view the videos of all the students participating the class. He would have one main video screen which will allow one large resolution video of a single student. All other student videos will be available in small thumbnail versions. Lecturer can switch these videos and get the large resolution video of the student he prefers on the main screen. At the same time full screen option would be available for any of these videos. It would be the same for the students. A student would be able to watch all the others students' videos and lecturer's video. Lecturer will have a great deal of control in the class and he could deny the visibility of some of the videos.

- **Real time interactive whiteboard**

  Whiteboard would be one of the intriguing concepts of the DLES. Lecturer can use this whiteboard to explain the concepts taught during the class. Lecturer would control this interactive whiteboard and he can allow students to put forward their suggestions on

the whiteboard.

- **Real time lecture slide previewing**

  Lecture slide preview is one of the newest ideas in virtual classroom systems. Non of the existing virtual class environments provide the lecture slide preview option. Lecture slides will be controlled by the lecturer at one end and the preview will be video at the student end.

- **Real time student collaboration (Chat program and Raising doubts)**

  Students can coordinate with each other while a class session is conducted. They can chat with each other during the lecture. However this is controlled by the lecturer. They can chat only if the lecturer wishes them to chat and lecturer can control this option within the class. Also he may allow group discussions within the class by assigning groups and students should be able to perform group activities. While the class is in session only the audio of the lecturer is allowed to be heard. Doubt raising can be done in two ways. Either student or lecturer can start a chat window with multiple users including the lecturer and he may ask his doubt. Or else he can buzz the lecturer and then lecturer may give the control of the class of the student for some time to raise his doubt. At this instance, audio of this student can only be heard.

- **Real time lecture material sharing**

  All the lecture materials can be shared during the lecture using the public share area in the classroom. These materials will automatically be published in the course web after the class.

- **Classroom integrated course web**

  Class course web will contain all the lecture materials shared during the class and after the class. Lecturer can upload materials to the course web.

- **Recording and storing the classroom session videos**

  All the classroom session videos including whiteboard and the slide previewing will be

recorded and stored in the DLES storage. These session videos can be accessed via the class course web.

- **Secure examination system**

  Examination system will use multiple choice and structured essay questions. Lecturer must create exam papers and he should also provide answers for multiple choice questions. Multiple choice questions will be automatically marked by the system. All the structured essay answers must be manually corrected by the lecturer at the end of the exam. All the possible measures will be taken to avoid copying and plagiarism during the online exam.

DLES will not only be used for the Educational purposes. It can also grow in different aspects in the business world today. Business video conferences can be carried out using this system. Since it's a form of social networking, online video chatting will also be another alternative use of this system.

2.1 Product perspective

A DLES is public online space that lectures can use to support student learning. It is accessible via the Internet, 24 hours a day, 7 days a week. Just like your face-to-face classroom.

The purpose of the DLES project is to provide a platform for educators to experiment with designing spaces for learning. A DLES is a learning environment created in the virtual space. The objectives of a DLES are to improve access to advanced educational experiences by allowing students and instructors to participate in remote learning communities using personal computers; and to improve the quality and effectiveness of education by using the computer to support a collaborative learning process. The explosion of the knowledge age has changed the context of what is learnt and how it is learnt Ű the concept of DLES is a manifestation of this knowledge revolution.

Following are the system features we going to implement in Distributed Lecturing and Examination System (DLES)

- Real time lecture conducting/viewing
- Smartboard
- Application Sharing
- Flexible Content Area
- Presenter On-The-Fly
- Content Upload and Storage
- Technology Appropriate for Online Education
- Online examination system
- Robust, 24 x 7 Technical Support from DLES

Why Choose DLES

- **DLES is especially designed for online learning and training.**

  Our target user segments are organizations and individuals delivering their educational services over the Internet. We know their specific requirements and constantly develop our products so that they have everything needed for the online collaboration part of their teaching process.

- **Live is adaptive and flexible**

  DLES is flexible enough to fit to any specific business model. You do not need to change anything on your side to get started working with DLES.

- **DLES is cost effective**

  Our product is totally free and anyone can register with our system without paying any amount of money.

- **Easy to work with DLES**

  DLES is easy to start and easy to use service. Students and teachers from different parts of the world, speaking different languages use DLES in their daily activities without having any special technical knowledge.

- **Live Video Sessions**

  Enhance lecture conducting and group discussions with live video conferencing even on lower bandwidths.

- **Session Recording and Playback**

  Record the live lecture sessions in our system for later references. Publish that recordings on our website to attract new students or give individual playback permissions.

- **Instant Messaging and Session Comments**

  Instant messaging / text chat is available for communication along with the audio. The lecture session creator can enable/disable the text messaging options.

- **Easily create and customize virtual classrooms**

- **Secure examination system**

2.1.1 System interfaces

- **Any Windows OS or Linux OS**
- **XAMPP to manage Apache and MySQL :**
  XAMPP is a free and open source cross-platform web server package, consisting mainly of the Apache HTTP Server, MySQL database, and interpreters for scripts written in the PHP and Perl programming languages.
- **NetBeans IDE for develop PHP :**
  The NetBeans IDE for PHP is an open source project. It is one of the series of supports for scripting languagesprovided by the NetBeans IDE. The NetBeans IDE for PHP is intended to provide a comfortable environment for a developer at each stage of a PHP project. This is achieved through integrating PHP development specific features into the NetBeans IDE.

2.1.2 User interfaces

To connect with our DLES system you can use our URL. When you go to that link it will displayed welcome screen with login interface.

Main interfaces in the DLES system:

- **Login interface**
- **Main system interface**
- **Exam interface**

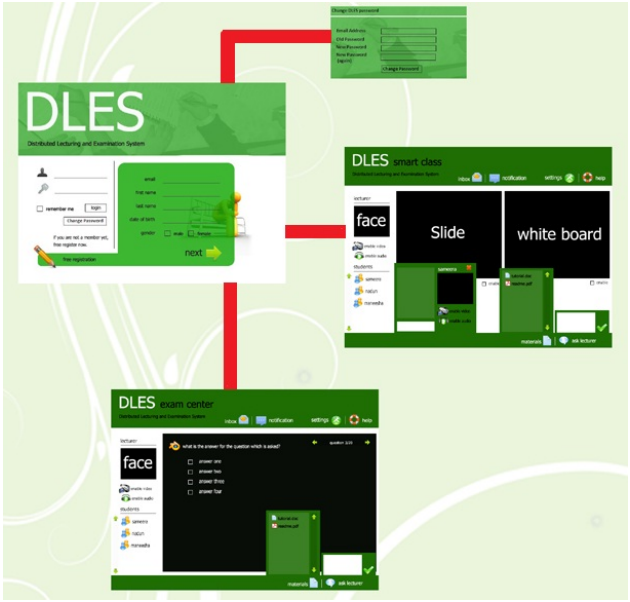

Figure 2.1: Main interface in the DLES system

Register with DLES

1. Provide username, E-mail, password and other required details.
2. Then click on [next] button.
3. An email will be immediately sent to your email address.
4. Read your email, and click on the web link it contains.
5. Your account will be confirmed and you will be logged in.
6. Use the same username and password to log in next time.

If you need to change your account password you can use [change password] button, after that you can provide old password and new password.

2.1.3 Hardware interfaces

1. computer headset (combination of headphones and a microphone)
2. webcam (optional)
3. minimum 56Kbps of bandwidth internet connection.

2.1.4 Software interfaces

NetBeans for PHP development

Figure 2.2: NetBeans interface

XAMPP to manage Apache and MySQL

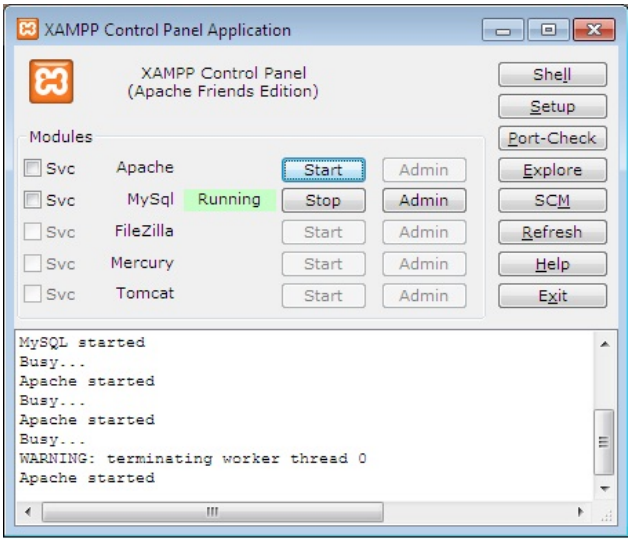

Figure 2.3: XAMPP interface

Eclipse for JAVA development

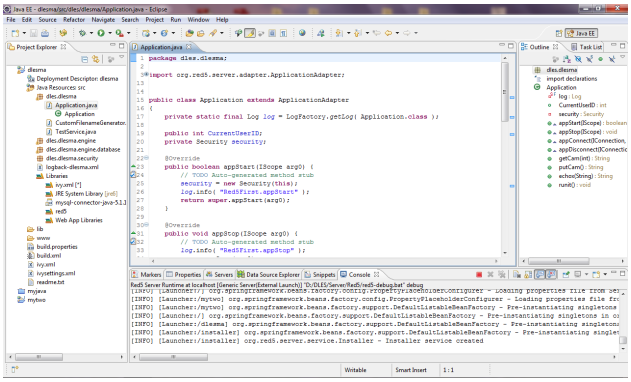

Figure 2.4: Eclipse interface

2.1.5 Communication interfaces

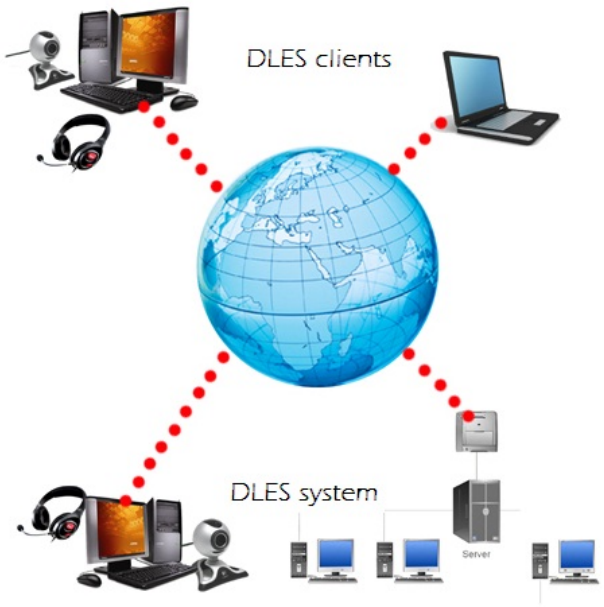

Figure 2.5: DLES Communication interfaces

2.1.6 Memory constraints

Minimum and recommended system requirements for virtual classroom

Requirement	
Operating System	Any windows or unix oS
Browser	1. Internet Explorer 5.5 or higher (Recommend ActiveX enabled) 2. Firefox 1.5 or higher (Recommend Java installed 3. Netscape 7.1 or higher (Recommend Java installed)

