Web Based Learning Management System for Information Technology Infrastructure Library (ITIL) Certification

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Web Based Learning Management System for Information Technology Infrastructure Library (ITIL) Certification

A dissertation submitted for the Degree of Master of Information Technology

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Abstract

Web based system for Information Technology Infrastructure Library is an implementation done to assist learners and teachers who involve in Information Technology Infrastructure Library certification. This system provides all necessary information to possess an honest understanding about Information Technology Infrastructure Library examination and its practical usage. Developed system will drastically reduce the necessity of browsing hours of lengthy tutorials, eBooks and unstructured self-studying. Since crowd sourcing methodologies is employed users can collaborate in additional interactive manner. For user, content is going to be available for free of charge and no payment required. Only requirements are going to be registering to the system.

As system be a web based one, it'll be available real-time from anywhere. For this venture system is developed embedded with crowd sourcing approaches. Users are going to be getting advantages of some quality output of study materials and trainings. The top components aren't limited to supply only educational content, but also system will provide user friendly interfaces that would effectively support for any kind of users. Web based system for Information Technology Infrastructure Library will provide a far better learning environment for Information Technology Infrastructure Library learners. Everyone involves can improve their learning in collaborative manner. Once it's done, they're going to be ready to see the progress visually though the system.

The system is developed using PHP (PHP Hypertext Processor) open source server-side scripting language. MySQL is used as the database tool for designing the database. Apache web server was chosen to run the system. Agile development methodology was identified as the best suited development methodology supported its flexible developing theory and related advantages as compared to other software methodologies consistent with existing software engineering theories and by studying the matter domain.

Declaration

The thesis is my original work and has not been submitted previously for a degree at this or any other university/institute.

To the best of my knowledge it does not contain any material published or written by another person, except as acknowledged in the text.

Student's name: G. K. Jayasekara
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Date:………………………………………………………………………….

This is to certify that this thesis is based on the work of
Mr./Ms. G.K. Jayasekara
under my supervision. The thesis has been prepared according to the format stipulated and is of acceptable standard.

Supervisor Name: Ms. M W A C R Wijesinghe
Signature:…………………………………………………………………….
Date:………………………………………………………………………….

Acknowledgement

I would happy to offer my deep sense of gratitude to the people that supported me directly and indirectly to form this dissertation to a reality.

It has been an honor to present this implementation thesis as a MIT student in University of Colombo School of Computing. My great honor goes to my University to giving me the chance to require place in master's degree in field of Information Technology.

I would wish to thank Ms. M W A C R Wijesinghe for giving me fullest support relative guidance for my dissertation as my supervisor and inspiring me to form this project a success, also to form my carrier rewarding and successful.

At last but not least I wish to thank all my friends for their support in many ways to form this research a reality and that I would also wish to thank all others that helped me to be in this position of thinking.

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List of Abbreviations

DB – Database

DFD – Data Flow Diagram

ER – Entity Relationship

FITIL – Free Web based system for ITIL candidates

ICT – Information and Communication Technology

IT – Information Technology

ITIL – Information Technology Infrastructure Library

ITSM – IT service management

LMS – learning Management System

MVC – Model-View-Controller

RUP – Rational Unified Process

UAT – User Acceptance Testing

UI – User Interface

Chapter 1. Introduction

1.1 Preface to the Project

Information and communication technology (ICT) standards often exist because a tech-guru has translated a vision into a technical statement. This technology is shared for others to reinforce it and ensuing standard then enables others to develop new products and markets.

If anyone ever questions the worth of standardization, they have look no further than the proliferation of internet-enabled "appliances". Almost everywhere phones and televisions became smart, computer screens function input devices by touch alone and networks deliver unlimited information.

While a kitchen gadget is made for one use (for example, a pineapple slicer and dicer), ICT continues to converge such, every gadget can provide information to consumers worldwide, and in a format and language that matches their individual needs. This always-on, always-relevant reach for information is merely possible with the interoperability that comes from ICT standardization.

One such best practice is ITIL (Information Technology Infrastructure Library) and in this try a Web Based Learning Management System for Information Technology Infrastructure Library (ITIL) Certification [16].

The Web based system for ITIL candidates is an online application. Using this, user will be able to study and teach ITIL, review the best content, collaboratively drive success through ITIL certification (Figure 1.1 e-Learning System interaction).

Figure 1.1 e-Learning System interaction

1.2 Motivation

In Pearson Lanka PLC, ITIL is a compulsory certification. To study this there's no central location to get study materials. Even you find one all the materials are not free. For this venture objective is to develop an eLearning tool for ITIL examination, embedded with crowdsourcing approaches (Figure 1.2 e-Learning System motivation).

From this build we will be able to provide a far better learning environment for ITIL learners. Also, to provide an opportunity for the general public to contribute their experience and knowledge. Most of the content available for this exam are not free and all material in proposed system will be free from charge. This will help to improve learning in collaborative manner.

Since system is web based students can learn independently in any time and place. E-Learning is self-paced and therefore the learning sessions are available all time. Plus, interaction with students become more appropriate when students are sharing their problems with teachers, since it's not face to face they fear less and may ask their problems freely.

Few more motivational points can be given as:

- Activity and ROI Measurements – If you are using a learning management system to deliver your eLearning, then tracking learner progress is a piece-of-cake, and reporting on this activity is just as simple.

- High Learning Retention – Blended learning approaches result in a higher knowledge retention rate. It also helps that coursework can be refreshed and updated whenever needed.

- Time and Money Savings – This one is pretty well known, and a staple of any well-done eLearning program. eLearning reduces time away from the workplace, eliminates the need for travel, and removes the need for classroom-based training.

- Capacity and Consistency – Using eLearning allows educators to achieve a great degree of coverage for their target audience, and it ensures that the message is communicated in a consistent fashion. This results in all learners receiving the same training.

- Up to date and immediate content – Learning Management Systems allow administrators instant access to update the content of courses, or to add materials and resources for students for immediate access.

- Multimedia learning – The systems allow businesses and educational institutions to create multimedia learning content which is comprehensive and practical, using video, images, audio and text which all serve as great tools in learning new skills or information.

- Reduced Costs – eLearning is cost effective as compared to traditional forms of learning. The reason for this price reduction is because learning through this mode happens quickly and easily. A lot of training time is reduced with respect to trainers, travel, course materials, and accommodation.

- Scalability – eLearning helps in creating and communicating new training, policies, concepts, and ideas. Whether it is for formal education or entertainment, eLearning is very quick way of learning.

Figure 1.2 e-Learning System motivation

1.3 Aims and Objectives

The objective of this system is to provide a cost effective, user friendly and complete learning management system for ITIL certification users. Objectives are described in detail as follows:

To provide a cost effective learning management system for ITIL certification users

- Since the users do not have to pay for the content available in the system the cost of learning is comparatively low. Most of the study material currently available for this certification need to be purchased and all materials in proposed system will be free of charge.

To provide a complete learning environment for ITIL learners:

- Since comment function and rating function exists while system depends on crowdsourcing for materials, users will have more outreached ideas about information. Users can rate the most valuable materials per their liking. Up to date content will be available.

To provide an opportunity for general public to contribute with their experience and knowledge:

- As mentioned earlier users or resource providers for this system will be public who are interested in ITIL certification. So the actual user will be discussing most suitable study content for them and share knowledge on ITIL exam or their experience. They can improve knowledge in collaborative manner.

To provide a platform to share knowledge on ITIL exam:

- Interactions among students will be more resourceful. When students are sharing their problems with teachers, since it's not face to face, they fear less and can ask their problems freely.

1.4 Scope

Web based system for Information Technology Infrastructure Library is an implementation done to assist scholars and teachers who involve in ITIL certification. This system gives all necessary details to possess an honest understanding about Information Technology Infrastructure Library exam and its practical usage.

Developed system will drastically decrease the necessity of browsing hours of lengthy tutorials, eBooks and unstructured self-studying. Since crowdsourcing methodologies are used users can collaborate in more interactive manner. For user, uploaded content will be available for free of charge and no payment required. Only requirement will be registering to the system.

Most of the existing systems expect a fee for content. Respective material/content will be uploaded by content managers and content coordinators later discussed in this proposal. In proposed system, users will be able to search, view, comment rate, upload content. System administrators will be able see most viewed/commented material, frequent visitors, and highly active users. Also be able to provide answers to common questions, guide on study plans.

Proposed system will drastically decrease the need of going through hours of lengthy tutorials, eBooks and unstructured self-studying. Since crowdsourcing methodologies are used users can collaborate in a more interactive manner.

While there will be a content owner for the course users can contribute with their ideas, study materials with others (like a virtual class room) and will require content owner's approval first. Since user contribution is highly encouraged, several kinds of study materials/references are going to be available to a good range of end users in one place.

For user's content will be available for free without any payment. Only requirement will be registering to the system. As systems going to be a web based, up to date content will be available and real-time from anywhere.

System will contain:

Three types of users – Learners, ITIL coordinators and Content Managers

- Learners will have
  - Free of charge registration mechanism
  - Material search mechanism
  - Material viewing mechanism (PDF, videos, tutorials, dumps, questionnaires Etc.)
  - FAQ viewing mechanism
  - Comment facility
  - Content rating mechanism

- ITIL coordinators will have all above functions for learner, furthermore:
  - On registration user must provide proof whether he/she already a teacher/instructor
  - Reports on most viewed content, questions and visited users
  - Content uploading mechanism

- Content Managers will have all above functions for learner and ITIL coordinator, also:
  - Content reviewing mechanism: Commenting/Suggestions on uploaded materials
  - Content approving mechanism
  - Registered user approving mechanism: ITIL coordinators and other Content managers
  - Adding lessons and categorizing lessons facility: Materials can be categorized under lessons
  - Function for adding FAQ
  - This user level can be used as a super admin for the system as well.

1.5 Outline of Thesis

Chapter 2. Background

An analysis of the requirements will be provided in this chapter. A review of similar systems, a comparison of alternative design strategies will be discussed.

Chapter 3. Methodology

The design of the system will be given in this chapter. Implementation environment (hardware/software), any tools, any existing software that were used will be mentioned. Also will identify and explain all major code and module structures.

Chapter 4. Evaluation

Chapter will provide a critical evaluation of the system. It will discuss whether the project objectives were satisfied and if not, the reasons for them. Lessons learnt during the course of the project will also be expanded upon if applicable.

Chapter 5. Conclusion

This chapter will conclude the work indicating a summary of the results of the project. It will also identify any deficiencies in the final product (if applicable) and highlight how improvements could be made through future work.

References

All references cited in the dissertation will appear in the reference list, and all references in the reference list will appear as citations. The referencing should be done in the IEEE format

Appendices

Detailed information or data which may increase the usefulness of the dissertation for examiners and subsequent readers, but which are too detailed for inclusion in the main body of the dissertation may be included as appendices.

Chapter 2. Background

During this review author will be carrying out analysis for a proper system for ITIL training and also review of other related systems available. Previous research or existing systems also will be discussed in this section. This analysis aims to review the critical points of current knowledge on a specific topic. Therefore, the aim of the background chapter is to seek, read and analyse the literature or any works or studies associated to this system. It is important to well understand about all information to be considered and related before develop this system. For this project, some research has been done to understand about existing system that associates with this development. Once above discussed facts are correctly identified, the developing stage would not be that confused or conflicts.

2.1 Analysis of the Requirement

ITIL is such a commonly used word in the kingdom of ITSM that it is easy to assume it to be a global phenomenon. After all the official ITIL exam website [14] cites ITIL as the most widely accepted approach to IT service management in the world.

By adopting the ITIL framework, companies make sure that their services are delivered according to a set of consistent, well-defined processes that incorporate best practices and processes, resulting in a predictable level of service for users. The advantages of ITIL include reduced cost of service development and deployment, improved customer satisfaction with service delivery, increased productivity from IT personnel, quality improvements, better management metrics of services and increased flexibility in adapting services to changing business requirements [16] (Figure 2.1 ITIL Certificates in past years).
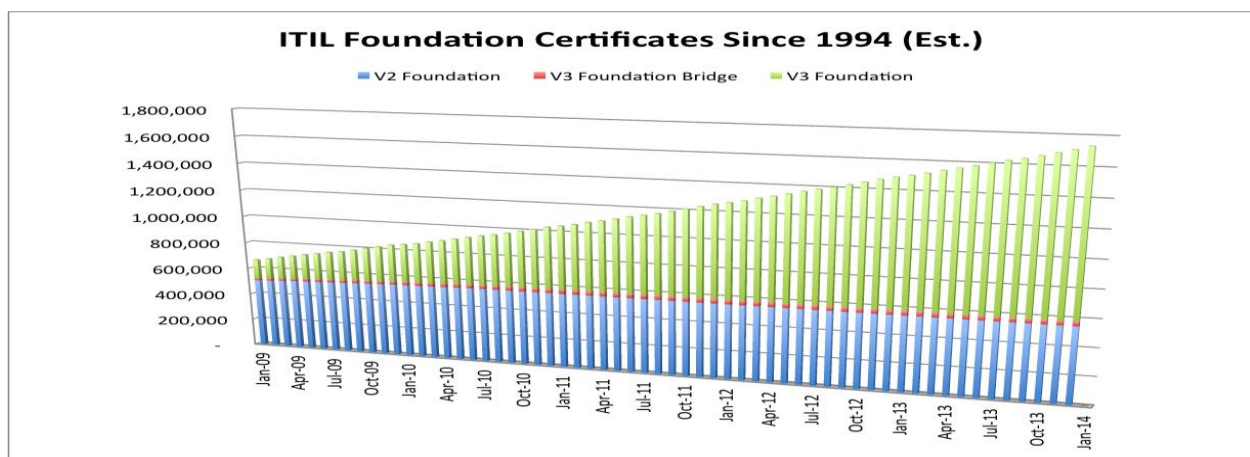

Figure 2.1 ITIL Certificates in past years

How does ITIL certification work?

ITIL certification is split into five stages, namely foundation, practitioner, intermediate, expert and master levels. Each of these levels has different requirements for appearing, clearing and is awarded a specific set of credits. As an example, one needs to have a total of 22 credits to be certified as an expert. Apart from these, there are complementary certifications that help you reach the expert level faster. Here's a summary of the various levels and credits [16] (Figure 2.2 ITIL Certificate levels).

Level	Credits
Foundation	2
Practitioner	3
Intermediate	15/16
Managing across lifecycles	5 credits
Complementary certifications	6
Expert	A minimum of 22 credits to appear for expert
Master	NA

Figure 2.2 ITIL Certificate levels

All of those exams are online exams and study materials also available online. However none of them are free. Hence the proposal for "Web based system for ITIL candidates" came in.

Sample Use Case diagram for an existing eLearning System

Below given a sample Use Case diagram of an existing LMS system.
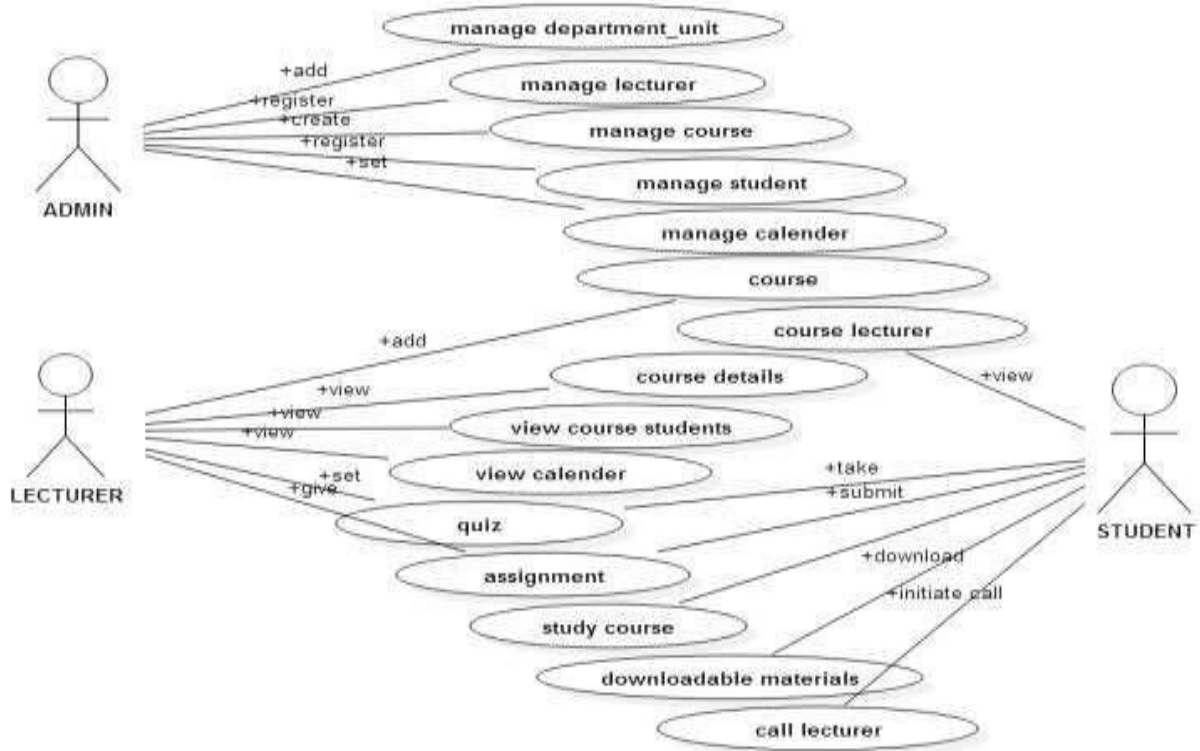

Figure 2.3 Use Case for Existing LMS

Proposed system will drastically decrease the need of going through hours of lengthy tutorials, eBooks and unstructured self-studying. Since crowdsourcing methodologies are used users can collaborate in a more interactive manner.