Configuration	1. Memory: 128 MB; recommend 256 2. Available Disk Space: 15 MB 3. Processor Speed: 550 MHz (recommend 600); 1 GHz for sharing 4. Native Data transport on HTTP/port 80 - firewall and proxy server friendly 5. Bandwidth: 56 Kbps 6. Display: 800 x 600 (recommend 1024 X 768), 16-bit color Adobe Acrobat Reader (required for some student materials)
Audio/Video	1. Full duplex sound card 2. Headphones or speakers and microphone 3. Video camera (optional) 4. TCP/IP connection with at least 26 Kbps; for streaming video at least 48 Kbps

2.1.7 Operations

Students in virtual education typically acquire knowledge in a uni-directional manner first (e.g. by studying a video, reading a textbook chapter). Subsequent discussions of problems, solving exercises, case studies, review questions, etc. help the students to understand better what they learned before. Electronic media like a discussion forum, chat room, voice mail, e-mail, etc. are often employed for communication.

The difference is that all communication goes via electronic media.

2.1.8 Site adaptation requirements

We are providing only English version of the system.

2.2 Product functions

Use case diagram of basic functions

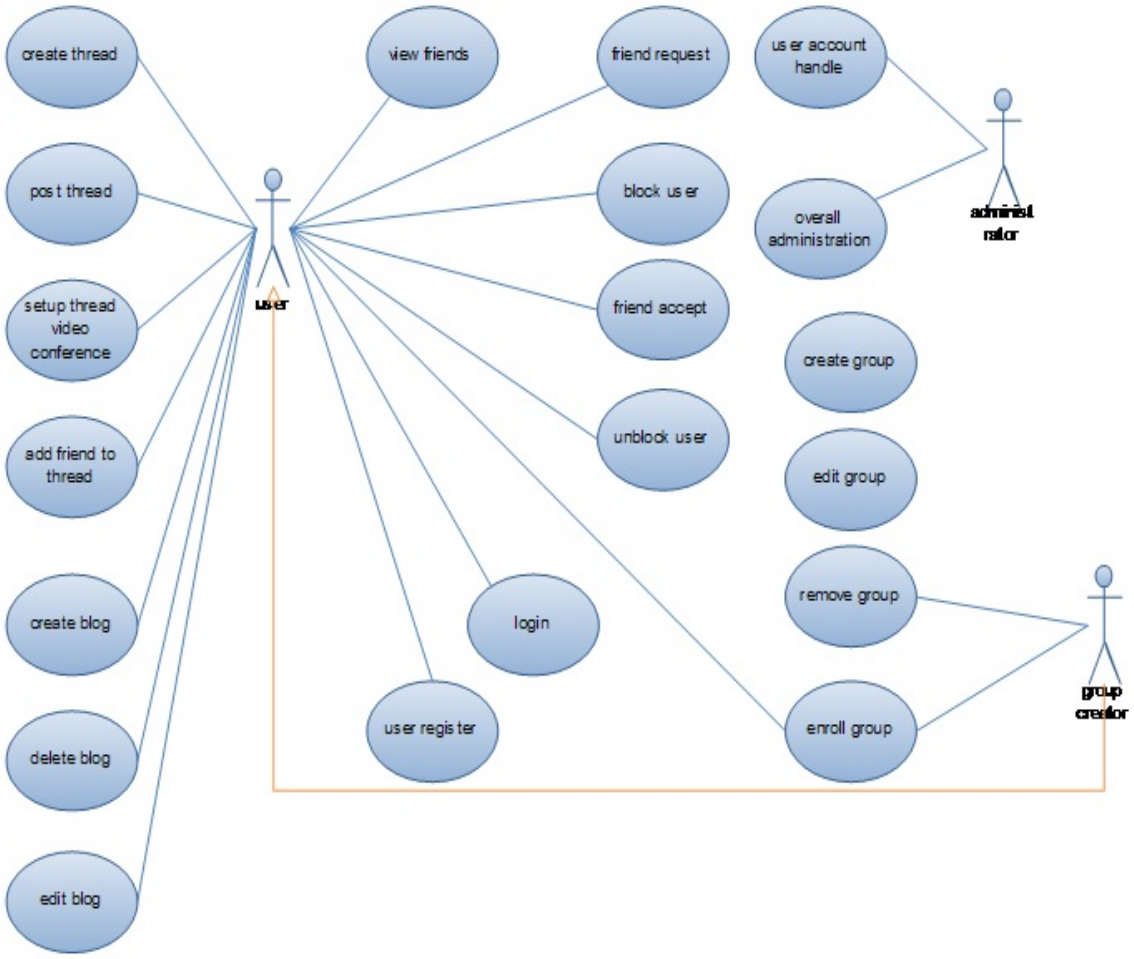

Fig :Use case diagram of basic functions

Table 1: User account handle

Usecase Name	**User account handle**
Summery	Handle user account administration by the administrator
Actor	Administrator
Precondition	Login as Admin
Description	1. Select the user 1. Select user disable/enable 2. Reset password 3. View user statistics
Post condition	User account altered

Table 2: Overall Administration

Usecase Name	**Overall Administration**
Summery	Handle the DLES system administration along with the database
Actor	Administrator
Precondition	Login as Admin
Description	1. Select the section of administration 1. Block/unblock group 2. Block/unblock thread 3. Block/unblock blog 4. Block/unblock class 5. Block/unblock exam
Post condition	System altered

Table 3: Login

Usecase Name	**Login**
Summery	User authentication
Actor	User

Precondition	Load the login screen
Description	1. Enter username 1. Enter password 2. Click login 3. System login and display success
Alternatives	4.1. display login error
Post condition	User logged in

Table 4: Register

Usecase Name	**Register**
Summery	New user registration
Actor	User
Precondition	User should not be logged in
Description	1. Enter user details 2. Validate data 3. User register message
Alternatives	2.1 display register validation error 3.1 display register error
Post condition	User Registered

Table 5: Create Thread

Usecase Name	**Create Thread**
Summery	User can create a new thread; the threads are used to communicate with other fellow users. To create a thread user should need to provide the thread title
Actor	User
Precondition	Login as user

Description	1. Select new thread creation 2. Enter title and description 3. Add users to the thread 4. Create thread
Post condition	Thread created

Table 6: Post Thread

Usecase Name	**Post Thread**
Summery	User can create a new thread; the threads are used to communicate with other fellow users. To create a thread user should need to provide the thread title
Actor	User
Precondition	Login as user and created a thread or enrolled to a thread
Description	1. Select the thread enrolled 2. Enter the post 3. Submit
Post condition	Thread post created

Table 7: Setup thread video conference

Usecase Name	**Setup thread video conference**
Summery	After creating the thread a user can setup video conference inside the members those were included to that specific thread
Actor	User
Precondition	Login as user and created a thread or enrolled to a thread
Description	1. Select new thread creation 2. Select the conference mode 3. Select video or audio or both 4. Create conference

Post condition	Thread conference created

Table 8: Add friend to threadconference

Usecase Name	**Add friend to thread**
Summery	The thread creator can add users those are specified ad friends to the thread that he created
Actor	User
Precondition	Login as user and created a thread
Description	1. Select the thread created 2. Select add user 3. Search for friends 4. Add friends to the thread
Post condition	Thread conference created

Table 9: View friends

Usecase Name	**View friends**
Summery	The user can view his/her friend list
Actor	User
Precondition	Login as user and has friends in his friend list
Description	1. Go to friend list section 2. View friend list 3. Select the user 4. View friend profile

Table 10: Create Blog

Usecase Name	**Create Blog**
Summery	A blog can be created to publish the blog posts of a specific user
Actor	User

Precondition	Login as user
Description	1. Select profile 2. Go to create new blog 3. Provide blog title, description, security and key words 4. Submit the blog creation
Post condition	New blog is created for the user.

Table 11: Delete Blog

Usecase Name	**Delete Blog**
Summery	Blog creator can delete the blog created
Actor	User
Precondition	Login as user and has a created blog
Description	1. Select profile 2. Go to view blogs 3. Provide security authentication 4. Delete the blog
Post condition	User blog is deleted.

Table 12: Request friend

Usecase Name	**Request friend**
Summery	A user can be a friend of another user. To add another user as a friend, he/she should request the other user to let him add as friend.
Actor	User
Precondition	Login as user
Description	1. Search for profile 2. Select user profile 3. Send the friend request
Post condition	Friend request is sent.

Table 13: Friend accept

Usecase Name	**Friend accept**
Summery	When a friend request is made by a user, the requested user can accept or reject his offer t be his friend.
Actor	User
Precondition	Login as user and contains a friend request
Description	1. Go to friend request list 2. Select the entry 3. Accept the friend request
Alternatives	3.1. Reject the friend request
Post condition	User add to the friend list.