While there will be a content owner for the course users can contribute with their ideas, study materials with others (like a virtual class room) and will require content owner's approval first. Since user contribution is highly encouraged, several types of study materials/references will be available to a wide range of end users in one place.

For user's content will be available for free and no payment required. Only requirement will be registering to the system. As systems going to be a web based one, it will be available real-time from anywhere.

In a nutshell, the target audience/users of this project are the people who work with internet like students, IT professionals, executive grade staff and other all who would be able to work with internet.

Every user has to register to system before using it. For learners/student it's a basic registration page with username and password. For ITIL coordinators and Content managers they have to upload a letter of proof when registering and already registered Content managers will have to approve their registration in order to login.

After registering students can search for content, can view content, can comment on content, can rate content, can view and search lessons, can view FAQs, can view and update their profiles.

After registering ITIL coordinators can perform same task as students above plus they can upload materials, these materials will be published after approved by Content managers. Also they can view reports, view total uploaded materials by him/her with pending ones.

After registering Content managers can perform same tasks as students and ITIL coordinators plus approve materials, add FAQ, approve new users, delete materials and add new lessons. Content managers are user group with highest privileges.

2.1.1 Functional Requirements

"In software engineering, a functional requirement defines a function of a software system or its component. A function is described as a set of inputs, the behavior, and outputs."

The success of this system is not only dependent on the functional requirements; it is also based on the non-functional requirements. It acts as the main role for the success of the system. Following are the major functional requirements which were identified at this stage.

Every user has to register to system before using it. For learners/student it's a basic registration page with username and password. For ITIL coordinators and Content managers they have to upload a letter of proof when registering and already registered Content managers will have to approve their registration in order to login.

After registering users can search for content, can view content, can comment on content, can rate content, can view and search lessons, can view FAQs, can view and update their profiles.

Learners – Can view materials, comment, rate content, and search function
Content managers – Can upload content, add FAQ, approve users, and approve materials
ITIL Coordinators – Can upload content upon approval of Content managers

User registration –
Allow users (student, ITIL coordinators and content managers) to register to system

Content/material uploading –
Coordinators and content managers should be able to upload content

Search function –
User should be able to search content

Comment function –
Users should be able to comment on content

Rating function –
Users should be able to rate content

Content approving function –
Content managers should be able to approve uploaded content

Content delete function –
Content managers should be able to delete inappropriate content

User approve function –
Content managers should be able to approve registration of ITIL coordinators

Add FAQ function –
Content managers should be able to add FAQ

Add lesson function –
Content managers and ITIL coordinators should be able to add lessons

View reports function –
Content managers and ITIL coordinators should be able to view reports

Edit profile function –
User should be able to edit their profiles

2.1.2 Non Functional Requirements

Appearance and Interactive – The website should be more attractive and interactive. Appearance of the site should be beautiful and the visitors should not feel bored to visit the site.

Availability/Reliability/Security – Website should be operated on 24*7. It should available to everyone. Reliability of the website should be very high. There should not be any crashes in the system and should available for anyone when in need.

User-friendly – Anyone should be able to easily understand the system and use it without any problem. Anyone should be able to get relevant information easily.

Effective/Efficient – The details generated from the system should be accurate.

2.2 A Review of Similar Systems

Studied the available famous ITIL learning systems to gain idea about ITIL learning portals. Also learnt about the problems in such systems and how the required functionalities should be presented to avoid those problems. Following are several similar systems that were reviewed to get the idea to build the new system.

AXELOS [21]

Figure 2.4 AXELOS ITIL landing page

This is the official web site for ITIL® Certifications. Site doesn't contain many study resources. Lacking student teacher interaction.

Learning tree [22]

Figure 2.5 Learning tree landing page

This site contains blogs and tutorials, however need to pay to access them.

Purple Griffon [23]

Figure 2.6 Purple Griffon landing page

This site contains video tutorials, PDFs, dumps, however need to pay to access them.

Good e-Learning [24]

Figure 2.7 Good e-Learning landing page

This site contains slides, however need to pay to access them. No student teacher interaction.

SPOCE [25]

Figure 2.8 SPOCE landing page

This site contains video tutorials, PDFs, dumps, trainer assistance however need to pay to access them.

The above mentioned facts are subjected to develop some good commercial applications. As described before most of these systems are not free for users. Users have to pay some amount of money for each and every feature they are going to activate. As per the latest review of these applications the graphical overview can be displayed as below. This is an official review of LMS and they have concerned several facts while doing review [26].

LMS vendor/ Feature	moodle	Sakai	canvas	edX	Blackboard
Ease of installation and maintenance	★	★★	★★	★★	★★★
Content creation/ management simplicity	★★★	★★	★★★	★★★	★★
Design & branding flexibility	★	★	★★	★★★	★
Social & collaboration functionality	★★★	★★	★★	★★	★★
Mobile access/ mobile app	★★★	★	★★★	★★	★★
Payments & Ecommerce functionality	★★	★★	★★★	★★★	★★
Student management & statistics	★★★	★★★	★★	★★	★★★
Gamification/tokens/ badges/incentives	★★	★	★★	★★	★
Grading functionality	★	★★	★★★	★★	★★★

Figure 2.9 LMS comparison

There are many options and features provided from above systems and some of them are functioning as they expected. Above review [25] is drastically helpful when developing this project because most of these options could be applied to our system too (Figure 2.9 LMS comparison).

By comparing the outputs of the above finding, this project also could be developed to a commercial level in future work. It is suggested to keep Web based system for ITIL as a free tool for the users, but some advertisements can be published from some vendor's as well.

2.3 A Comparison of Alternative Design Strategies

Different competing design strategies were consider for developing the system. Since author is not having much experience with SW development, it was decide to develop system from scratch.

Strategy Component	Developing from scratch	Using open-source components	Using proprietary SW
Hardware	Stand-alone personal computer	Stand-alone personal computer	Client-server environment
Choice of system software	Windows/Linux	Windows/Linux	Windows/Linux
Cost	Low/Medium	Low/Medium	High

Table 2.1 Comparison of Alternative Design Strategies

The system was developed using PHP (PHP Hypertext Processor) open source server-side scripting language. MySQL was used as the database tool for designing the database. Apache web server was chosen to run the system. Agile development methodology was identified as the most suitable development methodology based on its flexible developing theory and related advantages in comparison to other software methodologies according to the present software engineering theories and by studying the problem domain (Table 2.1 Comparison of Alternative Design Strategies).

Chapter 3. Methodology

This chapter illustrates the design of the proposed system and describes methodologies and techniques which have been used to develop the system. Considering the complexity of the system, a series of activities were followed to carryout work. Therefore, to implement this system in more attractive and efficiently, several tools and technologies were used. The details of the implementation environment, hardware infrastructure, development strategies, tools used, database and application development architecture are described in this chapter.

3.1 Requirement Gathering and Analysis

Requirement analysis also called requirement engineering is the process of determining user expectations for a new or modified product. These features called requirements must be quantifiable relevant and detailed.

Requirement gathering techniques used to collect requirements, how the current system process is going on, drawbacks of the present system, functional and non- functional requirements of the proposed system.

Agile development methodology was identified as the most suitable development methodology based on its flexible developing theory and related advantages in comparison to other software methodologies according to the present software engineering theories and by studying the problem domain.

Fact Finding Methods

Following methods were followed to gather information related to system.

- Questionnaires – A collection of questions that helps to identify the functional and non-functional requirements of the system has been given to a set of users.

- Interviews – By interviewing learners, it will help to have a good idea about the current systems. Also it will help to find the special features that can be added to the system in future.

- Gather data from e-books, Internet – This will help to have a good understanding about the nutrients each food has, what is good and what is bad.

- Prototyping – By a prototype of the system, functional and non-functional requirements of the system can be understand properly.

3.2 Design Overview

Learners, ITIL coordinators and Content managers are the main system users of this system. In here the use case diagrams along with the use case descriptions, activity diagrams for each user activities and the sequence diagram for the proposed system are included.

3.2.1 Use Case Diagrams

Use Case for User Registration: In here it shows how the user interacts when registering to the system. User has to enter required info (name, email, passwords) and go forward.
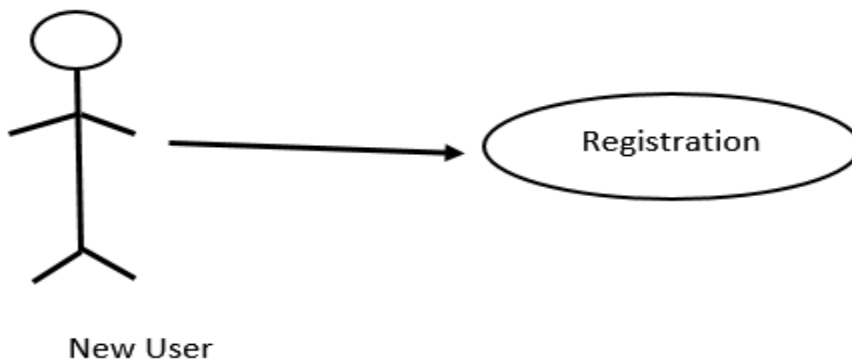
Figure 3.1 Use Case for User Registration

Use Case Narrative For User Registration

Use Case Number	01
Use Case Name	User Registration
Assumption	N/A
Pre-Conditions	N/A
Trigger Event	This use case starts when user select register option
Main Flow of Events	1: Use case provide list of information to be provided 2: Actors provide details in given interface 3: Actors click register button 4: User gets registered
Exception Flow of Events	N/A
Post-Conditions	1: User gets registered

Table 3.1 Use Case Narrative For User Registration

Use Case for Student/Learner: Here it shows what action can be performed by a student.
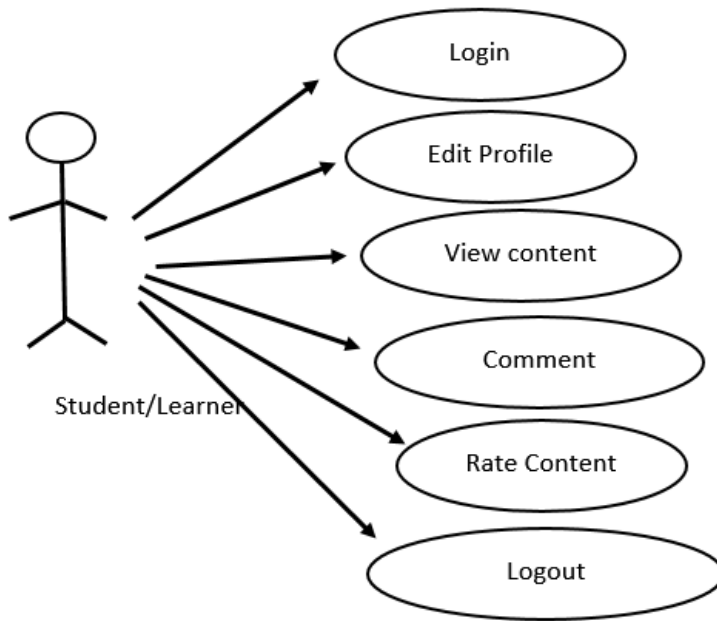
Figure 3.2 Use Case for Student Navigation

Use Case Narrative For Learner Home Page Access

Use Case Number	02
Use Case Name	Learner Home Page Access
Assumption	N/A
Pre-Conditions	1: User have already registered
Trigger Event	This use case starts when user select login option
Main Flow of Events	1: User insert login information and click login button 2: Users directed to home screen 3: Users able to view options available
Exception Flow of Events	N/A
Post-Conditions	1: User access content

Table 3.2 Use Case Narrative For Learner Home Page Access

Use Case for ITIL Coordinator: Here it shows what functions are available for Coordinator.
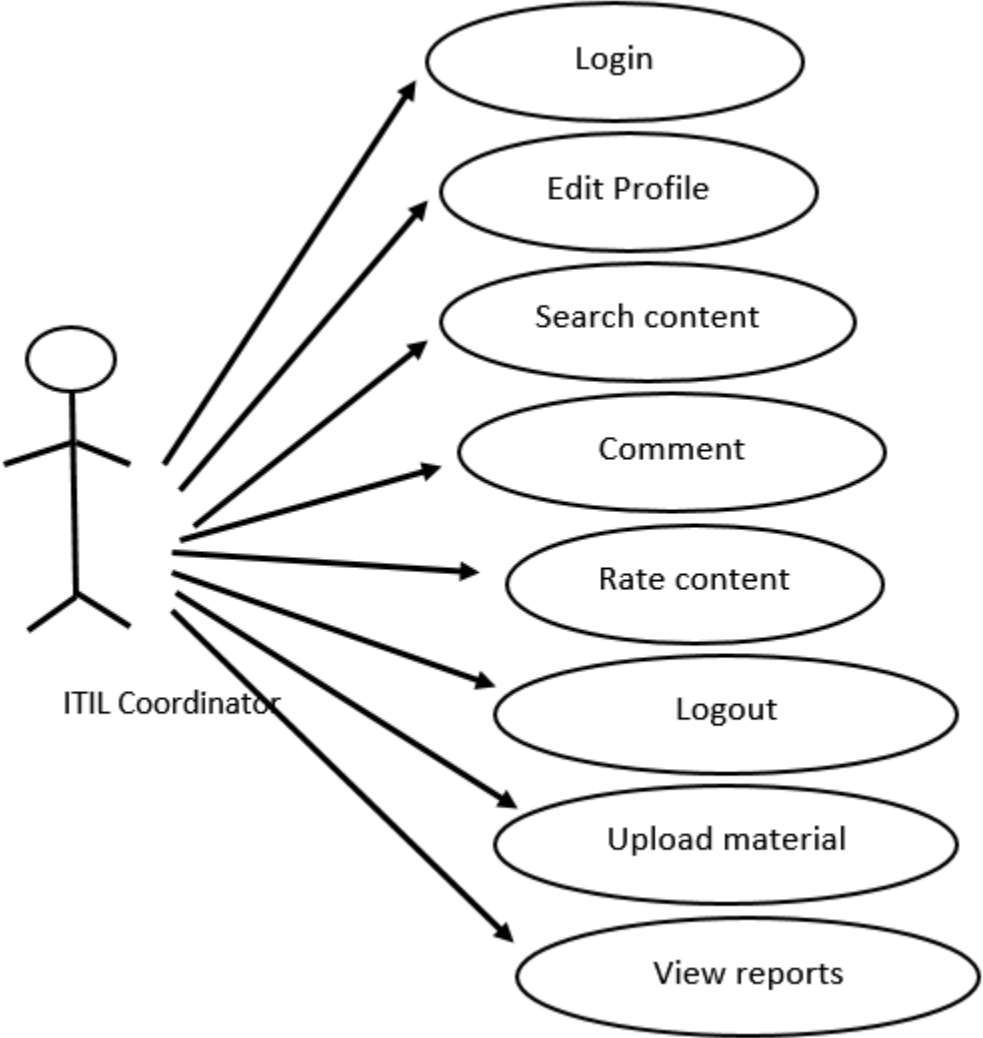
Figure 3.3 Use Case for ITIL Coordinator

Use Case for Content Manager: Here it shows what functions are available for Content Manager.
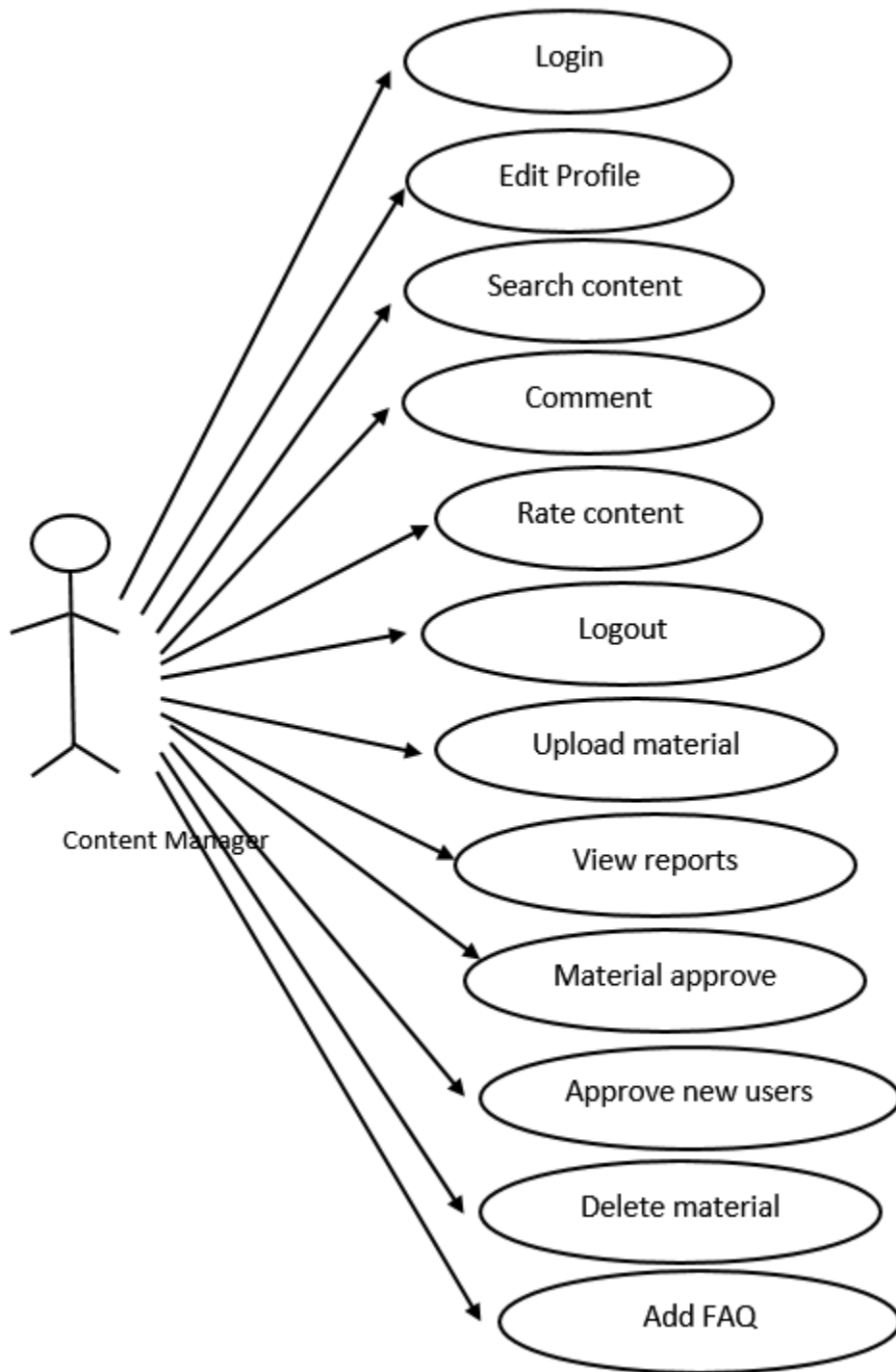
Figure 3.4 Use Case for Content Manager

3.2.2 Activity Diagrams

Activity Diagram for User Registration
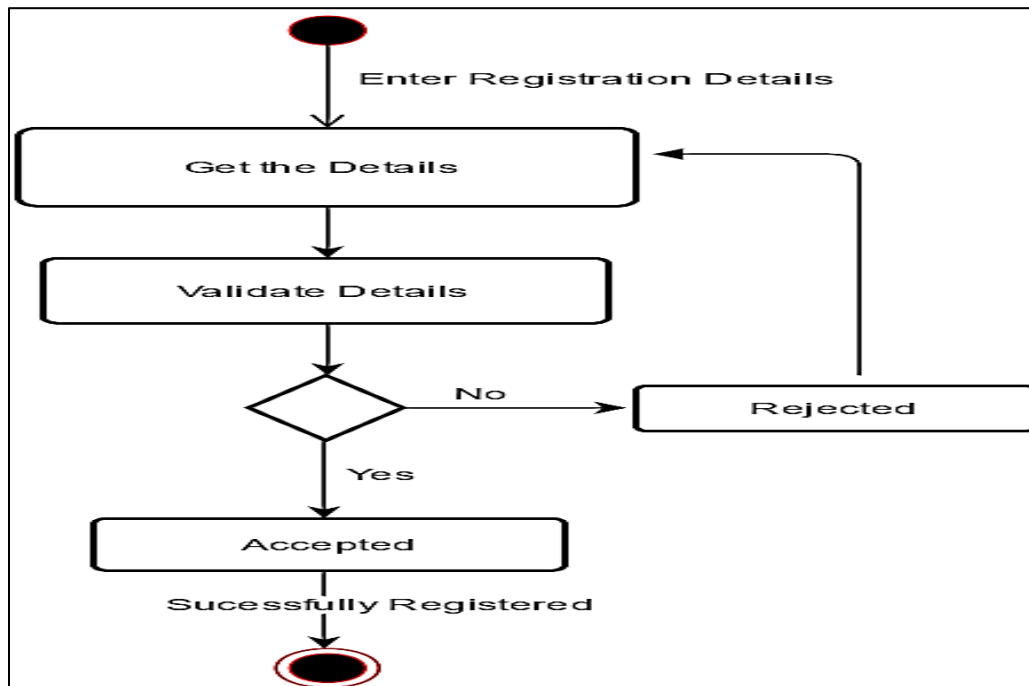
Figure 3.5 Activity Diagram for User Registration

Activity Diagram for User Login
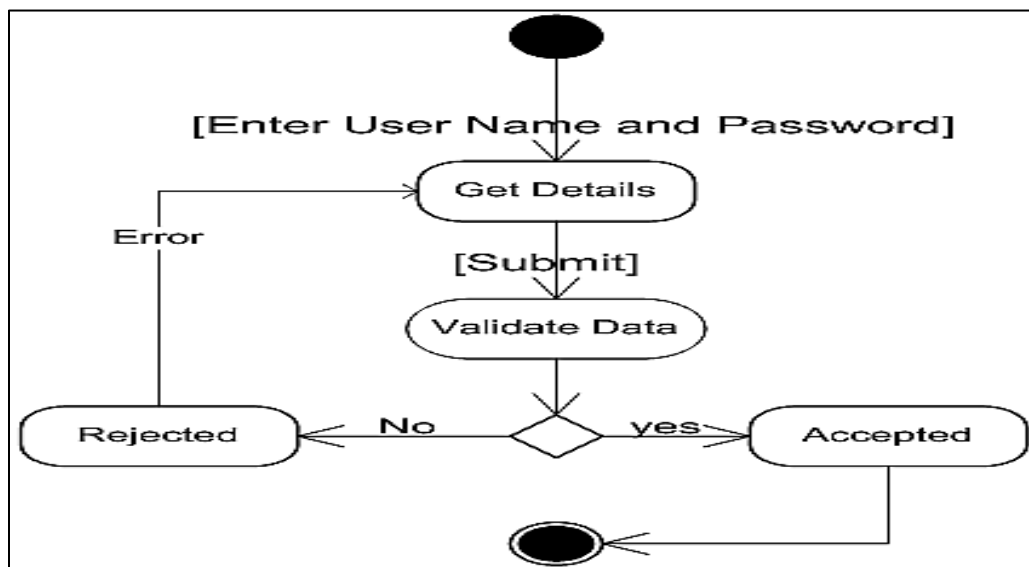
Figure 3.6 Activity Diagram for User Login

Activity Diagram for Admin login and Activities
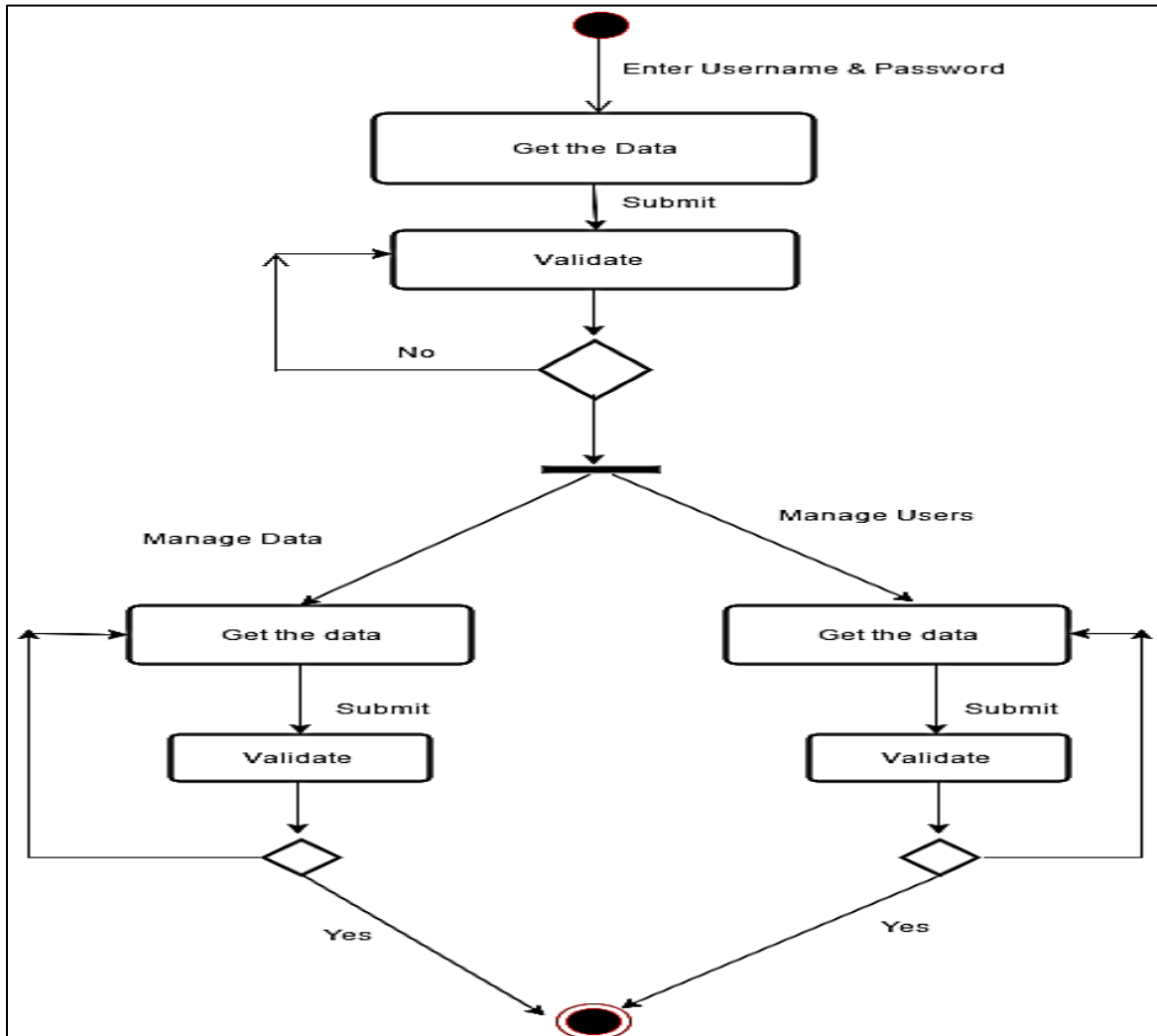
Figure 3.7 Activity Diagram for Admin login and Activities

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3.2.3 Structure/Workflow

Workflow of material Approve/Reject
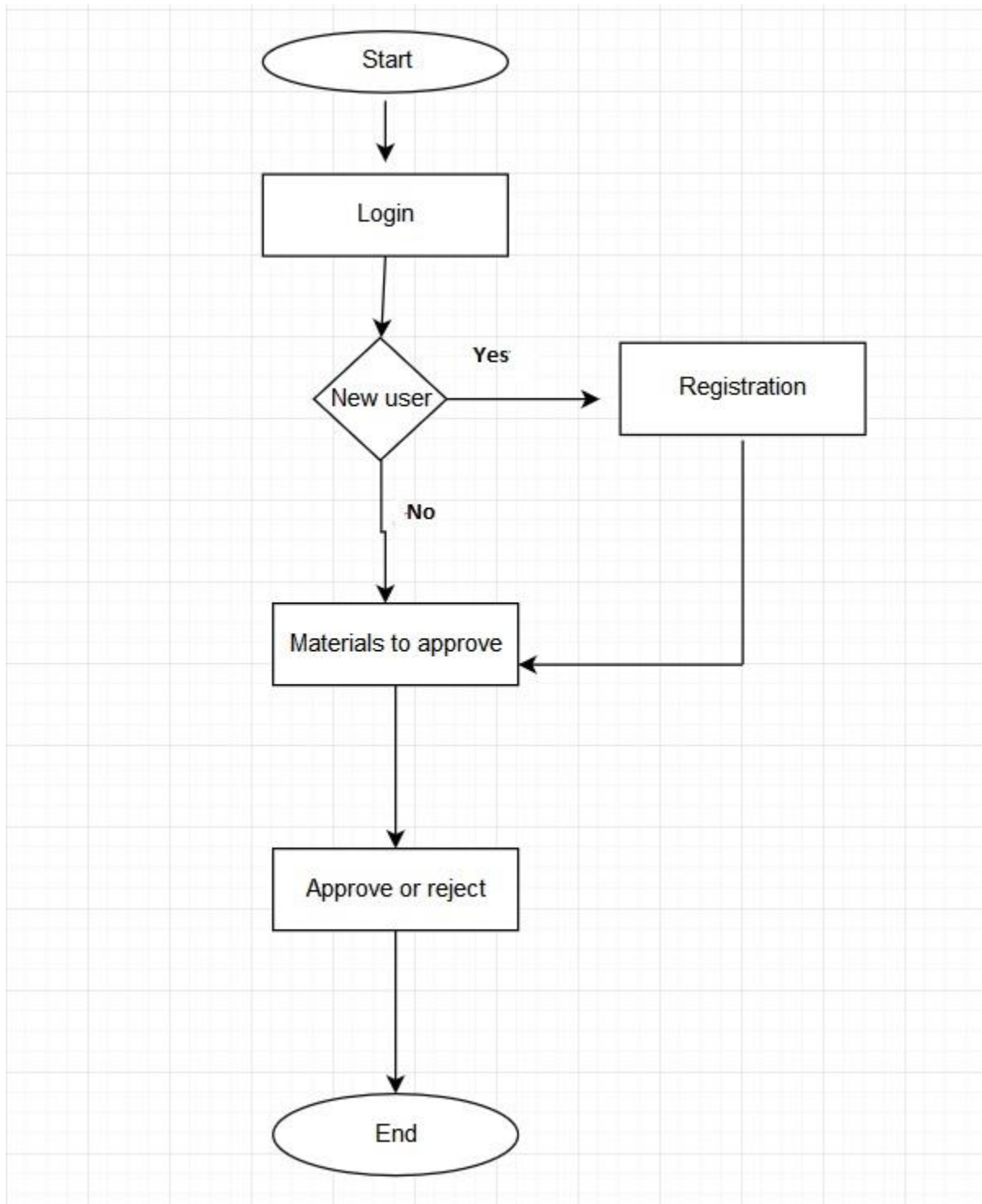
Figure 3.8 Workflow of material Approve/Reject

Workflow of new user Approve/Reject
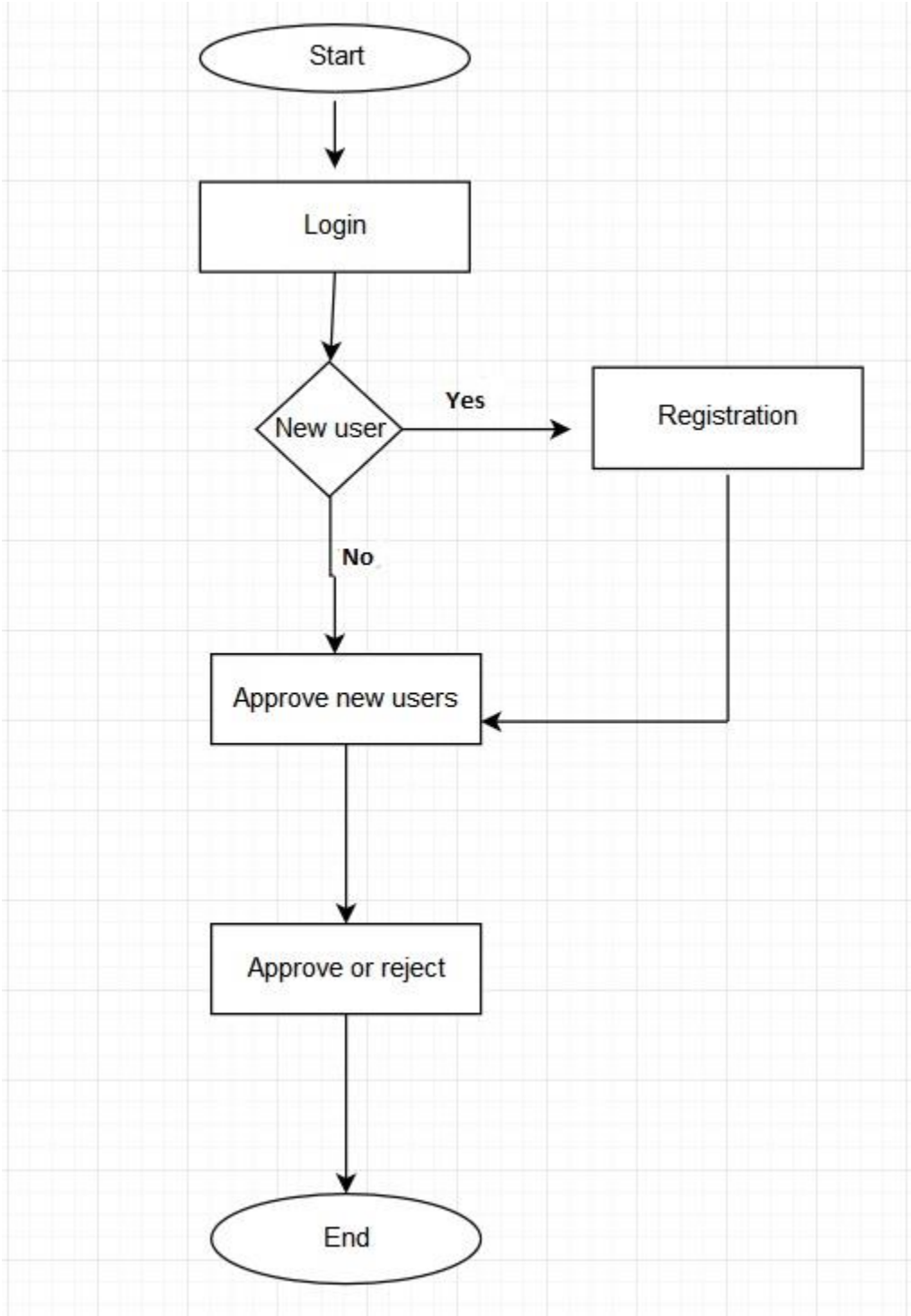
Figure 3.9 Workflow of new user Approve/Reject