Table 14: Create group

Usecase Name	**Create group**
Summery	A user can create groups to share information among the users of common interest.
Actor	User
Precondition	Login as user
Description	1. Go to profile 2. Select new groups 3. Set group title, description 4. Create group
Post condition	Group created.

Table 15: Delete group

Usecase Name	**Delete group**
Summery	A user can delete the group that he/she has created.
Actor	User

Precondition	Login as user and contains a group that he/she has created
Description	1. Go to profile 2. Select personal groups 3. Give security authentication 4. Delete group
Post condition	Group deleted.

Table 16: Enroll Group

Usecase Name	**Enroll Group**
Summery	When a user is invited or when the group is open, a user can enroll into the group. If the group is closed. Then the user should request the group creator to accept his request to enroll on the group.
Actor	User
Precondition	Login as user and contains a group invitation or send group invitation
Description	1. Go to profile 2. Select groups 3. Send request to enroll 4. Or accept request came for the enrollment
Post condition	User enrolled to a group.

Use case diagram of Handle Lectures

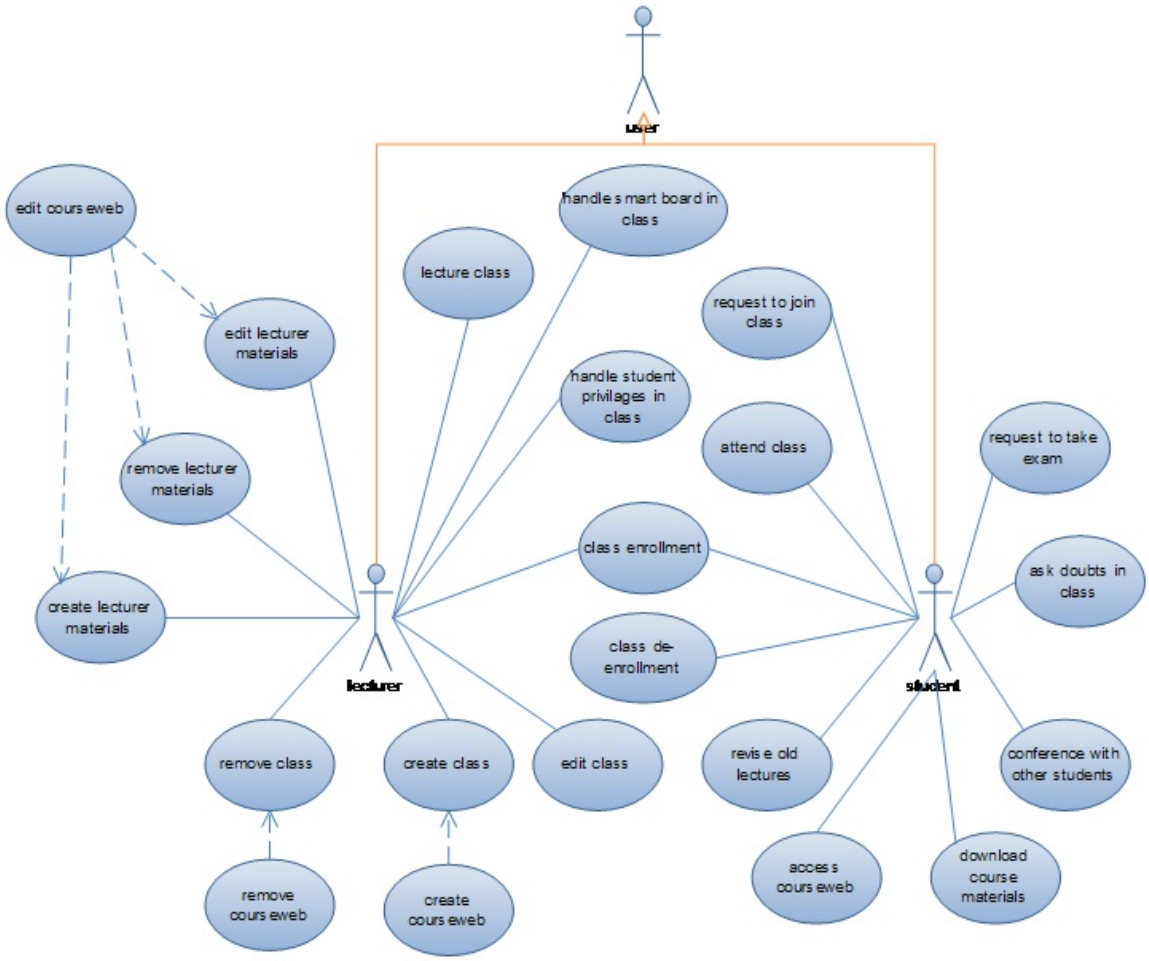

Fig :Use case diagram for Handle Lectures

Table 17: Handle Smart Board

Usecase Name	**Handle Smart Board**
Summery	The lecturer can make the software whiteboard to enable and show to the students. Lecturer can select whether to enable privileges for the students to write on the white board.
Actor	Lecturer
Precondition	Login as user and plays the role of lecturer

Description	1. Go to the class lecturing 2. Select the white board application 3. Set the privileges 4. Enable it.
Post condition	Transmit the smart board content.

Table 18: Request to join the class

Usecase Name	**Request to join the class**
Summery	User can request the class creator to enroll to the class. This can be reviewed and accept or reject by the group creator.
Actor	Student
Precondition	Login as user and plays the role of student
Description	1. Search the class list 2. Select the class 3. Send the class request
Post condition	Class request is sent.

Table 19: Lecture class

Usecase Name	**Lecture class**
Summery	Lecturer can conduct lectures in the class. He can use the voice, video or both while conducting the lecture.
Actor	Lecturer
Precondition	Login as user and plays the role of lecturer
Description	1. Search the class list in which the user is lecturing 2. Select the class 3. Lecturer in the class
Post condition	Class conducted.

Table 20: Handle student privileges

Usecase Name	**Handle student privileges**
Summery	Lecturer has given the privileges to handle the student privileges inside the class. This includes enable and disable personal chats, video conference, etcĚ
Actor	Lecturer
Precondition	Login as user and plays the role of lecturer
Description	1. Go to the class lecturing 2. Select the student privileges application 3. Set the privileges 4. Save the settings.
Post condition	Transmit the smart board content.

Table 21: Attend class

Usecase Name	**Attend class**
Summery	The student who is enrolled to a class can attend the class.
Actor	Student
Precondition	Login as user and plays the role of Student. User should have a class enrolled
Description	1. Search for the class enrolled. 2. Select the class. 3. Go to the class enrolled
Post condition	Student attend the class.

Table 22: Class enrollment

Usecase Name	**Class enrollment**
Summery	Student and class creator or lecturer can enroll the student to the specific class if it's a secured one.

Actor	Student, lecturer
Precondition	Login as user and plays the role of Student.
Description	1. Search for the class. 2. Select the class. 3. Enroll to the class with the permission of the class coordinator.
Alternatives	3.1. Student enrollment cancelled
Post condition	Student enrolled to the class.

Use case diagram of Examination System

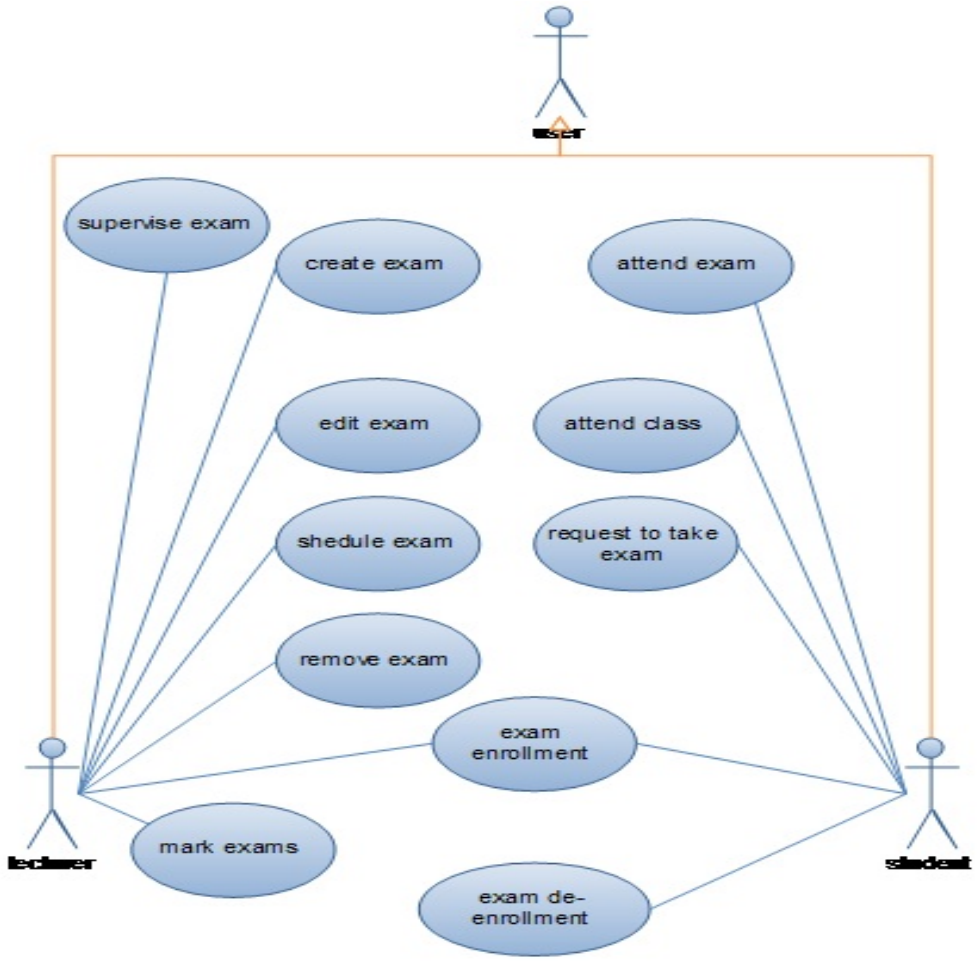

Fig :Use case diagram of Examination System

Table 23: Create exam

Usecase Name	**Create exam**
Summery	The exam coordinator can create a exam. This coordinator can be a lecture
Actor	User, Lecturer
Precondition	Login as user and plays the role of lecturer.
Description	1. Go to profile 2. Select personal exams 3. Enter the exam title, description 4. Enter questions in the exam 5. Create new exam 6. Invite students to the exam.
Post condition	Exam created.