Workflow of Content Upload
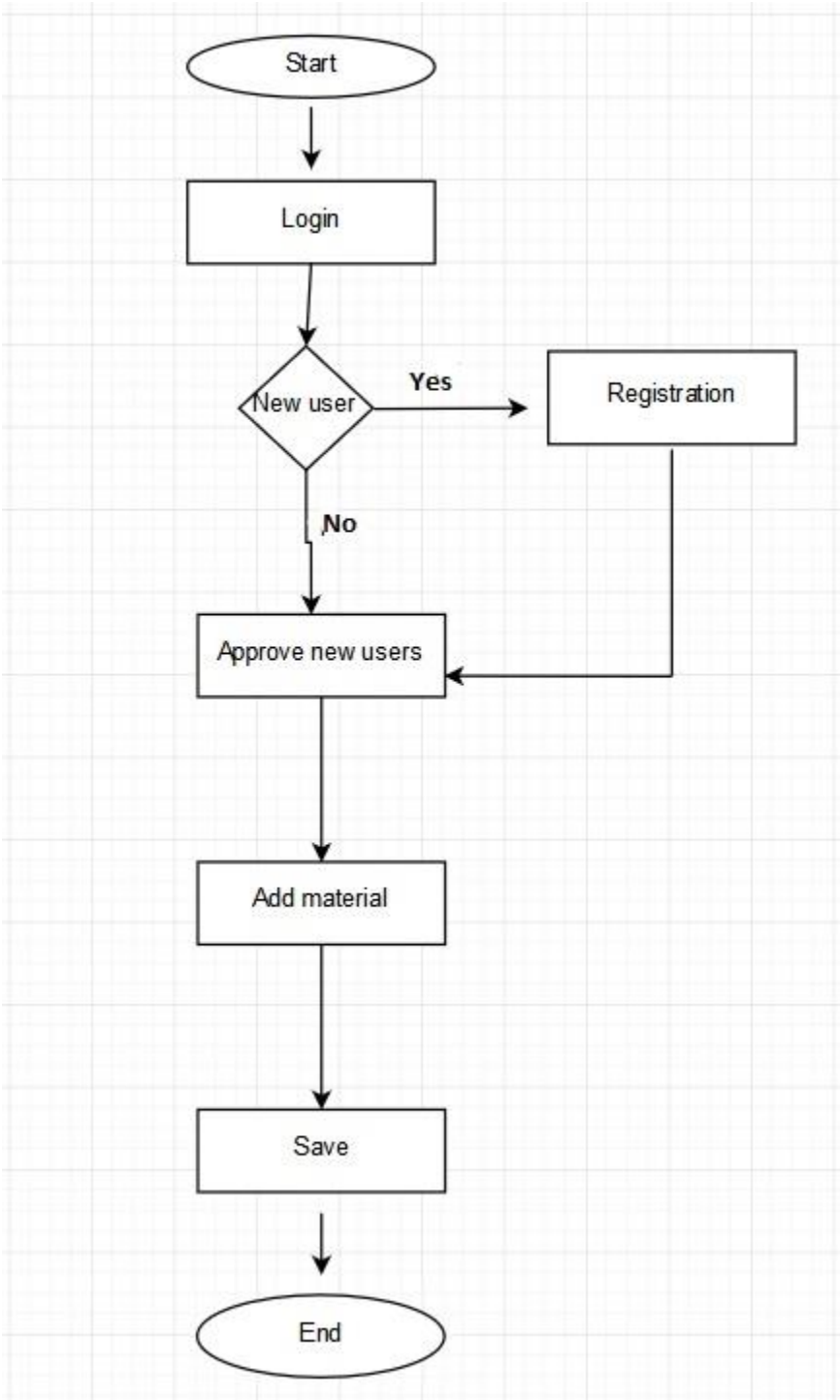
Figure 3.10 Workflow of Content Upload

3.2.4 Database Table Structures

DB Table List

Figure 3.11 DB Table List

DB Design for System
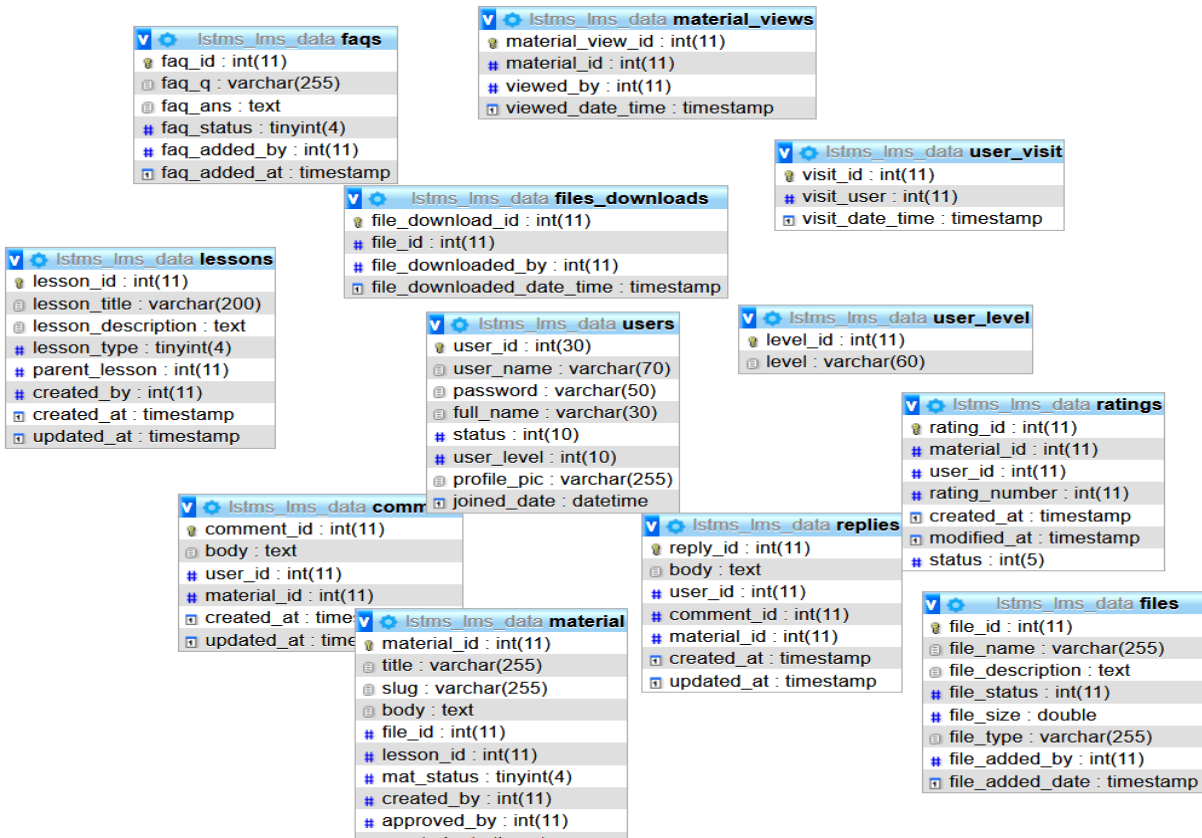
Figure 3.12 DB Design for System

3.2.5 Sample Entity Relationship diagram for an existing eLearning System

Below given a sample ER diagram of an existing LMS system.
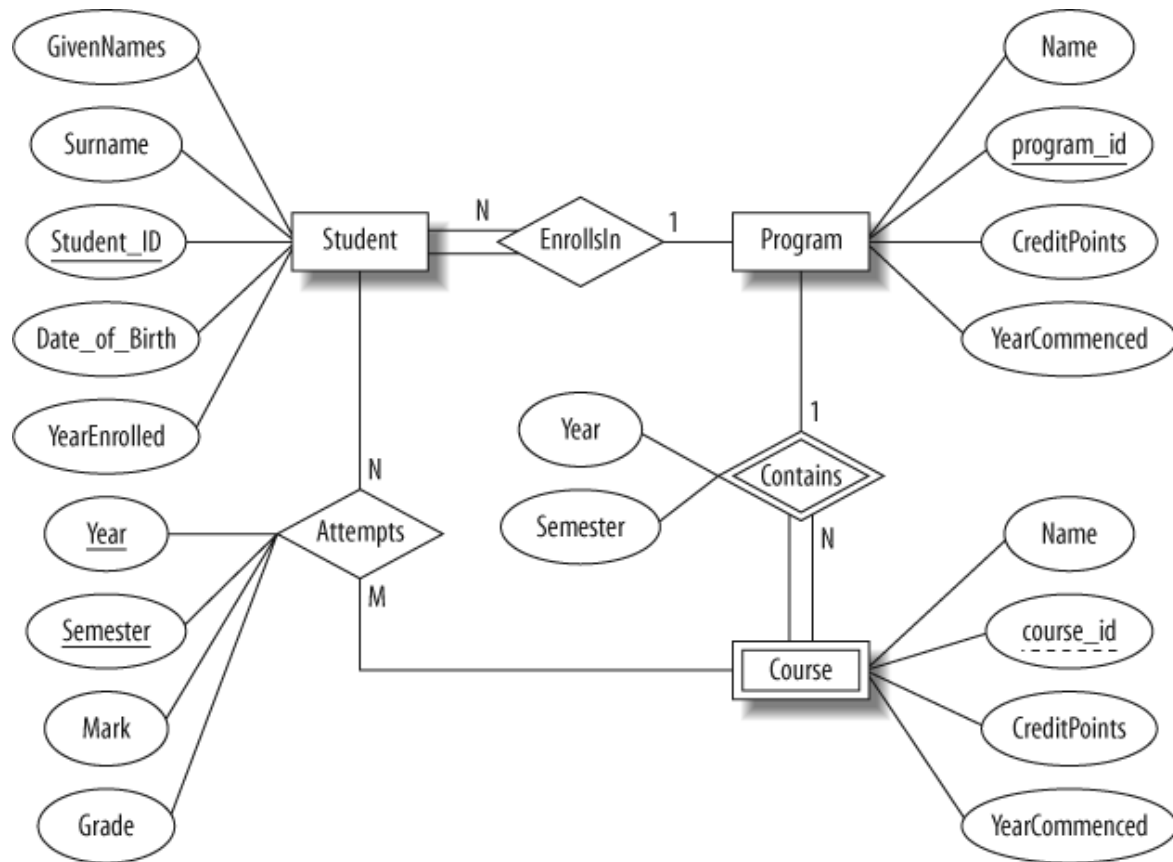
Figure 3.13 ER diagram of Existing LMS

3.2.6 Sequence Diagrams

Sequence diagram of adding new study material to the system
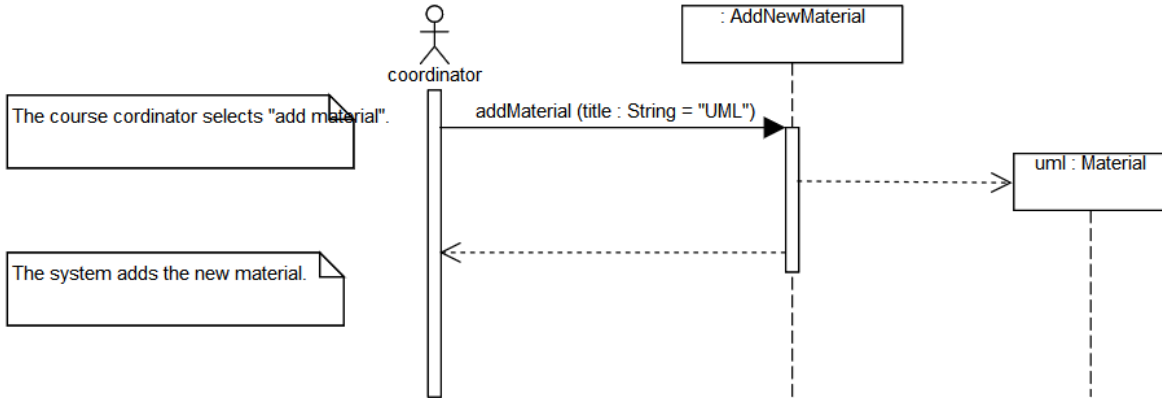
Figure 3.14 Sequence diagram of adding material

Sequence diagram of new user registration to the system
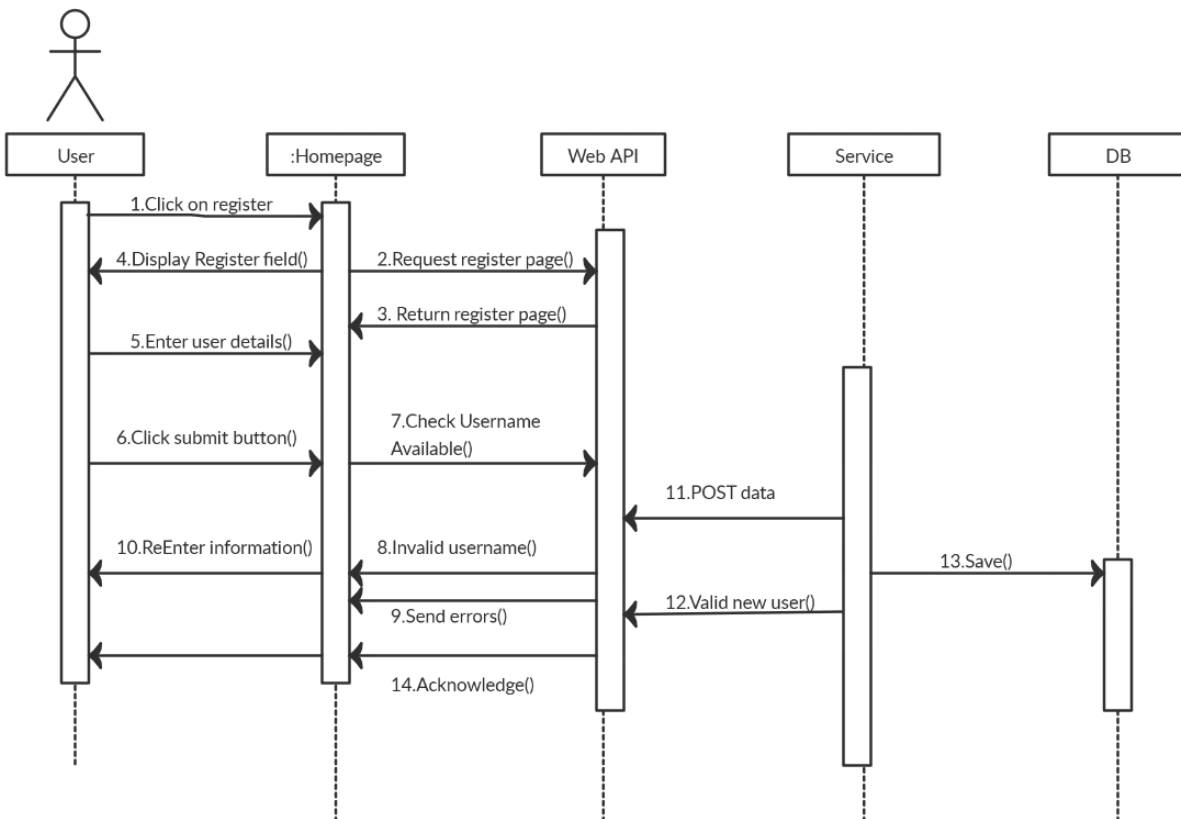
Figure 3.15 Sequence diagram of user registration

Sequence diagram of user login to the system
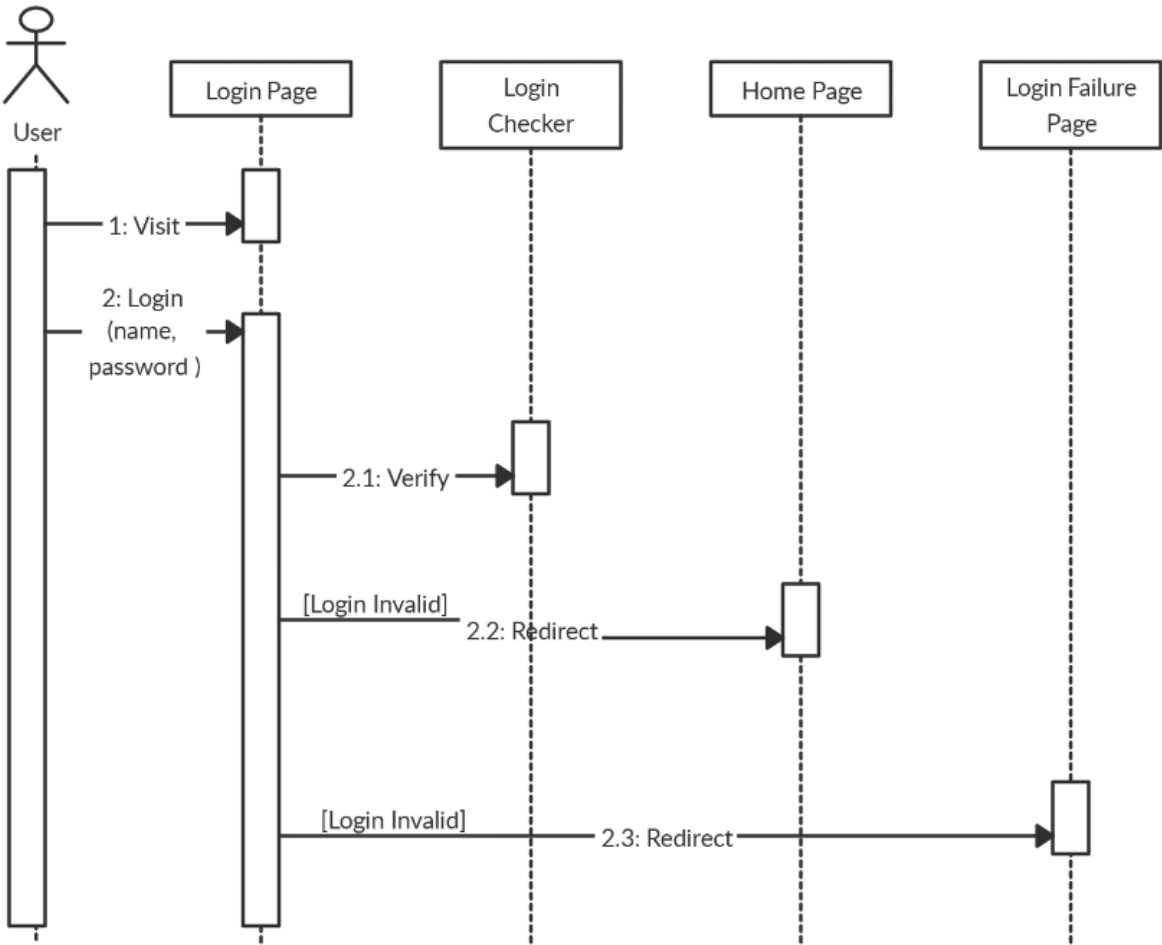
Figure 3.16 Sequence diagram of user login

Sequence diagram of user search study material in the system
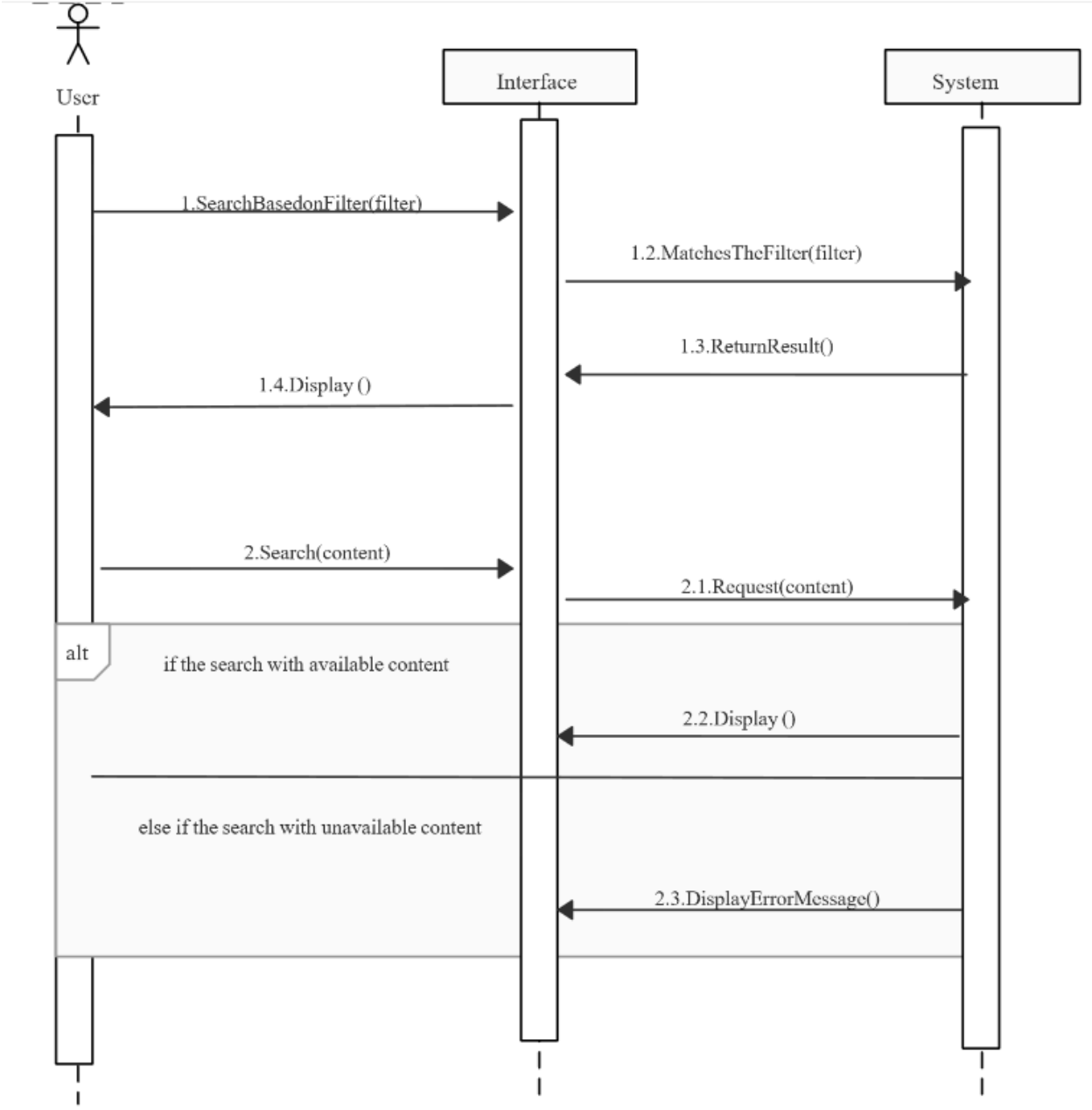
Figure 3.17 Sequence diagram of user search material

3.3 User Interface Design

Among all the major components of the system, a major role of the system is played by user interfaces. Interactivity in between system and the user is managed by the interface. User friendliness, integrated colour combination and the well-organized components are dependent on it.

Without having a user-friendly interface, interaction with the system becomes hard. Privileges must be set to content managers, ITIL coordinators and learners in different ways. Management of those privileges and presenting them effectively to users are helped by the interfaces.

3.3.1 User Login Interface

The system login page which belongs to the developed system is displayed by Figure 3.18 User Login Interface. In any computerized system the first interface encountered by the user is the login page. Therefore, by designing and handling errors properly and pleasant feeling about the rest of the system can be created within the user.
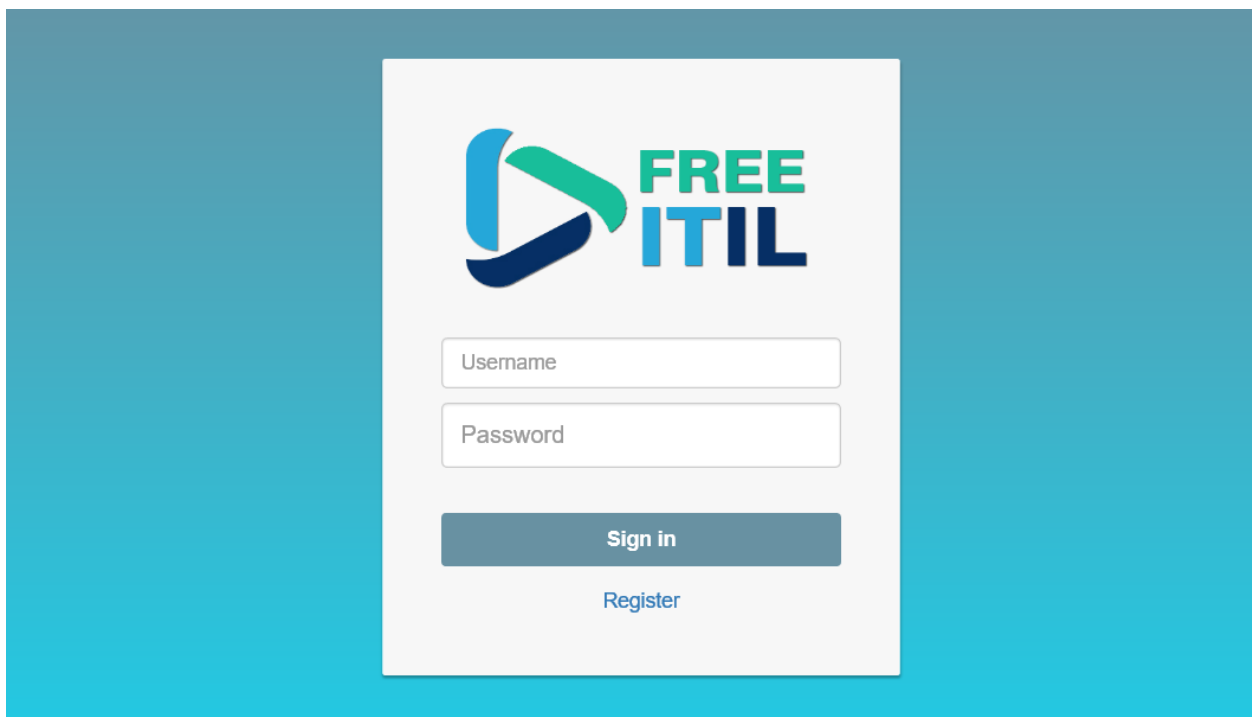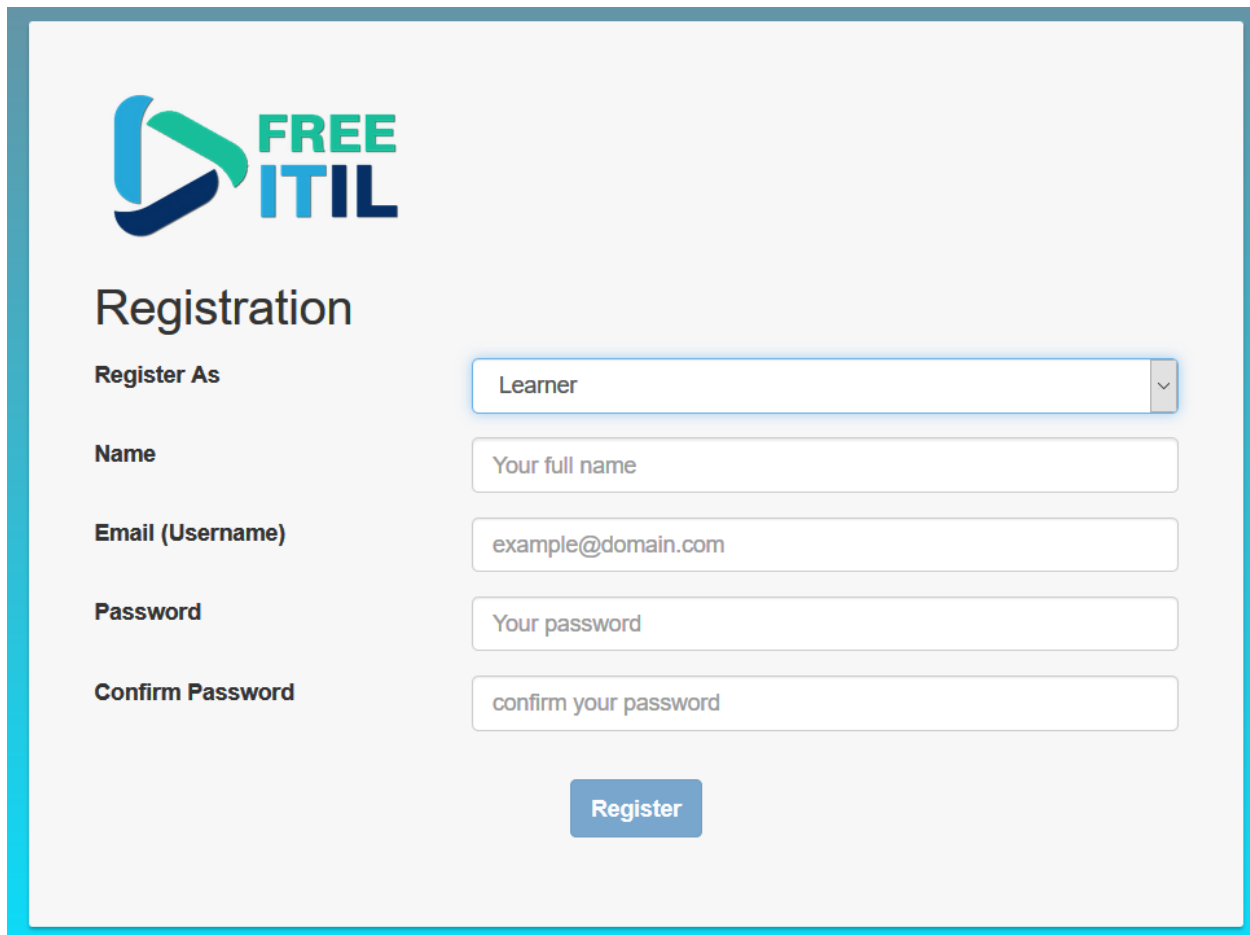
Figure 3.18 User Login Interface

3.3.2 User Registration Interface

The user needs to register to the system before login. Only the registered users can use the system. User registration interface for students shown in Figure 3.19 User Registration Interface for Learner/Student and for Content manager and ITIL coordinator in Figure 3.20 User Registration Interface for Content manager and ITIL coordinator. Different with these two is. Content manager and ITIL coordinator have to attach a letter if proof when registering and later by a Content manager will approve the registration.

Figure 3.19 User Registration Interface for Learner/Student

Figure 3.20 User Registration Interface for Content manager and ITIL coordinator

3.3.3 Home Page

After login in following three interfaces will be shown as home pages for each of the three user types. Figure 3.21 Home Page for Students, Figure 3.22 Home Page for ITIL coordinator and Figure 3.23 Home Page for Content manager. Depending the privilege levels for each user type different functions will be available.

Figure 3.21 Home Page for Students

Figure 3.22 Home Page for ITIL coordinator

Figure 3.23 Home Page for Content manager

3.3.4 User Profile Interfaces

Below given the page for user profile editing. Depending the privilege levels for each user type different information will be available. For Learners Figure 3.24 User Profile Interface for Student and for other users Figure 3.25 User Profile Interface for ITIL coordinator.
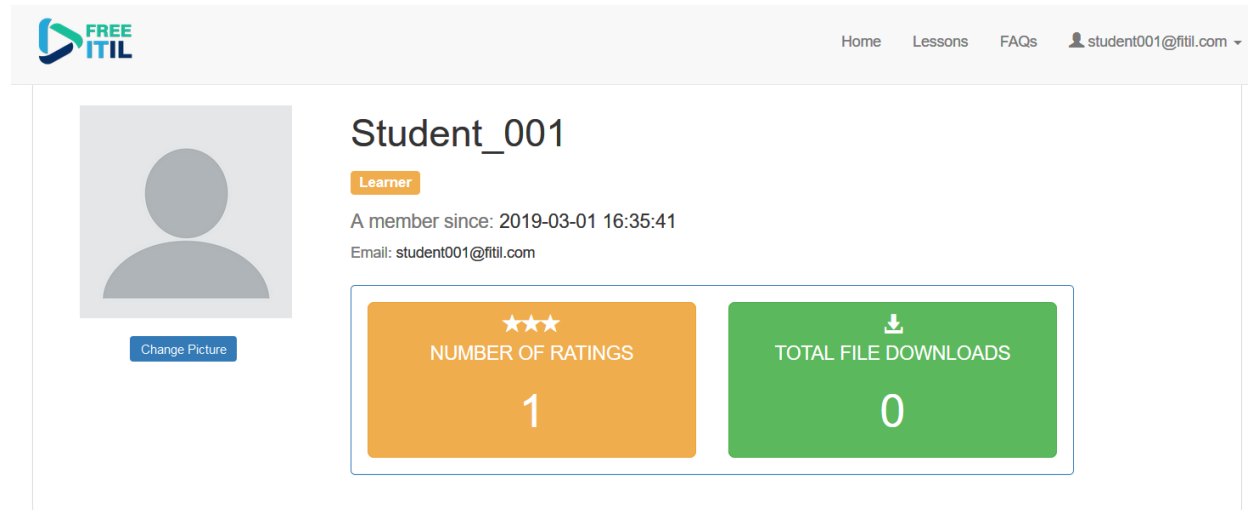
Figure 3.24 User Profile Interface for Student
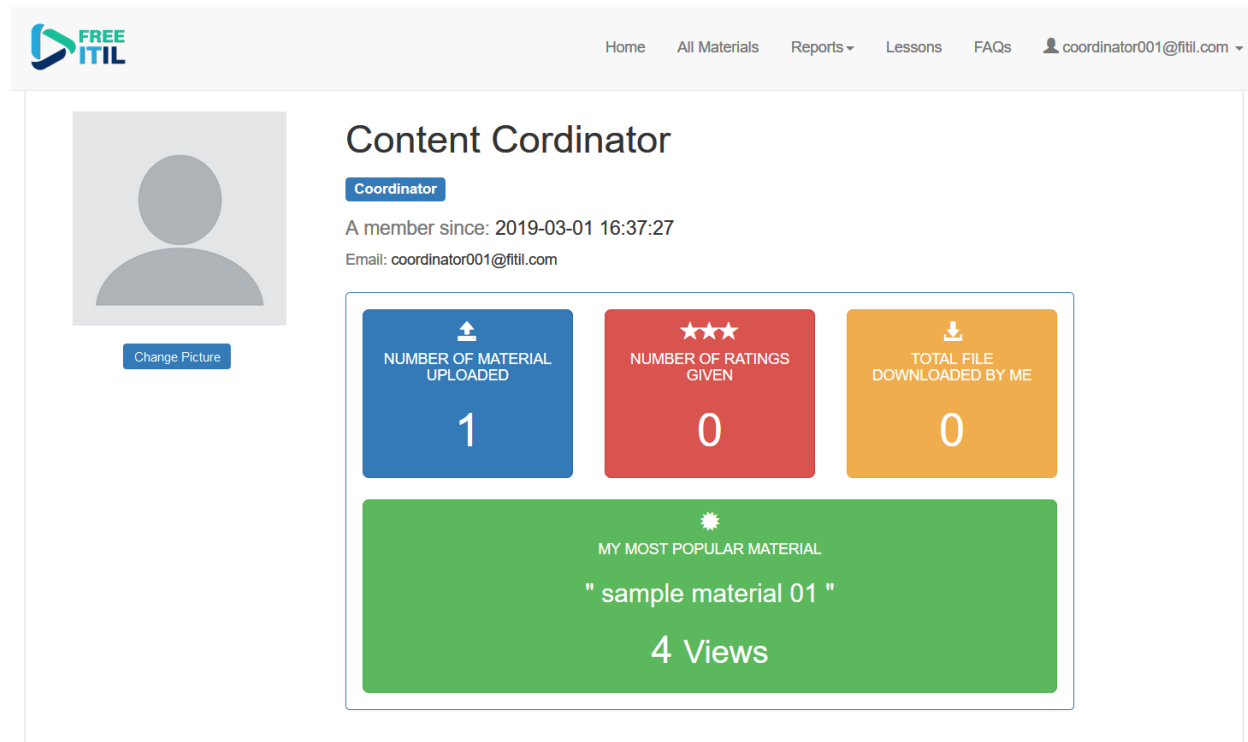
Figure 3.25 User Profile Interface for ITIL coordinator