Table 24: Edit exam

Usecase Name	**Edit exam**
Summery	The exam coordinator can edit a exam. This coordinator can be a lecturer
Actor	User, Lecturer
Precondition	Login as user and plays the role of lecturer. And should contain the exam he has created
Description	1. Go to profile 2. Select personal exams 3. Edit the exam title, description and questions 4. Save exam settings.
Post condition	Exam altered.

Table 25: Remove exam

Usecase Name	**Remove exam**
Summery	The exam coordinator can remove a exam. This coordinator can be a lecturer
Actor	User, Lecturer
Precondition	Login as user and plays the role of lecturer. And should contain the exam he has created
Description	1. Go to profile 2. Select personal exam 3. Authentication of the user 4. Remove the exam
Alternatives	3.1 authentication fails and exam don't get removed
Post condition	Exam removed.

Table 26: Attend exam

Usecase Name	**Attend exam**
Summery	The student can attend the exam which he/she has enrolled
Actor	User, Lecturer
Precondition	Login as user and plays the role of lecturer. And should contain the exam he has created
Description	1. Go to profile 2. Select personal exam 3. Authentication of the user 4. Attend the exam
Post condition	Exam Attend.

2.3 User characteristics

Users of the DLES can be any person who is interested in having online lectures, meeting or even a conversation. Mainly we can categories the users as lecturers, students, professionals and any business organization.

As lecturers, they can distribute their lectures real-time without staying in a class room but having all the features in a class room. A software white board is provided to demonstrate the lectures. The documentations/presentations can be distributed prior to the lecture. Lecturer can interact with the students by answering their questions. Lecturer can also conduct an exam by storing a set of questions. According to the instructions given by the lecturer, the system will generate an exam paper.

Each student can participate lecturers by sending a request to the lecturer through the site. They can view the white board and the presentations real-time while listening to the lecture. They can also interact with the lecturer and the other students without interrupting the lecture and also can participate online exams the lecturer has given.

Professionals and business organization can held online meetings worldwide thorough our DLES system. They can also use the whiteboard and the presentations to demonstrate their areas.

A user does not need to have specialized in a particular language or any kind of subject to be familiar with the system. The DLES is a user friendly web based system that easy to work with by any person who can be specialized in different areas.

2.4 Constraints

- One student can only participate only in one class session at a given time
- The system is an online, web based system
- Video recordings of the classroom sessions can only be kept for a limited time period considering the server storage used. This may be roughly 3 days and may subject to change depending on the number of virtual classrooms handled.
- We cannot guarantee 100% that the student does not cheat during an online examination. We will be monitoring the student screen during the exam and we will use mechanisms to identify the students but the security of the exam beyond our control.

Client End minimum configuration

- Memory: 256 MB minimum for windows XP and Linux, 1 GB minimum for Vista and Windows 7
- CPU: Intel Pentium 4 2GHz or above
- Flash player browser plug-in
- Web browser supporting JavaScripts supported

DLES Server Configuration

- Memory : 4GB or above
- OS : Linux or Windows
- CPU : Intel Core duo 2.93Ghz or above
- Hard disk : 1 TB or above
- Should run Apache, MySQL, Red 5 servers

2.5 Assumptions and dependencies

One of the main parts of our system is the examination system. When implementing a real-time online examination system, many limitations arrives since the exam can be only monitored through the computer not from the outside system. In our system we monitor each student by checking the browser events (i.e. whether the browser is minimized or another window is opened, etc). And also by taking screen shots of the current window is taken every minute to monitor cheating while the exams.

The red5 RTMP we use has its own port to do the video streaming. When it comes to an institution/organization environment, these streaming may have to be done through a proxy. Since the proxy only allows http requests/responds, this also become a limitation of our project.

2.6 Apportioning of requirements

1. Conducting a lecture online.

   The lecturer must be able to conduct the lecture real time while using the demonstrating features in the system. They are;

   (a) Software white board

   (b) Real time Lecture slides previewing

   (c) Viewing the lecturer and student real time

   (d) Lecture material distribution

2. Lecturer-Student interaction

   Like in a class, students should be able to ask questions and the lecturer should be able to answer them on time. This is also provided through DLES. And also to make it feel more like a class room, students can interact with one another without disturbing the class. If the lecturer feels that this is not a good option, he can always restrict these features.

3. Secure Examination system

   Lecturer can conduct online exams through the DLES. He can produce either MCQ or structured questions under the system requirements, then the system will generate a paper for the student and will monitor until the student submit the paper.

Although the system consist of many features for educational purposes, it is not restricted only for educational institutes, but it can also used for many organizational purposes such as online meetings, presentations and etc...

Chapter 3

Specific requirements

3.1 External interfaces

In this section we provide details of our DLES external interfaces and provide an External Interface Diagram to aid in this description. Identify each external interface by name and provide a brief description of each interface.

Expected prototype external interfaces

1. User login interface
2. Registering with DLES
3. Changing the DLES Password
4. Main User Interface
5. Smartboard
6. Create class
7. Examination system

3.1.1 User interfaces

User login interface

The PHP login interface enables you to integrate user login with the content of our web site. The system offers full anti-hack protection as with the usual pop-up login method, and also includes support for the 'OpenCrypt Points System'.

Figure 3.1: User login interface

You can log into the DLES Web Interface by issuing the username and password to the above user login interface. Then our system will check whether the password is valid or not using the MySQL database. If you issue a valid username and password you will be redirect to our DLES system, otherwise it will generate an error message.

If you login with the "remember me" method DLES allows you to bypass this login screen. This option is, however, only recommended for people who have physically secure machines (for instance, on your machine at home or in your office).

If you do not have DLES account, you can simply register with our DLES Community by giving the required information.

Register with our system

Figure 3.2: Registering with DLES

If you do not already have a personal username and password, you can use above interface to register with our DLES system.

Your can enter your email and password. Then Confirm the password by entering it again, and then click the next button. When your password registration is accepted, a confirmation email will be sent to you. You will have to activate your password by responding to the email (or clicking the link it contains).

Changing the DLES Password

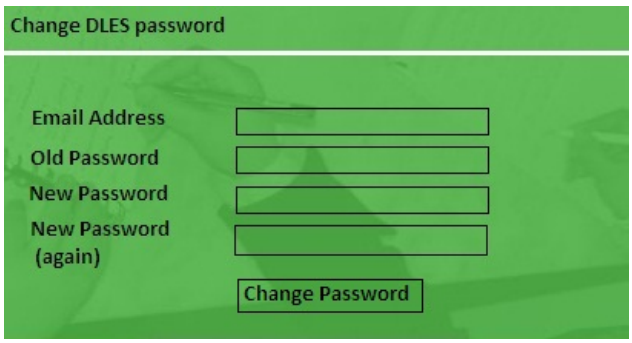

Figure 3.3: Changing the DLES Password

To change your DLES password, click the [Change Password] button on the Login Screen. The Change DLES Password screen opens. Enter your email address, your current DLES password, the password you

would like to change it to, and then click on the [Change Password] button.

Main User Interface

Distributed Lecturing and Examination System is a web based, one of the most users friendly, all in one complete virtual classroom package. DLES classroom environment with robust features that include audio, video, application sharing and content display, and chatting facilities.

Its pedagogical design and ease-of-use ensures that educators and students engage as if they were meeting face-to-face. Advanced features such as whiteboarding, presenter on-the-fly, resizable chat areas and participant lists, content download enable further dynamic interaction between students and educators.

Following diagram shows the sample main user interface of the system.

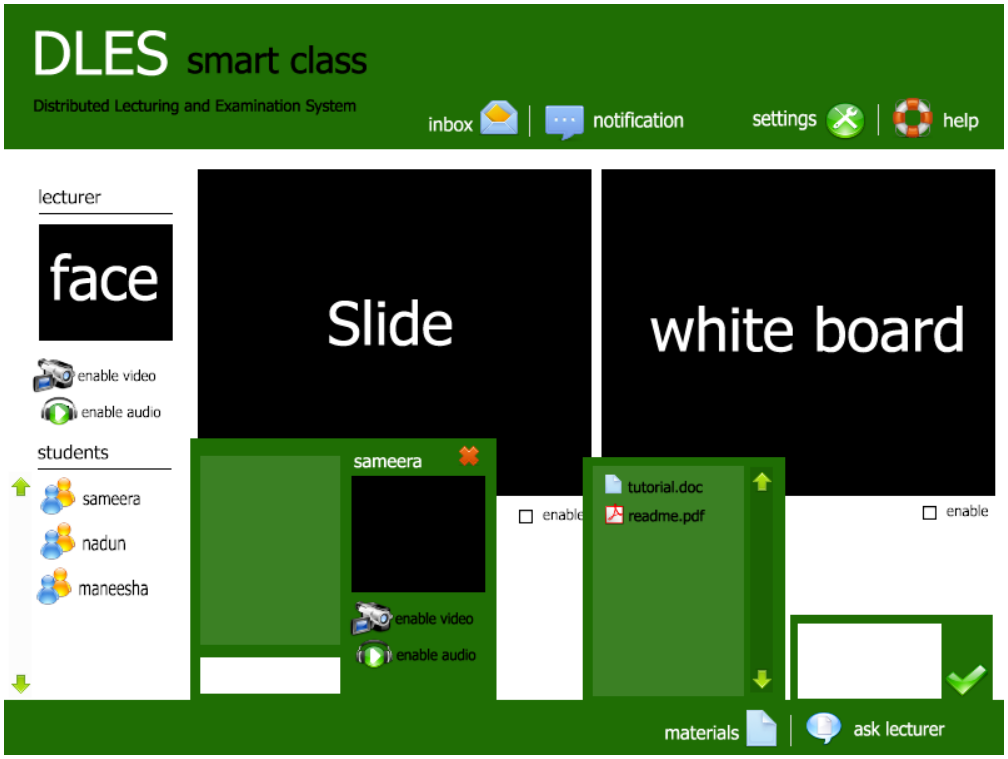

Figure 3.4: Main User Interface

File sharing Window

Figure 3.5: File sharing Window

Application Sharing allows you to share any document or files with other participants. By selecting the [metarils] quicklet we can upload or download any shared document.