3.3.5 Report Interfaces

1. Most Commented Contents resides in the system
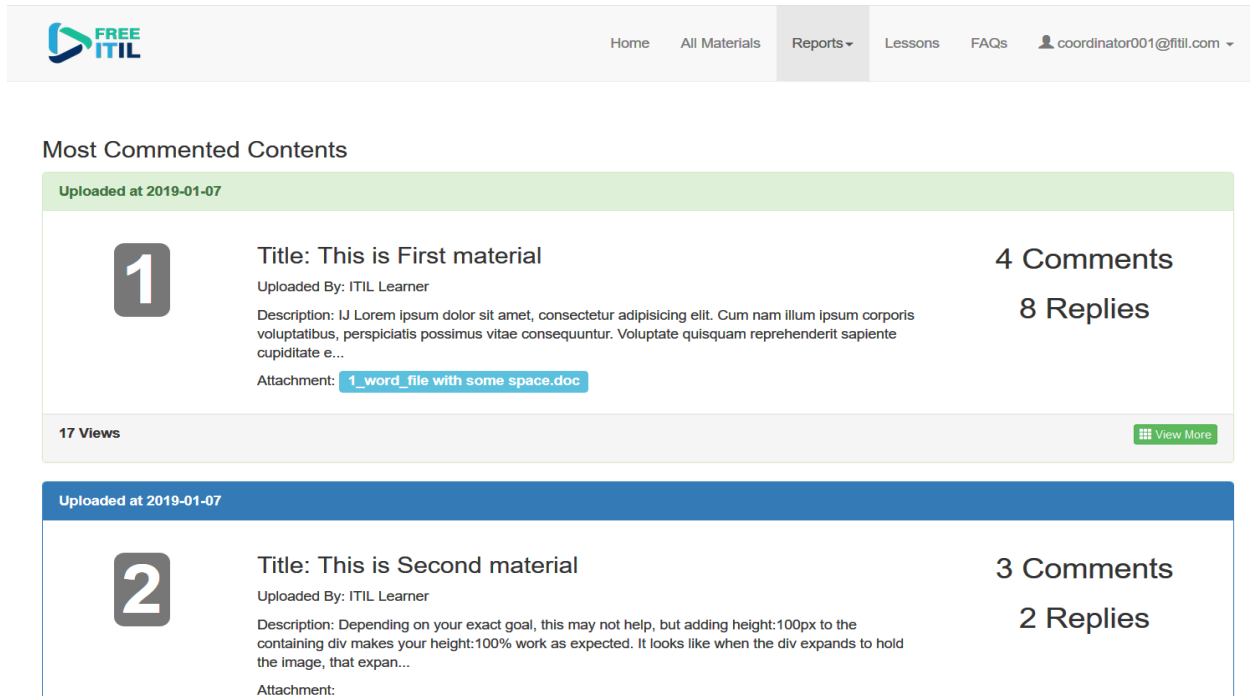
Figure 3.26 Most Commented Contents

2. Users with most number of visits to system
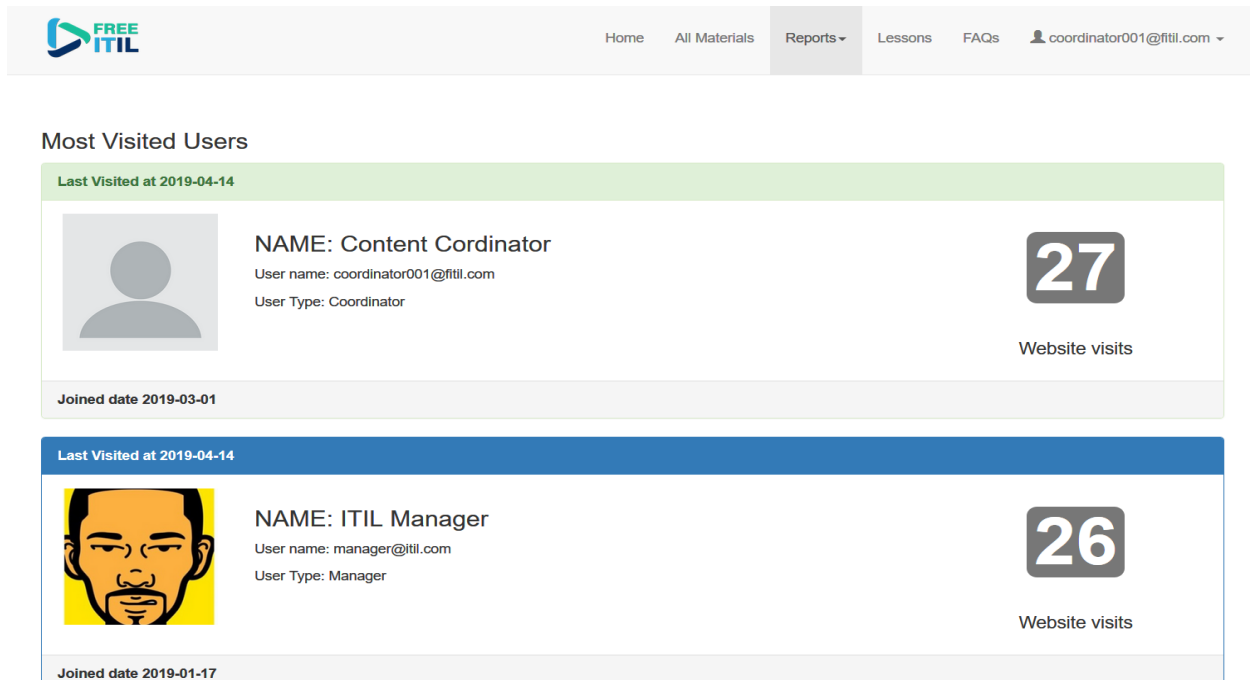
Figure 3.27 Most Visited Users

3. Uploaders with most number of content/material uploaded
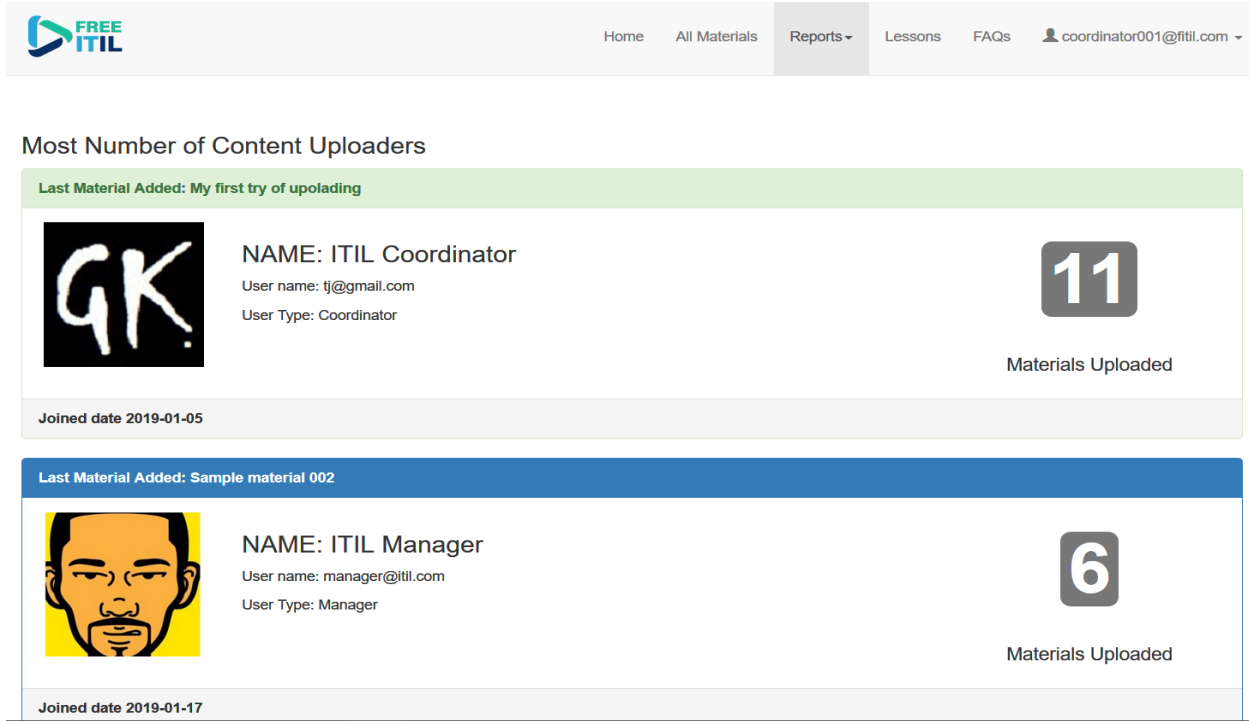
Figure 3.28 Most Number of Content Up loaders

4. Content that have most number of views by users
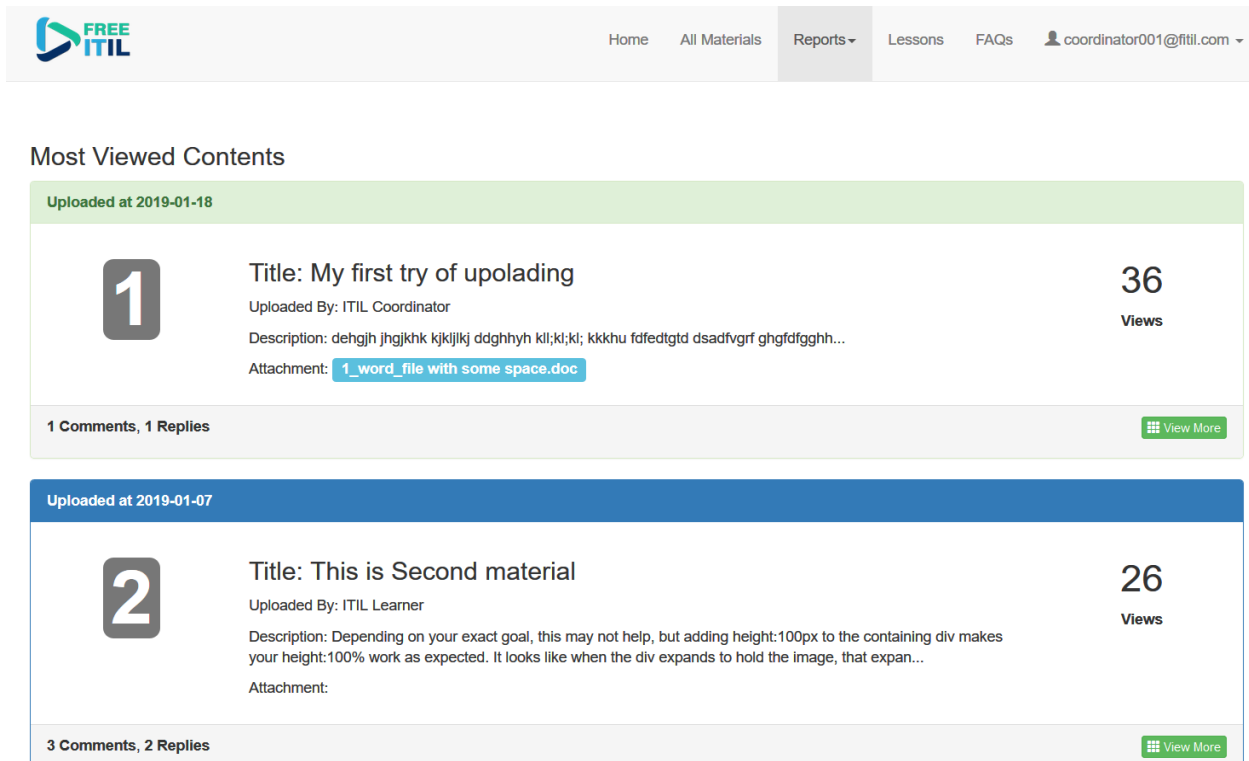
Figure 3.29 Most Viewed Contents

3.3.6 Approve/Reject Materials

When a content manager goes to approve or reject uploaded content, they will be directed to following screens. Figure 3.30 Approve/Reject Materials Interface and Figure 3.31 Approve/Reject Materials Interface 02.
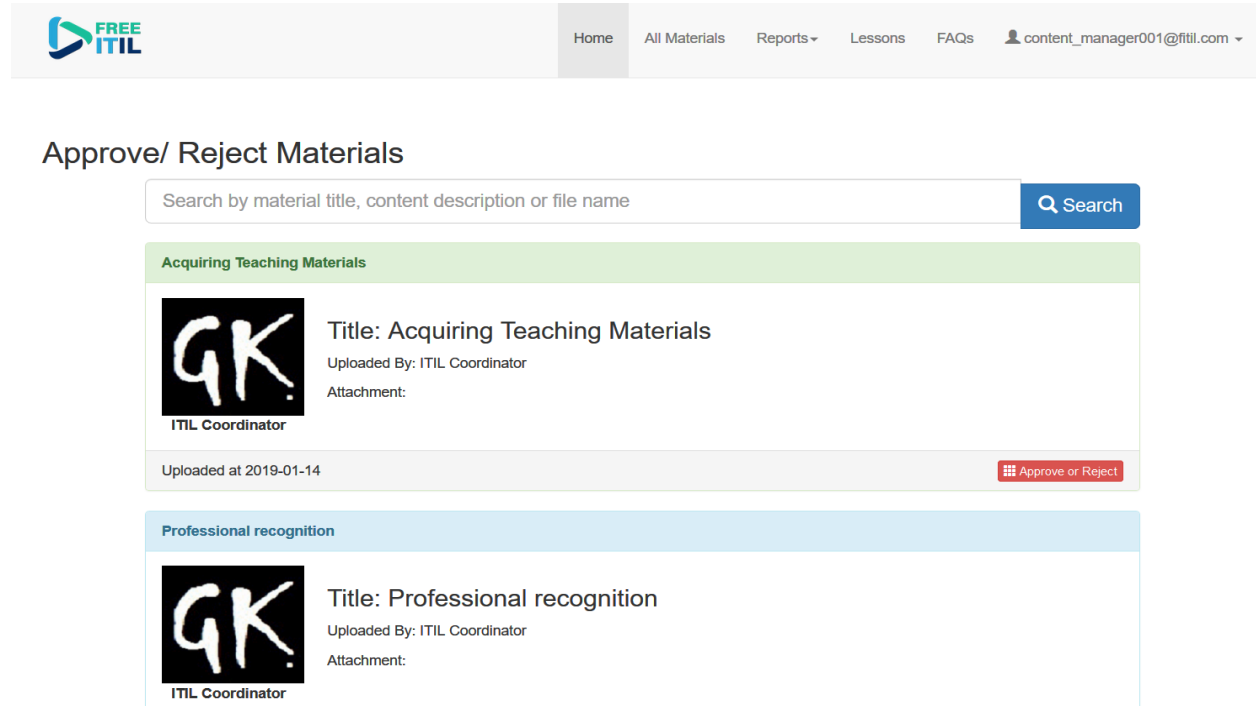
Figure 3.30 Approve/Reject Materials Interface 01
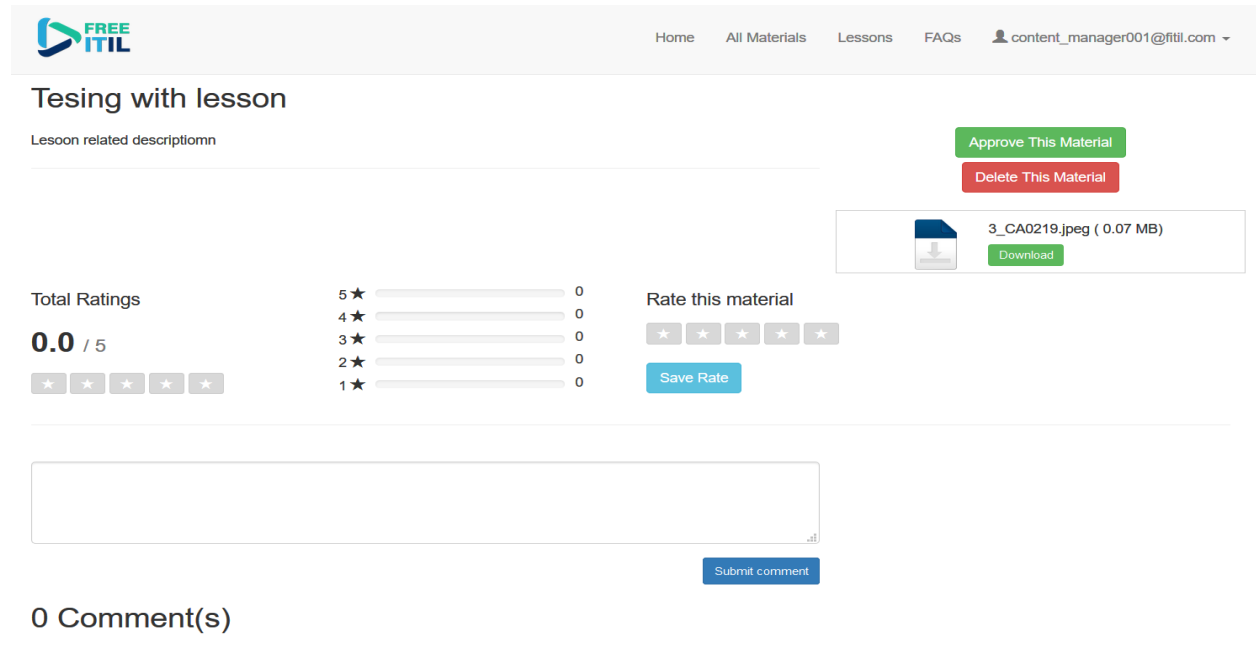
Figure 3.31 Approve/Reject Materials Interface 02