Public/Private Text Chat

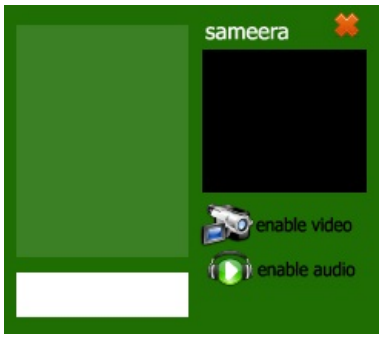

Figure 3.6: Public/Private Text Chat

Some students are more comfortable writing than speaking, and our chat messaging allows that student to communicate textually so they can participate with their more talkative classmates.

Smart board

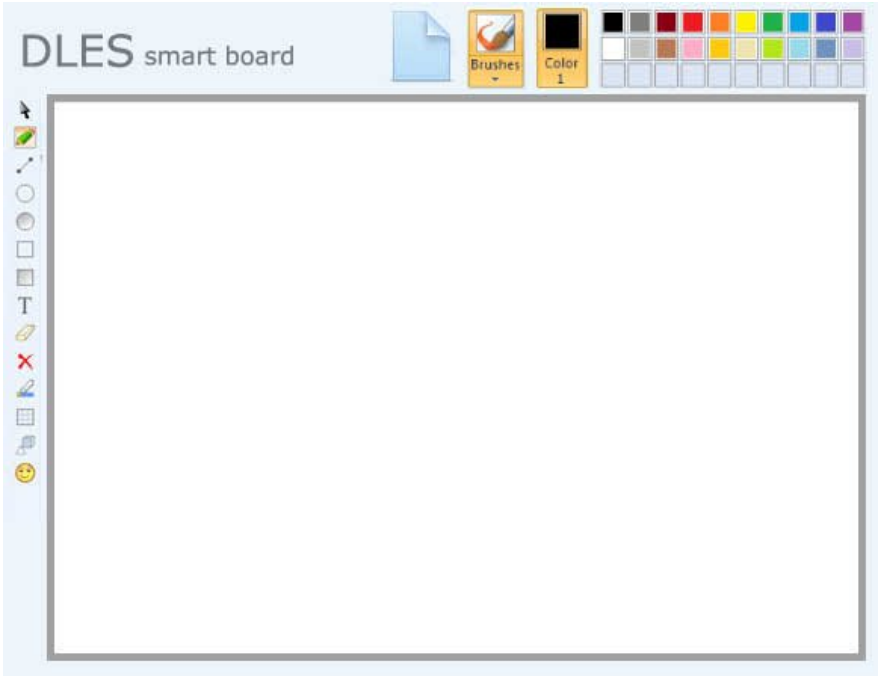

Figure 3.7: Smart board

The Smart board enables users in the DLES to present different types of information as they would on a blackboard in a classroom. Using the tools in the Whiteboard Tools palette, users can draw images, type text, and present equations.

1. **To select an item:**

   Click the Arrow tool. Then click on an item for selection. The following actions may be performed on selected items:

   - **Enlarge:** Click one of the small black boxes that surround the item and drag it to the desired size.
   - **Move:** Click the item and move it to the desired location.
   - **Cut:** Click the Whiteboard Tools palette item, then click the Cut icon.
   - **Copy:** Click the Whiteboard Tools palette item, then click the Copy icon.

- **Paste:** Click the Whiteboard Tools palette item, then click the Paste icon.
- **Delete:** Click the Whiteboard Tools palette item; click on the selected object; then click the Delete icon.
- **Group items:** Click the Whiteboard Tools palette items, then click the Group icon.
- **Ungroup:** Click a Whiteboard Tools palette item in a group, then click the Ungroup icon.
- **Bring front:** Click the Whiteboard Tools palette item; click on selected object; then click the Bring to front icon.
- **Bring back:** Click the Whiteboard Tools palette item; click on selected object; then click the Send to back icon.
- **Select all figures on the Whiteboard:** Click the Selects all Figures icon.

2. **To draw free hand:**

   Click the Pen drawing tool. Choose the color of the pen in the "Fill Color" drop-down list.

3. **To enter text using the keyboard:**

   Click the text tool (T) then the Whiteboard area. A Whiteboard Text Input box appears. Type the text in the box and click "Insert." Use the options in the Tools palette to select color, font, and size.

4. **To draw a straight line:**

   Click the Slanted Line tool.

5. **To highlight something with an arrow:**

   Click the Pointer.

6. **To draw a square:**

   Click the Square drawing tool. Choose the color of the square from the "Fill Color" drop-down list.

7. **To draw a circle:**

   Click the Oval drawing tool. Choose the color of the circle from the "Fill Color" drop-down list.

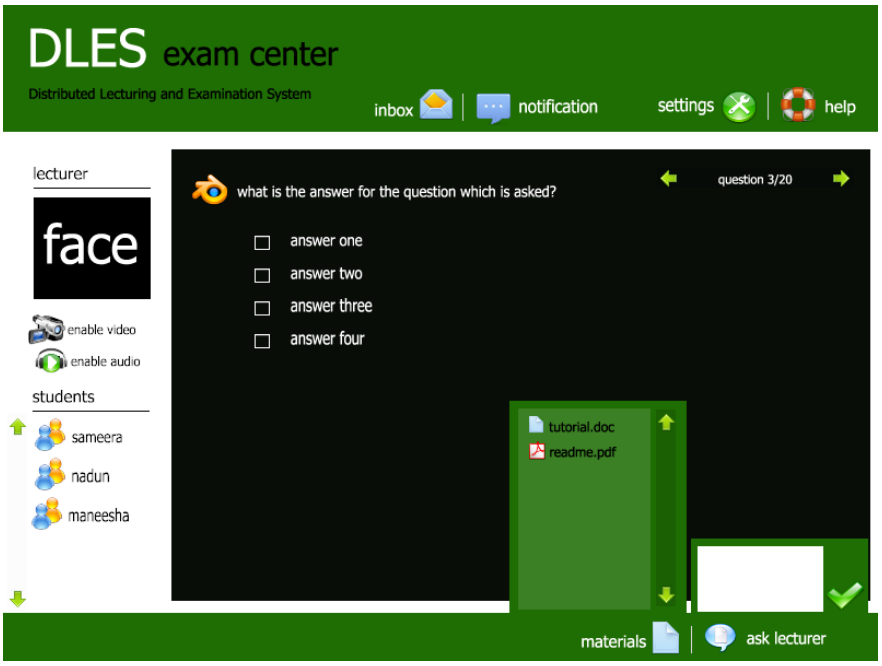

Figure 3.8: DLES exam center

Exam center Interface

1. **Creating data banks and tests with the Online Examination System**

   - Online examination questions can be categorized according to topic, types, etc. (libraries)
   - The online examination system makes provision for difficulty levels of items.
   - A test can be compiled with questions from different topics/libraries.
   - A "serial number" is provided for each question according to topic, etc.
   - The "serial number" can be used to search for and select questions.
   - Tests can be created on a random basis per student.
   - Specific questions can be flagged to be included/excluded in a test.
   - The online examination system is suitable for surveys.
   - The online examination system can automatically add the marks allocated in each question to determine the total mark for the test.

- Different papers (shuffle code) and memoranda can be compiled.
- Export question papers and memoranda to .txt or .doc file

2. **Control mechanisms in the test**

- A time limit can be set for the test.
- The sequence of questions can be randomized.
- Online Examination System allows jumping to specific questions based on the previous answer.
- The online examination system limits the number of times a student can write a test.
- Students can navigate within a test (i.e. backwards and forwards). Can be set.
- Navigation tools/buttons can be selected for a test, and these buttons can be switched.

3. **Online Examination System Feedback**

- Feedback on test results can be set on/off.
- Feedback per question can be set on/off.
- Customized feedback per question/test.

4. **Question types of the Online Examination System**

- Multiple Choice

  This question type allows the user to select ONE correct answer

  (a) Options can be randomised

  (b) More than one option can be correct but the user can only select ONE option

  (c) Score can be set per option

  (d) No limitation on number of options

  (e) If there are a number of Options, these can be presented in a column(s).

- Multiple Response

  This question type allows the user to select more than ONE correct answer

(a) Options can be randomised.

(b) Score can be set per option.

(c) No limitation on number of options.

(d) If there are a number of Options, these can be presented in a column.

(e) The number of responses students enter can be limited.

- Information page

  This screen provides information but does not contain a question

  (a) No limitation on the amount of text (scroll bar).

- Fill-in the blanks

  This question type gives the user the opportunity to type in short text answers

  (a) More than one blank space can be specified to be filled in by the student.

  (b) System caters for multiple spelling variations.

  (c) System caters for multiple possible answers.

  (d) Boolean operators can be used for marking.

  (e) Score can be set per answer.

- Numeric

  This question type gives the user the opportunity to type in a numeric answer

  (a) Ranges can be set.

  (b) The number of decimal places can be limited.

  (c) The number of decimal places can be set.

  (d) Score can be set per answer.

  (e) No text answers can be typed.

- Other essential requirements of the Online Examination System:

  (a) Graphic(s) can be included as part of a question.

  (b) Sound can be included as part of a question.

(c) Video can be included as part of a question.

(d) Animations can be included as part of a question.

- Security

(a) Only registered students are able to access a test.

(b) The test can be made available on specific dates.

(c) The test can be made available at specific times.

(d) The number of times students access tests can be set.

(e) The login time per student is available.

(f) Logoff time per student is available.