3.3.7 Add FAQ Interface

When Content manager try to add a new FAQ topic, user will be directed to Figure 3.32 Add New FAQ Interface.
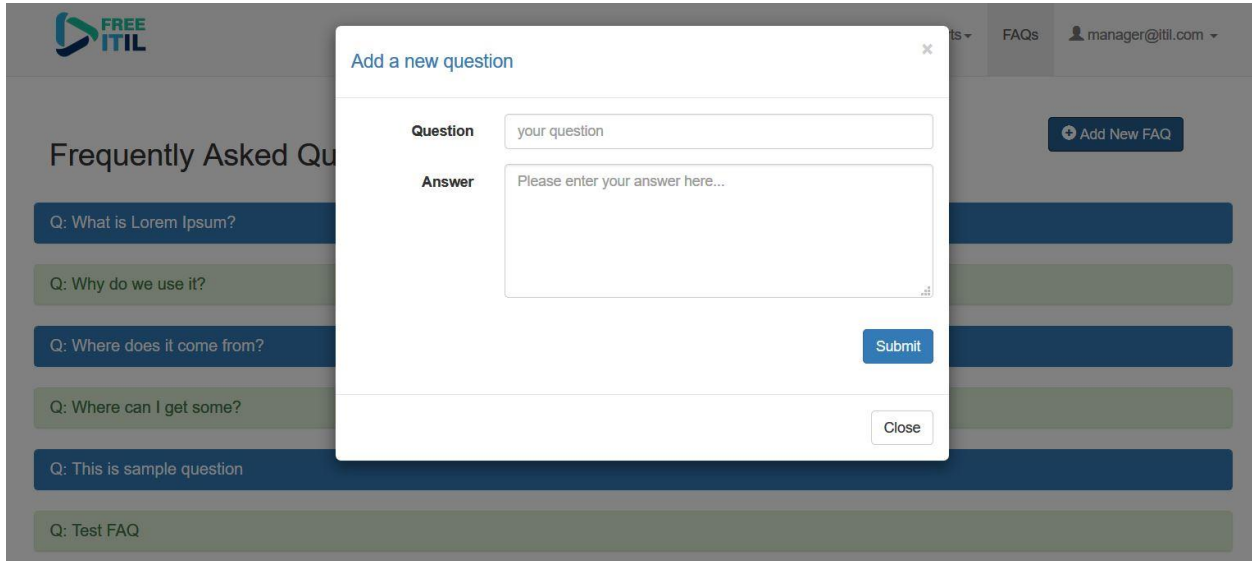
Figure 3.32 Add New FAQ Interface

3.3.8 Content and Lesson adding Interfaces

When Content managers for ITIL coordinators try to upload material, they are directed to Figure 3.33 Content Upload Interface. When Content manager try to add a new lesson, they are directed to Figure 3.34 Add New Lesson Interface.
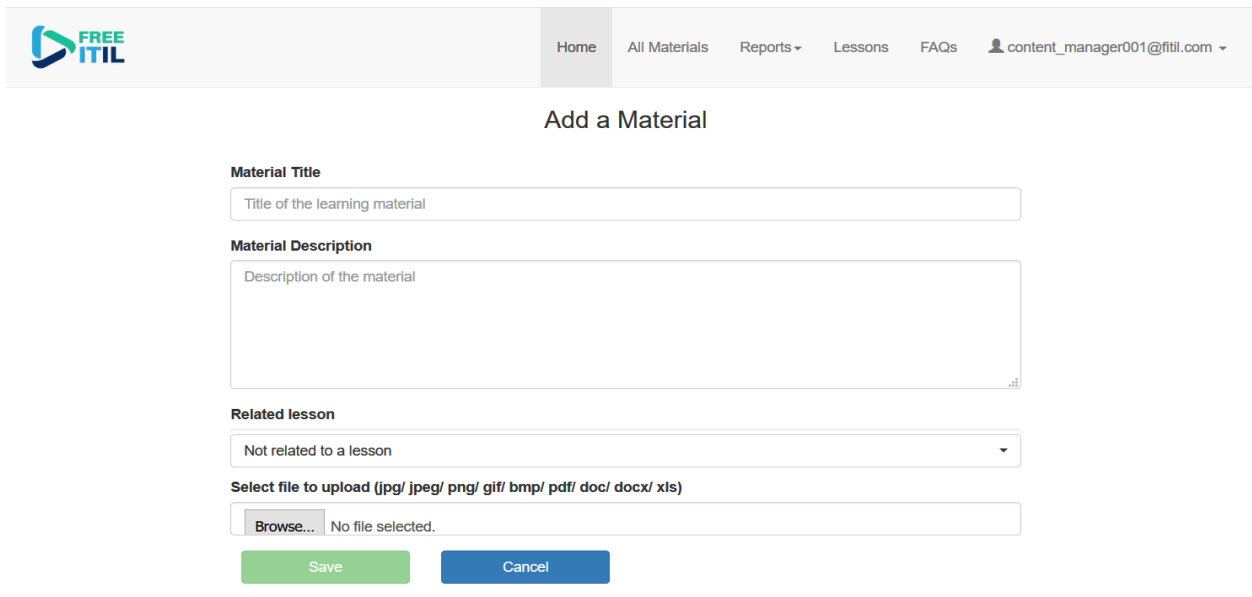
Figure 3.33 Content Upload Interface
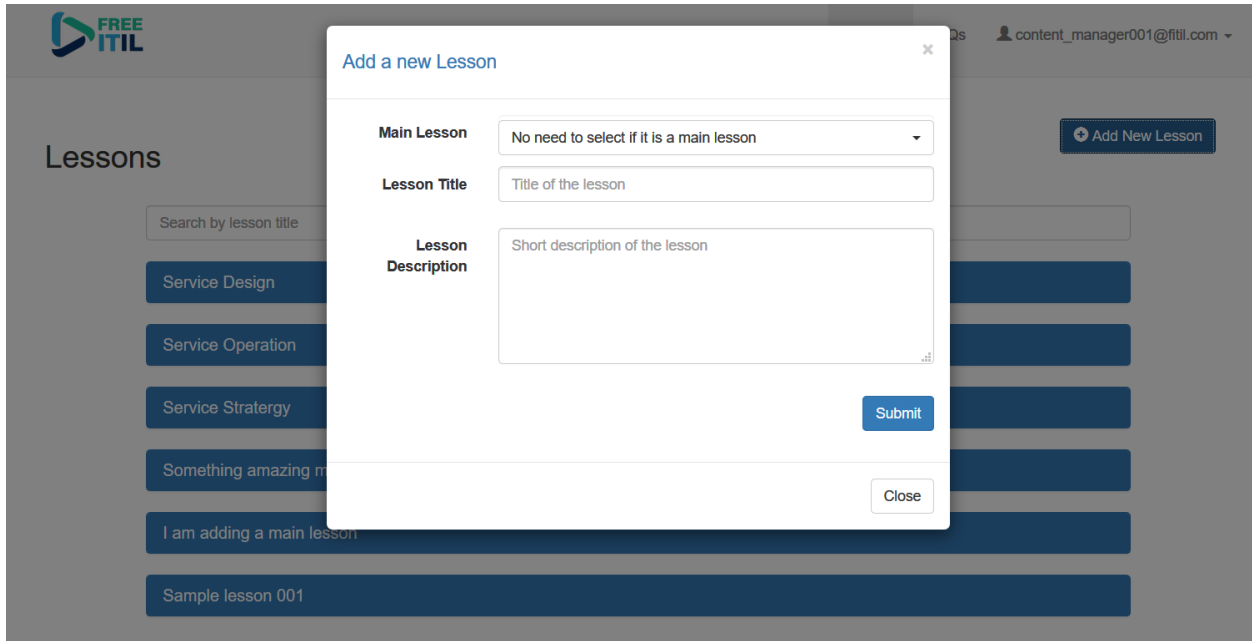
Figure 3.34 Add New Lesson Interface

3.4 Major Code and Module Structures

Main code modules developed in the system have been mentioned below by briefly describing their functionality.
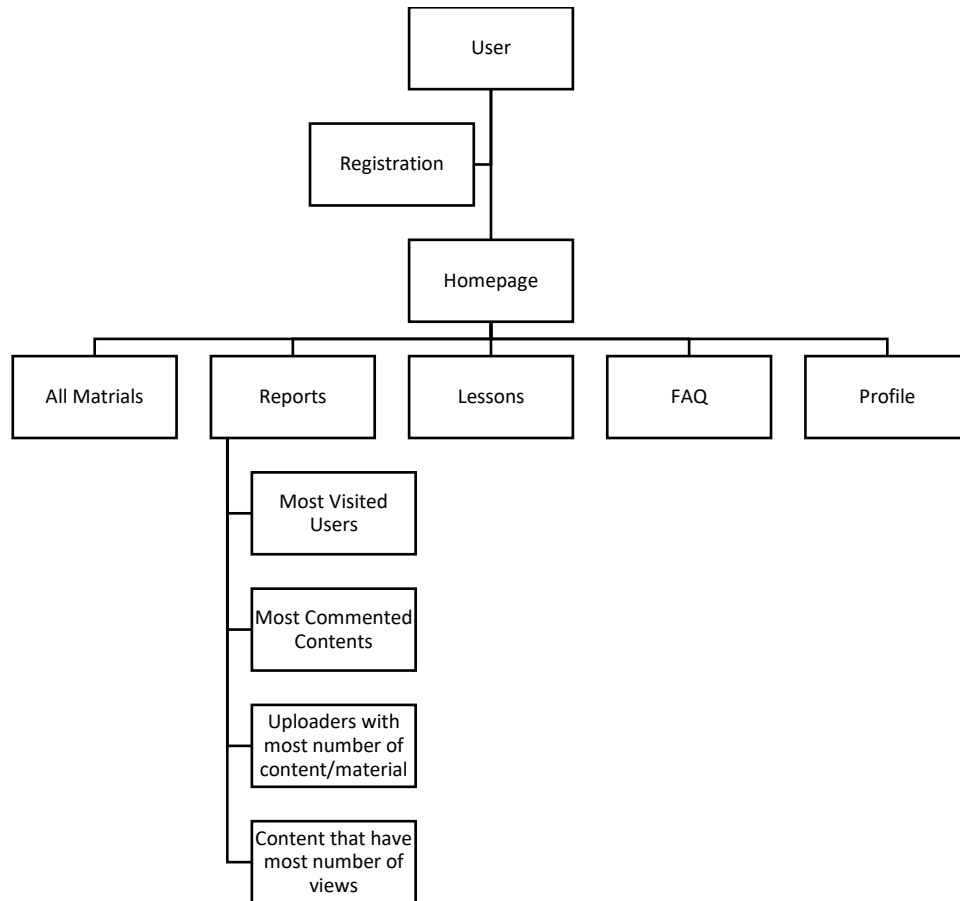
Figure 3.35 Main code modules

Ex: Code for User Registration

Every system user needs to register to the system before login. User registration handled by below code segments.

```php
<?php
$error_message ="";
$success_msg = "";
$path = "files/";
$valid_formats = array("jpg","jpeg", "png", "gif", "bmp", "pdf", "doc", "docx");
if(isset($_POST['submit']))
{
    include "functions/db_con.php";
    $name = $conn->real_escape_string($_POST['name']);
    $userEmail = $conn->real_escape_string($_POST['email']);
    $userPassword = $conn->real_escape_string($_POST['password']);

    $sql = "SELECT user_id FROM users WHERE user_name='".$userEmail ."'";
    $result = $conn->query($sql);

    if ($result->num_rows > 0)
    {
        $error_message ="Sorry!, you have already registered with this email address";
    }
    else
    {
        //password encryption
        //https://www.webslesson.info/2016/10/php-login-registration-form-with-md5-password-encryption.html
        $password = md5($userPassword);
        $status = 0;
        $success_msg ="You have registered successfully! please <a href='login.php'>Login</a> now";
        if($_POST['usertype'] == 1)
        {
            $status = 1;
        }
        $sql="INSERT INTO users (user_name, full_name, password, user_level, status) VALUES ('".$userEmail."','".$name."', '".$password."', '".$_POST['usertype']."','".$status."')";
        $conn->query($sql);
        if($_POST['usertype'] > 1)
        {
            if($_FILES['letter']['name'] != "")
            {
                $sql = "SELECT user_id FROM users WHERE user_name='".$userEmail ."'";
                $result = $conn->query($sql);
                $row = $result->fetch_assoc();

                $name = $_FILES['letter']['name'];
                $size = $_FILES['letter']['size'];

                $name = $_FILES['letter']['name'];
                $size = $_FILES['letter']['size'];

                list($txt, $ext) = explode(".", $name);
                if(in_array($ext,$valid_formats))
                {
                    $actual_image_name = $row["user_id"]."_".$txt.".".$ext;
                    $tmp = $_FILES['letter']['tmp_name'];
                    move_uploaded_file($tmp, $path.$actual_image_name);
                }

                $sql="INSERT INTO files (file_description, file_status,file_added_by,file_type ) VALUES ('This is copy of the approval letter to request permission ','0','".$row[
                "user_id"]."','Registration Proof')";
                $conn->query($sql);

            }
            $success_msg ="You have registered successfully! please allow manager to approve your account, then you may <a href='login.php'>Login</a> ";
        }

    }
}
```

Figure 3.36 Code for User Registration

For rest of the code please refer Appendix A - User Documentation

3.5 System Test Plan

Planning a test case is a very important aspect for developing the system as well as for the completed system. The test plan should have the ability to test the functionality of the overall system. By properly testing a system, it can identify the errors which generate from the system and can correct them. The implemented system was tested using different test cases.

Since the development started, the test plan continued by testing the system units. After completing a system unit, it was completely tested to identify whether it can function according to expectations. Therefore, early detection of the errors was helped by this testing stage.

After performing the system unit testing, next integration testing was done, and this can identify the errors and the required functionality of the units after integration. System testing was performed as the final stage for the completely developed system to check the functionality.

The system was subjected to focus on three main test types during the testing phase.

1. Unit or functional test

One interface will take as a one unit in the application. System has been tested deeply with the unit level test cases.

2. Integration test

Once each and every interface integrate together and tested for some integration test to make sure nothing has broken during the integration.

3. UAT testing

Once functional and integration testing completed, User acceptance test will proceed to give the final sign off.

Test Case for User Login

Test Case ID	01
Test Case Description	Login
Pre - Condition	User should be a registered user
Test Procedure	Enter user name Enter password Click login button
Expected Output	User directed to home page
Actual Output	User directed to home page
Pass / Fail	Pass

Table 3.3 Test Case for User Login

Test Case for Material Upload

Test Case ID	02
Test Case Description	New material upload
Pre - Condition	User should be a Content manager or an ITIL coordinator User should be logged in
Test Procedure	Click upload material button Enter Material Title Enter Material Description Select Related lesson from dropdown Select files Click save button
Expected Output	Material gets uploaded
Actual Output	Material gets uploaded
Pass / Fail	Pass

Table 3.4 Test Case for Material Upload

Test Case for Add new Lesson

Test Case ID	03
Test Case Description	Add new lesson
Pre - Condition	User should be a Content manager User should be logged in
Test Procedure	Click lessons tab Click add new lesson button Select main lesson from drop down Add a lesson title Add a description Click submit button
Expected Output	New lesson added
Actual Output	New lesson added
Pass / Fail	Pass

Table 3.5 Test Case for Add new Lesson

Test Case for Material Approve/Reject

Test Case ID	04
Test Case Description	Approve or reject uploaded material
Pre - Condition	User should be a Content manager User should be logged in
Test Procedure	Click material approve button Click on a material Click approve or reject button
Expected Output	Material gets published
Actual Output	Material gets published
Pass / Fail	Pass

Table 3.6 Test Case for Material Approve/Reject

Test Case for Approve/Reject new Users

Test Case ID	05
Test Case Description	Approve newly registered ITIL coordinators and Content managers
Pre - Condition	User should be a Content manager User should be logged in
Test Procedure	Click approve new users button Click download proof document button Click approve or reject button
Expected Output	User get approved or reject
Actual Output	User get approved or reject
Pass / Fail	Pass

Table 3.7 Test Case for Approve/Reject new Users

Test Case for View Material

Test Case ID	06
Test Case Description	User view materials
Pre - Condition	User should be logged in
Test Procedure	Click on view more button in a material
Expected Output	Material information displayed
Actual Output	Material information displayed
Pass / Fail	Pass

Table 3.8 Test Case for View Material

Test Case for View Reports

Test Case ID	07
Test Case Description	User view reports
Pre - Condition	User should be logged in User should be a Content manager or an ITIL coordinator
Test Procedure	Click on reports drop down Select a report
Expected Output	Report information displayed
Actual Output	Report information displayed
Pass / Fail	Pass

Table 3.9 Test Case for View Reports

Test Case for Comment Function

Test Case ID	08
Test Case Description	User comment on a content
Pre - Condition	User should be logged in
Test Procedure	Click on view more button in a material Type a comment Click submit comment button
Expected Output	Comment submitted
Actual Output	Comment submitted
Pass / Fail	Pass

Table 3.10 Test Case for Comment Function

Test Case for Rating Function

Test Case ID	09
Test Case Description	User rate material
Pre - Condition	User should be logged in
Test Procedure	Click on view more button in a material Select a rating Click save rate button
Expected Output	Rating get saved
Actual Output	Rating get saved
Pass / Fail	Pass

Table 3.11 Test Case for Rating Function

3.6 Tools and Technologies Used

PHP

The term PHP is an acronym for PHP: Hypertext Pre-processors. PHP is a server-side scripting language designed specifically for web development. PHP can be easily embedded in HTML files and HTML codes can also be written in a PHP file. The thing that differentiates PHP with client-side language like HTML is, PHP codes are executed on server whereas HTML codes are directly rendered on the browser.