(g) The online examination system can limit logins to a specific subnet.

(h) Text files with students details (i.e. names and student numbers) can be used to give students access to tests.

(i) Implement special test monitoring system.

- Reporting

Answers can be saved in real time (if a power failure occurs the answers must be saved up to that point).

(a) Papers can be remarked after editing a test, e.g if a question is deleted.

(b) Results must be presented according to the original question/id numbers.

(c) Report of each individual's answers

DLES Classroom Creation

Figure 3.9: DLES Classroom Creation

1. Click the New class icon.
2. Complete the requested information in the following:

a. Class Info

1. Title: Give your Live Classroom a relevant title.
2. Description (optional): Enter a description that is helpful to you. Students do not have access to the Description text.
3. Type: Select Students and instructors have the same rights if you would like to provide all students with Presenter access to your class (by default, Instructors lead the presentation is selected).

b. Media

1. Student Privileges (only available if Instructors lead the presentation is selected in the Type setting above):

Enable students to speak by default: controls whether student microphones are turned on when they enter the Live Classroom.

Enable students to show their video by default: controls whether students may broadcast video when they enter the Live Classroom.

2. Video Bandwidth: determines the necessary bandwidth to view/share video, as well as set a ceiling at which participants and presenters can broadcast video.

c. Features

SmartBoard (only applicable if Instructors lead the presentation is selected in the Type setting above): Enable students to use the SmartBoard by default: controls student access to the SmartBoard (virtual white board) when they enter Live Classroom.

Chat: these options control how students use the different forms of text chat (only applies to class where Instructors lead the presentation).

d. Access

1. Available to Students: This box must be checked in order for a Room to be visible to students.

2. Maximum Users: Places a limit on the amount of users (including the instructor) who can enter the class. By default, this is set to Unlimited.

3. Enable guest access: You may allow users who are not registered in your course to enter the class via an external link (provided when selecting this option).

e. Click the Create button to build your class.

3.1.2 Hardware interfaces

Figure 3.10: DLES hardware interface

The only additional hardware necessary for participation in the DLES sessions is a computer headset (combination of headphones and a microphone), webcam (optional) and minimum 56Kbps of bandwidth internet connection.

3.1.3 Software interfaces

Server Architecture

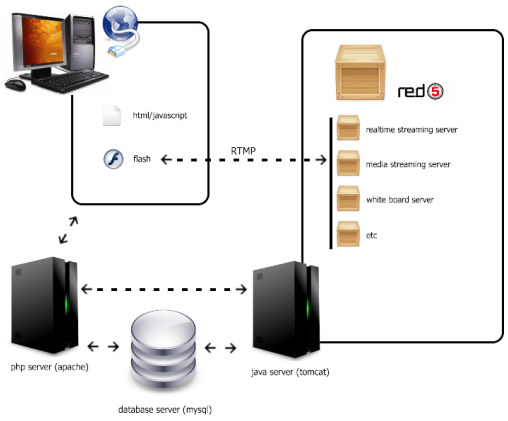

Figure 3.11: DLES Server Architecture

MySQL is used as the database server. All the user's data and system data will be stored in the MySQL Database. To access the MySQL database we have to implement software interfaces using PHP and java.

As the web server we use Apache HTTP server along with PHP. It contains the server side database handling and the client implementation to view the html and flash content. HTML is produced by the execution of the PHP codes deployed in the Apache server.

As Java server we use apache tomcat server. Server which runs as an application deployed in the Tomcat. Red5 server and Apache HTTP servers are directly interfaced with the Java server. And also there is a special java interface to communicate with MySQL database server.

Flash and RED5 uses RTMP as the media transmission protocol. The red5 applications written in order to work with the falsh applications will be deployed in the java tomcat server along with the RED5 server.

Real time streaming / publishing application

Figure 3.12: Real time streaming / publishing application

We transfer webcam output to each other via the web browser's flash client. The client which has the multimedia equipment such as Web Cam and microphone can transmit the real time data captured using flash. To achieve above task we have to make interface between clients and server using RTMP.

Multimedia streaming application

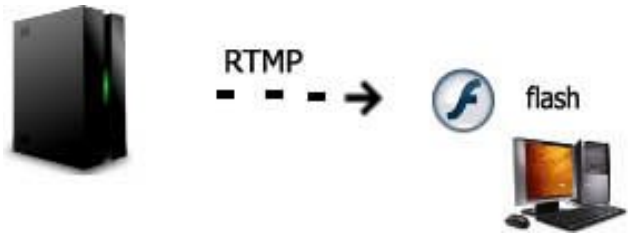

Figure 3.13: Multimedia streaming application

The stored audio video content can be accessed by the client using a specific flash player which interacts with the RED5 server application and retrieves the stored multimedia content.

whiteboard content distribution

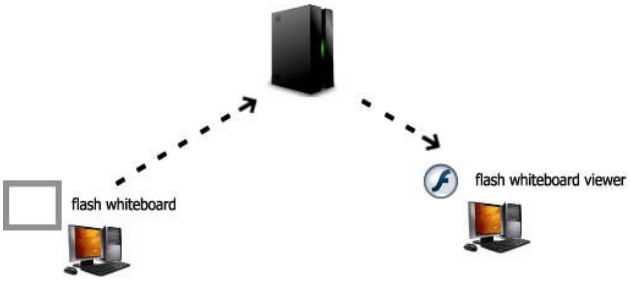

Figure 3.14: whiteboard content distribution

This fash application fetches the images periodically and transmits the whiteboard content to the server application written in RED5 API.

3.1.4 Communication interfaces

The DLES uses Java servlets and hence require HTTP tunneling for transmission of data. More over this allows easy transaction between the various clients and the server.

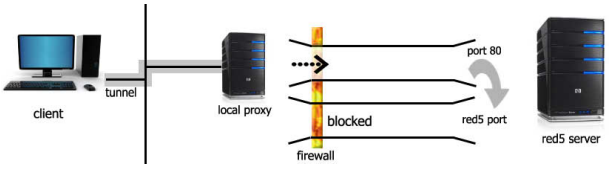

Figure 3.15: HTTP tunneling

3.2 Classes/Objects

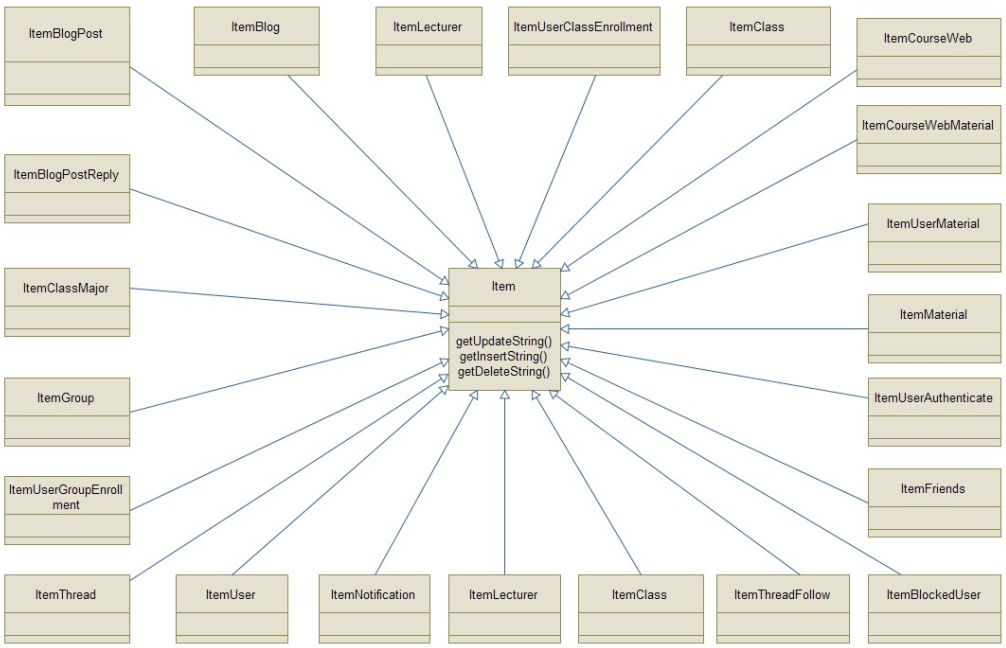

Figure 3.16: database package

- **Item:** The base class which is used to created the classes that represent the database data objects entries.
- **ItemBlogPost, ItemBlogPostReply, ItemClassMajor, ItemGroup :** Are the inherited classes from the Item class.
- **UserHandler :** The class which is used to handle the user specific events like, Login, Register, Update Information and Search
- **Blog Hanlder :** Use to handle blog related works, such as blog alter, blog posts alter and post reply alter
- **Material Handler :** handles materials uploaded to the system

- **ThreadHandler :** used to handle the chat and PM messages between the users
- **ClassHandler :** Class room related things can be altered by this handler class
- **ClassMajorHandler :** this is used to handle the class major entries used to create the class
- **ClassSessionHandler :** When a class finishes the class session is updated and handled by this controller class
- **CourseWebHandler :** Handles the course web manipulations
- **ExamHandler :** the class use to control and handle the Examination options and works
- **FriendHandler :** used to handle the Friend requests and responses

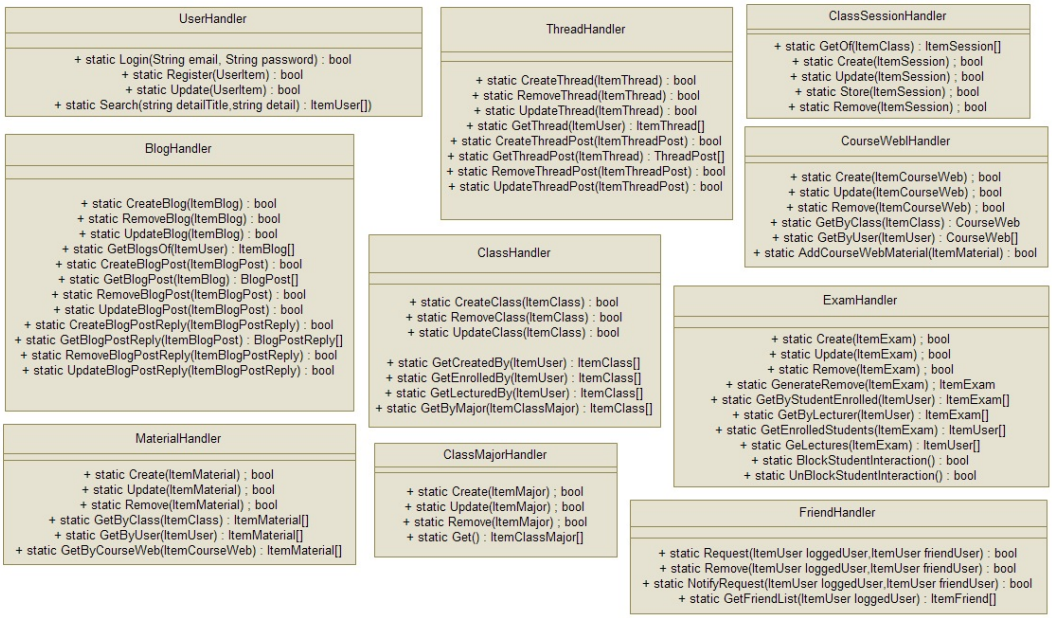

Figure 3.17: database handler

3.3 Performance requirements

- Number of users supported in the class will mainly depend on the server load, server processing capacity and its memory. We have set the initial maximum number of users in per class as 50. We have set the initial maximum number of simultaneous class sessions to be allowed as 25.

- The video quality at each end will depend on the webcam quality and also the network bandwidth. The application will adjust the frame quality according to the network bandwidth. If DLES works in a dedicated LAN (100Mbps or above) environment, the video quality would be higher. If it works through the internet connecting via dial up connection, video quality will be much less.

3.4 Design constraints

Logical Database Requirements

- There will only 1 database for the entire system. It is deployed in the MySQL server with the database name 'dles'.

- Only the administrators have direct access to the dles MySQL database. No users are given direct access to the database. All database operations will be performed using the database functions which implemented at the database platform.

- All the user accounts, profiles, class details, course web details will be stored in the dles database. Secondary storage will not be used for real time audio and video streaming via Red 5. It will only use memory. The video recordings will not be stored in the database. It will be stored in the secondary storage on the server and database will contain the file location.

- Only the lecturing system including smart class and course web will have tables in the database. Examination system will not use the database. All the exam papers with questions and answers will be stored in files. The student marks and grades will be stored in the database.

3.5 Software system attributes

3.5.1 Reliability

Our system is reliable since it is a web based application. The only time the system will not be available for users is the time that we backup data which will happen once a week. Further we are able to schedule the backup process in a manner which would have a minimum impact and interruption to our users.

3.5.2 Security

1. **Database Access** There will be no external access to the database, except through the XML protocol. Administrators of the system will have full database administration rights and Lecturers may have access to a copy of parts of the DLES database, for editing purposes.

2. **Storage and transmission of UDAI** Each and every user of the system will have a user name and a password. E-mail address will be used as the username and therefore it'll be a unique one for each user. The UDAI (Unique Domain authentication ID) will never be stored within the DLES; rather, a one way hash (encryption) of the UDAI will be stored.

   Whenever the UDAI must be verified, the incoming UDAI will have been encrypted by the Registrar then decrypted and hashed by the Registry upon receipt. This hash value will be compared with the hash stored in the database.

3. **Examination System Security** As DLES system can be used to conduct on-line examinations for the participants of a particular class. Therefore high level of security is essential in order to prevent cheating, copying during an exam.

   (a) Everybody can see each other during an exam. The webcam content of a particular user will be buffered to others and it verifies what others are doing in that time. Lecturer not only can view but also has a record option to save the webcam content of any student when conducting an exam.

(b) Exam papers can only be accessed by its creator. Others cannot download them as authentication will be done to each examination paper through php.

(c) After completing the exam even the student can't view or edit his exam paper as well.

4. **Application Access** Roles define behavior of individual processes for individual users. This will allow access to specific actions to be granted (or denied) for any specific user. The following list of roles will be required to provide access to various parts of the DLES.

   (a) **Administrator :** This role allows a user to have high level access to the system with all the privileges.

   (b) **Lecturer :** This role allows a user to have medium level access to the system with controlled set of privileges.

   (c) **Student :**This role allows a user to have low level access to the system with controlled set of privileges.

   At this level, and throughout this document, a user is a single business entity, i.e. a Student.

3.5.3 Availability

We could rank the availability of the DLES system as 100 present as the system is available for operation whole day along with whole year. System needs 5-10 min of down time for each month for database backup. But as a matter of fact the quality of the virtual experience for a user will depend upon the privileges of internet connection. Therefore network performance is directly related to the system performance.

3.5.4 Maintainability

DLES system can be further developed easily to increase the functionality by easily adding classes due to its object oriented design.

Research Review Document (RRD)

Chapter 4

Statement of the work

4.1 literature survey

Background

As we continue on completing our academic studies with relation to IT we tend to seek for methods which can make life more convenient and smooth. Because of that eventually we are driven to seek innovative methods to make our higher studies a convenient one. Since modern days most of our students are equipped with internet, laptops, web cams and various inventions thanks to the technology, we thought about compiling these inventions to create a virtual environment which could be helpful to create a new era of comfortable learning culture. The bloom of the concept "Distributed Lecturing and Examination System" was coupled up with the existing concepts like virtual class room, e-learning, educational networking and e-safe examination systems.

As a result of the extensive research that we carried out on the field of modern education system, it was realized by us that a system with all the online education features built in one single module is difficult to find. To make this aim a success we have done several researches about the existing products in the global market to identify the drawbacks of them. It also gave us an opportunity to identify the functions that require more improvement in our system and to meet user needs as well as the end user requirements. By

using the findings of this research we were able to give a clear comparison between existing products and the Distributed Lecturing and Examination system.

Literature Review

Product Comparison

Products	Live sharing of lecture materials	Provide Real-time whiteboard	Provide examination system	Web based
eLecta Live	✓	✗	✗	✗
INTOWEB	✗	✗	✓	✓
Virtual Blackboard	✓	✓	✗	✓
DLES (our system)	✓	✓	✓	✓

Figure 4.1: Product Comparison

1. **eLecta Live**

   eLecta Live is a Virtual Classroom Software and a Web Conferencing Solution for live classes, online meetings and webinars. It is available in different editions and configurations enhanced for online teaching, web conferencing and web collaboration. eLecta Live is available in several editions, a single web conference room, a personal web event center or an entire virtual school solution.

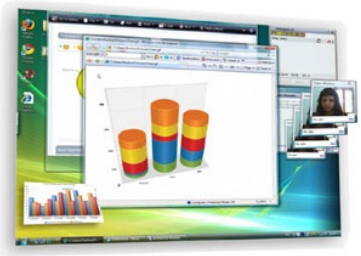

Figure 4.2: eLecta Live

Features of eLecta Live

- Crystal Clear Full Duplex Audio
- Shared Interactive Whiteboards
- PowerPoint, File and Image Broadcasting
- Rich Markup and Annotation Tools
- Share Your Screen and Applications
- Live Video Sessions
- Session Recording and Playback
- Instant Messaging and Session Comments

Drawbacks of the system

- It's a software product, therefore customers have to install it prior to use
- High cost
- No online examination system
- Different features are available with different editions. If you need a feature in a different edition have to buy the whole package.

2. **Wimba Classroom 6.0**

Wimba Classroom 6.0, cornerstone of the Wimba Collaboration Suite 6.0, is a live, virtual classroom environment with robust features that include audio, video, application sharing and content display, and MP4 capabilities. Its pedagogical design and ease-of-use ensures that educators and students engage as if they were meeting face-to-face. Advanced features such as polling, white boarding, presenter on-the-fly, resizable chat areas and participant lists, usage analytics tools, and MP3 or MP4 downloads enable further dynamic interaction between students and educators.

Figure 4.3: Wimba Classroom 6.0

Features of Wimba Classroom 6.0

- Break-Out Rooms
- Emoticons
- Public and Private Chat
- Follow-The-Speaker Video
- Multi-way Video and Audio (Voice over IP)
- Presenter On-The-Fly
- Polls, Quizzes Surveys
- Robust Electronic Whiteboard
- Application Sharing
- Flexible Content Area

Drawbacks of the system

- It's a software product, therefore customers have to install it prior to use
- Not an affordable solution
- No online examination system
- Different features are available with different editions. If you need a feature in a different edition have to buy the whole package.

3. **Intoweb- Online Examination System**

Intoweb Training offers a new unique approach to training. The training system is a web based Intranet driven solution allowing organizations to train up their employees in desktop skills. It provides training solutions, Examination systems and Demonstration solutions.

Features of Intoweb : Online Examination System

- Online examination questions can be categorized according to topic, types, etc. (libraries)
- The online examination system makes provision for difficulty levels of items.
- A test can be compiled with questions from different topics/libraries.
- A "serial number" is provided for each question according to topic, etc.
- The "serial number" can be used to search for and select questions.
- Questions can be converted to the databank from existing databanks.
- Questions can be converted from word processing files.
- Tests can be created on a random basis per student.
- Specific questions can be flagged to be included/excluded in a test.
- The online examination system is suitable for surveys.
- The online examination system can automatically add the marks allocated in each question to determine the total mark for the test.
- A printed paper and a memorandum can be compiled.
- Different papers (shuffle code) and memoranda can be compiled.
- Export question papers and memoranda to .txt or .doc file

Drawbacks of the system

No online lecturing, virtual classroom features available with this.

The concept of Virtual classroom and Educational networking systems, not been a stranger for the international market has been occupied to various cultures of learning among the world due to the

convenience it provides to the education system. As a matter of fact the challenge for us is to create a system which has all the existing features in a more advanced manner and its own unique features as well. The core objective of this project is to inspire students a new perception of a learning culture which is more convenient to them in engaging day to day learning activities without facing any hazard involved in learning by traveling to a certain destination, wasting time and travel cost which are involved in current educational system.

4.2 Identification and significance of the problem

DLES is a unique solution that provided all the necessary needs of a real classroom. As mentioned in the 6.1 Literature Survey all the existing products do not have the all the features of the DLES.

When comparing with Electa Live and Wimba

Both don't have a web based solution and they are not free. Both are software and do not contain Lecture slide preview option, integrated courseweb and the secure exam system.

When comparing with IntoWeb

It's only an examination system without any real time lecturing system. None of the features of the lecturing system are available with IntoWeb.

Even though the uniqueness of the DLES lies with all the additional functionalities provided as all in one package, there are other main research areas we cover which haven't been used in any of the mentioned solutions thus far. They are as follows.

- Bandwidth optimization protocol will be designed to reduce the network bandwidth used by the videos and the whiteboard content transfer. It will be in such a way that only the changes of the whiteboard will be transmitted and idle when whiteboard content is not used. The same will be applied for the video transmission as well. This will be the fastest web based video conferencing solution.
- The security of the exam system will be designed in such a way that all the user screens and videos will be captured and necessary measure will be taken to avoid exam fraud.

- The access control will be controlled by means of ACLs (Access Control Lists) for each objects and methods so that each user privileges will defer form the other. The lecturer becomes the highest privileged user within a classroom and exam center and he would assign other user privileges as he wishes. This system has never been used in any of the existing systems.

4.3 Technical objective

Project DLES has several research area's which have never been implemented in the past projects, but working out in this project as a total new concept. To achieve these new conceptual goals we are entitled to finish up these technical goals.

1. In the examination system we are trying to provide the security for denying the students doing fraud while attending the examinations. For this we are using the online monitoring system which works in two main areas.

   (a) Monitoring the screen

   (b) Monitoring the person

   We install or run a small java application in the student client computer to retrieve the screen shots by time to time. This will let the lecturer or the supervisor know the actual desktop view of a student while he/she is doing the examination.

   Then we activate the client camera and view the student while he/she is doing the exam. This will help the lecturer to know what the student is doing physically while he/she is attending the exam.

   These two contents are stored automatically and let the lecturer review It later.

2. Online smart board content is transmitted letting the bandwidth used in minimal level. The change in pixels makes the data to transmit over the network to the server. In the idle state this content never transmitted.

3. Video and audio transmission is sampled and frame rate is set to minimize the network usage. This is done by controlling the frame rate and quality of the media content before its being transmitted.

The student client machine should have java runtime environment and flash runtime libraries to run the system in the web browser. The web browser should be java script enabled and cookies enabled. This should also support java and flash plug-in.

Client machine is recommended to have at least the memory of 256MB, VGA Display and decent processing power.

The server Machine should have installed Java, Flash and flex runtime. This should run Red5 Server, Apache server which has enabled PHP and some database server such as MySQL.

Server machine is recommended to have 4GB of RAM, 1TB of HDD and a dual core or equivalent processing power.

4.4 Detail design

1. **Examination Security**

   (a) Screen content transmission

   The small java application which runs in the student side client machine retrieves the desktop screenshots and transmits periodically to the server. This can be reviewed by the lecturer when he/she is marking the paper.

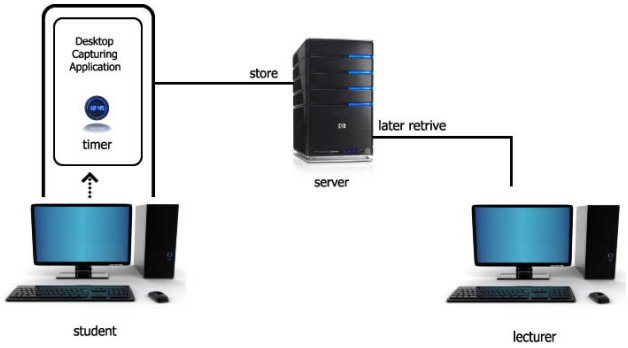

Figure 4.4: desktop caputing application

   (b) Webcam Transmission

   Webcam is accessed by the flash application which runs in the client host and transmit the content of the camera to the server continuously until the student finishes his/her examination. This can be reviewed by the lecturer when he/she is marking the examination paper.

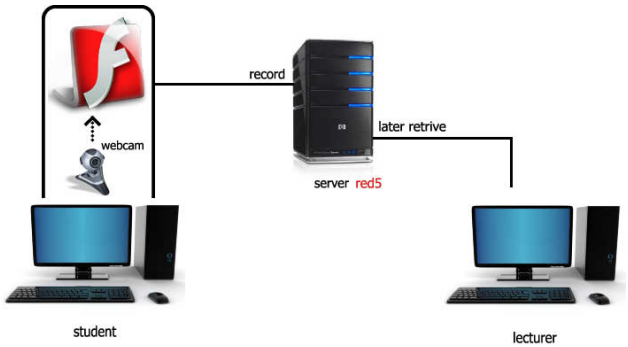

Figure 4.5: webcam application

2. **Video/Smart Board Transmission**

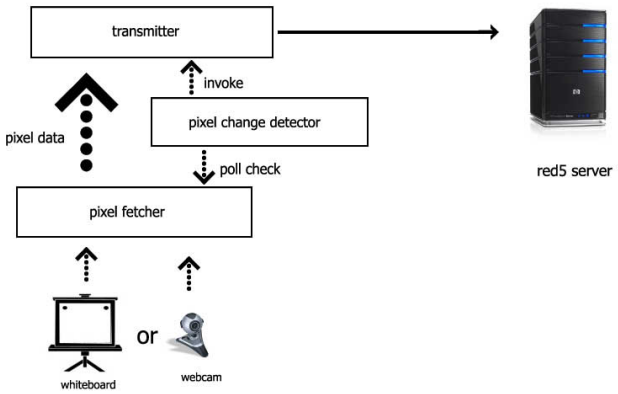

Figure 4.6: whiteboard transmitter

4.5 Sources for test data & analysis

The system is implemented by dividing into a number of independent modules. Therefore it's easier to implement as well as to test. System implementation is divided among the group members and unit test is done at the end of each implementation. After integrating each module to the system, an integration test will be done. This will help us to guarantee that the system compliances it's specified requirements by the customer. Alpha test will be done in order to guarantee the operational accuracy of the system and will be followed by a beta test to get the feedback of the customers.

4.6 Anticipated benefits

- The Smart class environment will provide the real atmosphere of a real classroom. Each and every essential requirement of a real world classroom is satisfied. Videos of each participant, Whiteboard, Slide viewer (similar to the projected slide screens in lecture hall), real time chatting, material sharing, integrated course web, Group discussions, and Exam center provide all in one package that has never been released before.

- DLES system is web based and it can be accessed from anywhere in the world. There is no additional software needed.
- The additional benefits that are not provided in a normal classroom is also provided. These are real time material sharing,
- Necessity to travel long distances to attend the classes is not required. Students can enroll, attend classes, learn and share and finally do the exams from their homes.
- The students who missed the lectures can obtain the videos of the missed sessions from the DLES website.
- Exam center is secured to avoid frauds during the exam. The user screen and videos are captured during the exam period.
- Lecturer has all the classroom privileges and he may assign security and control his class as he wants. This simulates a real world class teacher.
- DLES will use the minimum network bandwidth possible to avoid network traffic generated while accessing the DLES. Frame rate and the quality will be controlled.
- DLES can also be used for other business needs other than online classroom and exam center. It can be used for online web conferencing. Therefore DLES will be a multi-purpose system.

Chapter 5

Project plan

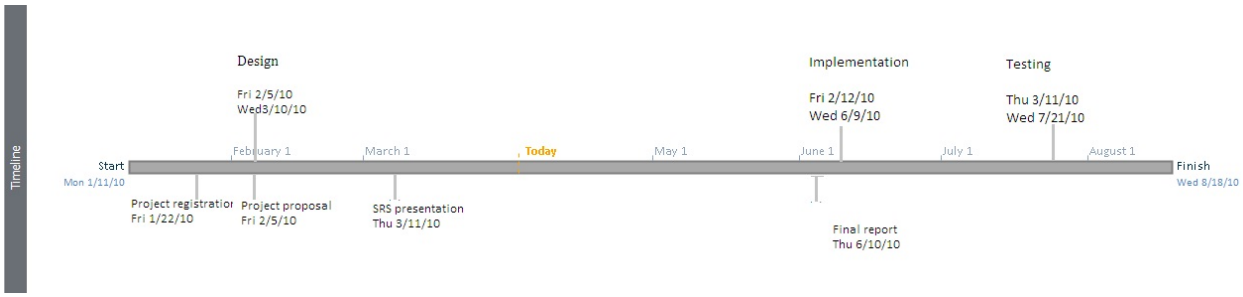

Figure 5.1: Timeline

Chapter 6

Research constraints

The speed of communication is one possible limitation. Working on a dial-up connection may adversely affect the sound quality of the voice applications. The setup allows for using "modem" connections, and even then records fairly well, but there may be additional sounds and background noises, which may make it difficult to hear. It is also important, whenever possible, to make sure students have access to headsets, so that any computer noises can be minimized on the recording.

Because any program that works with sound is a large system resource hog, there may be problems with interactions with other applications, especially when they are of the same type. It is advisable to test the application in the situation in which it is intended to be used to minimize the effect this will have on its use. Sometimes workarounds can be made to allow for the use of multiple applications, or (at least) give the ability to use one without the other.

Chapter 7

Specified deliverables

1. **Discussion and Interaction**
   (a) Break-Out Rooms
   (b) Emoticons
   (c) Public and Private Chat
   (d) Presenter On-The-Fly
2. **Instruction and Reinforcement**
   (a) Electronic Whiteboard
   (b) Application Sharing
   (c) Flexible Content Area
3. **Classroom Management**
   (a) Content Upload and Storage
   (b) Full-Featured Classroom Archiving
4. **Other features**
   (a) Secure examination system

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