MySQL

MySQL is a freely available open source Relational Database Management System (RDBMS) that uses Structured Query Language (SQL). SQL is the most popular language for adding, accessing and managing content in a database. It is most noted for its quick processing, proven reliability, ease and flexibility of use. MySQL is an essential part of almost every open source applications.

This enables a cost effective system delivery with reliability and good performance. MySQL is a very ideal database for a small to large scale systems and working extremely well for projects like online diet planning system. Easy administering is also one of the reasons for select this as the system database of this Diet planning system [7].

Apache Server

Apache HTTP Server is a highly popular web server for Windows and UNIX/Linux operating systems. It is developed as a free, open-source HTTP server that is highly secure, fast, efficient, and extensible. Launched in 1995, Apache HTTP Server has become the most popular web server in use today [5].

Bootstrap

Bootstrap is the most popular HTML, CSS, and JavaScript framework for developing responsive, mobile-first websites. Bootstrap is completely free to download and use [20].

jQuery

jQuery is a JavaScript library that allows web developers to add extra functionality to their websites. It is open source and provided for free under the MIT license. In recent years, jQuery has become the most popular JavaScript library used in web development.

NetBeans IDE

NetBeans IDE is a free and open source integrated development environment for application development on Windows, Mac, Linux, and Solaris operating systems.

The IDE simplifies the development of web, enterprise, desktop, and mobile applications that use the Java and HTML5 platforms. The IDE also offers support for the development of PHP and C/C++ applications.

XAMPP

XAMPP stands for Cross-Platform (X), Apache (A), MariaDB (M), PHP (P) and Perl (P). Since XAMPP is simple, lightweight Apache distribution it is extremely easy for developers to create a local web server for testing and deployment purposes. Everything you needed is to set up a web server – server application (Apache), database (MariaDB), and scripting language (PHP). XAMPP works equally well on Linux, Mac, and Windows.

Notepad++

Notepad++ is a free source code editor and Notepad replacement that supports several languages. Running in the MS Windows environment, its use is governed by GPL Licence.

Based on a powerful editing component Scintilla, Notepad++ is written in C++ and uses pure Win32 API and STL which ensures a higher execution speed and smaller program size. By optimizing as many routines as possible without losing user friendliness, Notepad++ is trying to reduce the world carbon dioxide emissions. When using less CPU power, the PC can throttle down and reduce power consumption, resulting in a greener environment [19].

Hosted Hardware and Software Environment

Since the solution is based on web-based development which is locally hosted for this specific attempt, identified minimum hardware and software requirement for development and hosting side application are listed as follows.

- Intel Core I5 Processor
- 8 GB RAM
- 1TB HDD
- Network access and card support 100Mbps
- Windows 10 OS 64bit
- The latest version of Firefox
- The latest version of Chrome
- The latest version of Internet Explorer

Chapter 4. Evaluation

Evaluation is a systematic determination of a subject's merit, worth and significance, using criteria governed by a set of standards. It can assist an organization, program, project or any other intervention or initiative to assess any aim, realizable concept/proposal, or any alternative, to help in decision-making; or to ascertain the degree of achievement or value in regard to the aim and objectives and results of any such action that has been completed. The primary purpose of evaluation, in addition to gaining insight into prior or existing initiatives, is to enable reflection and assist in the identification of future change.

This project would test and evaluation was done using a selected set of system users before releasing the final product. System hosted at the free hosting site and link to this temporarily hosted site given to the selected list of peoples with the simple questions. Main testing idea gain through evaluation of those answers.

4.1 Critical Evaluation

Author is happy to reveal all goals have been met within the project cycle. The process of finding the answer to the problematic question was successful but there were certain constraints and technical limitations significantly affecting the whole development process.

Several tests were conducted to get the full output throughout the project to achieve the objectives described in Chapter 1. In spite of the effects of such constraints and boundaries author have managed to handle the project successfully. The foundation of this development provided the author with a wealth of ideas. Once the constraints were identified a proper plan was needed to achieve the goals behind the questions. Therefore author has split the work in to several milestones and allocated some deadlines to each milestone.

This topic was somewhat strange or new to the author as there were lack of background knowledge of software development domain. Hence proper literal knowledge from the very basic point to the more advanced facts were required in order to develop the system with given criteria. Chapter 2 which is the literature review of this thesis helped to gain a proper knowledge about the Web Based System for ITIL Candidates.

In a nutshell, during the course of project, author has identified bunch of valuable areas while providing a good output for the users. Importance of proper materials to study, getting them free of charge are some of the valuable things author have learnt through this dissertation study.

4.2 Lessons Learnt

This final project helped me to build a fully functional system which improves my programming skills. It gave me thorough knowledge and experience in developing a system within both theoretical and practical aspects. It also taught me to work according to a proper schedule, systematically. Thereby it is understood the importance of managing time to submit the reports, a dissertation on time and experienced to work under pressure. Herewith listed some of the knowledge gained through this project.

- Learned that to analyse the project, use case diagrams, sequence diagrams, activity diagrams, class diagrams and ER diagrams are extremely helpful.

- Learned that there's various free wireframe design tools to pre-design user interfaces.

- Learned phpMyAdmin is an extremely user friendly software to create databases and related functions.

- Learned that a template can be taken to design the webpage attractively.

- Learned that by using an IDE it helps to minimize compatibility issues.

Chapter 5. Conclusion

5.1 Final Verdict

This section will conclude the development of web application by considering all the outcomes of the entire development process. We managed to carry out this project methodically and systematically to accomplish all the related objectives to find out the answers to the problem domain. With Web based system for Information Technology Infrastructure Library uses now be able to refer study material free of charge plus live engagement with teachers.

Since developer was a somewhat novice to this filed of development technology, certain things were needed to learn from the beginning. The implementation work was a big deal as developer does not come with a development background. Project was more challenging when the technical limitations made issues at certain points. Project testing could have been carried out more intensively and widely if the technical limitations did not impose boundaries on the process. Though the selected problem domain has been answered with proven results of the web application, the outcomes could have been more precise and accurate. The given time was adequate to handle the project and we are really happy to complete the dissertation within the given time frame even though some problems were faced. As mentioned, developer is not from a software development domain so had to learn most of the technological function from scratch.

This system is satisfactory for myself as this will be definitely a useful system for anyone who wishes to use it. Plus won't be a waste of time even after the project time frame if can be developed with more enhance features.

Finally, we are happy to state that, the entire work of this research study was successful, and developer has achieved all the objectives of the project within the given time period.

5.2 Future Work

This system will be developed more as future work

- Develop an android/IOS mobile application so system will be more portable and accessible

- Gather real time values throughout the mobile app like what time of the day the most number of users available

- Revenue gaining mechanism needs to be developed like posting advertisements

- System could be expanded to other exams apart from ITIL. Now system is only used on ITIL exam but same concept be used to other exams as well

- Add a password reset function which is lacking on implemented system

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Appendix A - User Documentation

Users who have privileges to access the system being guided on how to navigate within the system and how to use its functions are helped by this document. Eligibility to access the system is available to the Students, ITIL coordinators and Content managers. Different user levels are available to each and every member and their functionality described below.

Login Page

Upon accessing all users are directed to login page which is shown in Figure 3.18 User Login Interface.

Registration Page

To be able to logged-in user first need to register to the system. Depending on the user level information required is different here. Figure 3.19 User Registration Interface for Learner/Student and Figure 3.20 User Registration Interface for Content manager and ITIL coordinator. For Content manager and ITIL coordinator, they have to wait till their registration be approved in order to login.

Home Page

As soon as user log in to system, they are landed in to homepage. Depending on the user level homepage information be differ. Figure 3.21 Home Page for Students, Figure 3.22 Home Page for ITIL coordinator and Figure 3.23 Home Page for Content manager. All the functionalities available for each user type are given/displayed in homepage.

Students

Upon accessing students can search material, access lessons and FAQ. Plus comment and rate content.

ITIL coordinators

Upon accessing ITIL coordinators can search material, access/add lessons and access FAQ. Comment and rate content. Also can upload material and view reports. Figure 3.33 Content Upload Interface plus Figure 3.26 Most Commented Contents, Figure 3.27 Most Visited Users, Figure 3.28 Most Number of Content Up loaders and Figure 3.29 Most Viewed Contents.

Content managers

Upon accessing Content manager can search material, access/add lessons and FAQ, comment and rate content, can upload material, approve material, view reports, approve users. Figure 3.33 Content Upload Interface plus Figure 3.26 Most Commented Contents, Figure 3.27 Most Visited Users, Figure 3.24 Most Number of Content Up loaders and Figure 3.29 Most Viewed Contents also Figure 3.30 Approve/Reject Materials Interface, Figure 3.32 Add New FAQ Interface and Figure 3.34 Add New Lesson Interface.

Code for Content Upload

Content/material upload is handled by the below code segment.

```php
<?php
session_start();
IF(ISSET($_SESSION['username'])){

if($_SESSION['user_level'] == 1)
{
    header("location:".$_SESSION['user_home']);
}



$logged_user = $_SESSION['username'];
$user_id = $_SESSION['user_id'];
$error_message ="";
$success_msg = "";
include "functions/db_con.php";

if(isset($_POST['btnAddMore']))
{
    $path = "files/";
    $valid_formats = array("jpg","jpeg", "png", "gif", "bmp","pdf", "doc", "docx", "xls");
    $actual_image_name = "";


        if($_FILES['file_attached']['name'] != "")
        {
            $mname = $_POST['mname'];
            $mdesc = $_POST['mdesc'];
            $lesson = $_POST['ml'];
            if($lesson == 0)
            {
                $lesson = 'null';
            }
            $name = $_FILES['file_attached']['name'];
            $size = $_FILES['file_attached']['size'];
            list($txt, $ext) = explode(".", $name);
            if(in_array($ext,$valid_formats))
            {
                $actual_image_name = $_SESSION['user_id']."_".$txt.".".$ext;
                $tmp = $_FILES['file_attached']['tmp_name'];
                move_uploaded_file($tmp, $path.$actual_image_name);
```

Figure: Code for Content Upload

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```php
            $sql="INSERT INTO files (file_name,
            file_status,
            file_size,
            file_added_by) VALUES ('$actual_image_name',1,$size,$user_id)";
            $conn->query($sql);
            $file_id = mysqli_insert_id($conn);


            $sql="INSERT INTO material (title,
            body,
            file_id,
            lesson_id,
            created_by
            ) VALUES ('$mname','$mdesc',$file_id,$lesson,$user_id)";
            $conn->query($sql);
            $success_msg ="You have added your material successfully! ";


        }
        else{
            $error_message  ="Error: <br>File type is not supported. Attach a valid file";
        }


    }
}

?>
<!DOCTYPE html>
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<title>Free ITIL | Add new material </title>

<link rel="stylesheet" href="http://maxcdn.bootstrapcdn.com/bootstrap/3.3.6/css/bootstrap.min.css">
 <link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/bootstrap-select/1.13.2/css/bootstrap-select.min.css">
<link rel="stylesheet" href="resources/css/comment.css">
            <script src="https://ajax.googleapis.com/ajax/libs/jquery/1.12.4/jquery.min.js"></script>
            <script type="text/javascript" language="javascript" src="resources/js/validator.js"></script>
            <script src="http://maxcdn.bootstrapcdn.com/bootstrap/3.3.6/js/bootstrap.min.js"></script>
        <script src="https://cdnjs.cloudflare.com/ajax/libs/bootstrap-select/1.13.2/js/bootstrap-select.min.js"></script>
<style>
body { padding-top: 80px; }
</style>
</head>
```

Figure: Code for Content Upload

Code for adding new Lesson

```php
<?php
session_start();
$success_msg = "";
IF(ISSET($_SESSION['username'])){
    $user_id = $_SESSION['user_id'];
include "functions/db_con.php";

if(isset($_POST['btnaddfaq']))
{
        $qeu = $_POST['que'];
        $ans = $_POST['ans'];
        $ml = $_POST['ml'];
        if($ml>0)
        {
            $sql="INSERT INTO lessons (lesson_title, lesson_description,lesson_type,parent_lesson,created_by) VALUES ('$qeu','$ans',0,$ml,$user_id)";
        }
        else
        {
            $sql="INSERT INTO lessons (lesson_title, lesson_description,lesson_type,created_by) VALUES ('$qeu','$ans',1,$user_id)";
        }



    if ($conn->query($sql) === TRUE)
    {
        $success_msg ="<label style='color:green;' id='success_msg' >You have added new lesson successfully! </label>";
    }
    else
    {
        $success_msg ="<label style='color:red;' id='success_msg' >Error: <br>" . $conn->error ."</label>";
    }
}

$tablebody ="";

 $empResult  = $conn->query("SELECT * FROM lessons WHERE lesson_type=1");

if(mysqli_num_rows($empResult ) > 0)
{ // if one or more rows are returned do following

 $flag = 0;

    while($maintopicResults = mysqli_fetch_array($empResult ))
    {
```

Figure:Code for adding new Lesson

Code for adding new FAQ Topic

```php
<?php
session_start();
$success_msg = "";
IF(ISSET($_SESSION['username'])){
    $user_id = $_SESSION['user_id'];
include "functions/db_con.php";

if(isset($_POST['btnaddfaq']))
{
        $qeu = $_POST['que'];
        $ans = $_POST['ans'];
        $sql="INSERT INTO faqs (faq_q,
            faq_ans,
            faq_status,
            faq_added_by
            ) VALUES ('$qeu','$ans',0,$user_id)";



    if ($conn->query($sql) === TRUE)
    {
        $success_msg ="<label style='color:green;' id='success_msg' >You have added new FAQ successfully! </label>";
    }
    else
    {
        $success_msg  ="<label style='color:red;' id='success_msg' >Error: <br>" . $conn->error ."</label>";
    }
}

$tablebody ="";

 $empResult  = $conn->query("SELECT * FROM faqs WHERE faq_status=0");

if(mysqli_num_rows($empResult ) > 0){ // if one or more rows are returned do following

 $flag = 0;
    while($results = mysqli_fetch_array($empResult )){
            if($flag % 2 == 0)
            {
                $color = "panel panel-primary";
            }
            else
            {
                $color = "panel panel-success ";
```

Figure:Code for adding new FAQ topic

Code for Material approve

```php
<?php
session_start();
$logged_user = "";
        $tablebody ="";
        $query = "";
IF(ISSET($_SESSION['username'])){
if($_SESSION['user_level'] != 3)
{
    header("location:".$_SESSION['user_home']);
}

$logged_user = $_SESSION['username'];
include "functions/db_con.php";
$showRecordPerPage = 10;
    if(isset($_GET['page']) && !empty($_GET['page'])){
        $currentPage = $_GET['page'];
    }
    else
    {
        $currentPage = 1;
    }

$startFrom = ($currentPage * $showRecordPerPage) - $showRecordPerPage;
$lastPage  = $firstPage = 1;
$nextPage = $currentPage + 1;
$previousPage = $currentPage - 1;

if(isset($_GET['btnSearch']))
{
    $fragments = "";
    $search_term = "";
    $query = $_GET['query'];
    $min_length = 0;

    if(strlen($query) >= $min_length){

        $query = htmlspecialchars($query);
        $query = mysqli_real_escape_string($conn,$query);
         $sql = "SELECT * FROM material
            WHERE (`title` LIKE '%".$query."%')";
```

Figure:Code for Material approve

```php
        $allEmpResult = mysqli_query($conn, $sql);
        $totalEmployee = mysqli_num_rows($allEmpResult);
        $lastPage = ceil($totalEmployee/$showRecordPerPage);
        //echo $sql." LIMIT $startFrom, $showRecordPerPage";
        $empResult  = $conn->query($sql." LIMIT $startFrom, $showRecordPerPage");

        if(mysqli_num_rows($empResult ) > 0){ // if one or more rows are returned do following
            $tablebody ="";
            $flag = 1;
            while($results = mysqli_fetch_array($empResult )){
                // $results = mysql_fetch_array($raw_results) puts data from database into array, while it's valid it does the loop
                    if($flag % 2 == 0)
                    {
                        $color = "panel panel-info";
                    }
                    else
                    {
                        $color = "panel panel-success ";
                    }
                    $flag++;
                //$tablebody .= $results['title']."<br/>";
            $tablebody .=  '<div class="row"><div class="col-lg-10 col-lg-offset-1">
        <div class="'.$color.'">
        <div class="panel-heading"><strong>'.$results["title"].'</strong></div>
        <div class="panel-body">'.$results["body"].'</div>
        <div class="panel-footer"> Uploaded at '.(new DateTime($results["created_at"]))->format('Y-m-d').' <a href="material.php?mat_id='.$results["material_id"].'" class="btn
        btn-success btn-xs pull-right" role="button"><i class="glyphicon glyphicon-th"></i> View More </a></div>
        </div>
        </div></div>';
                    // posts results gotten from database(title and text) you can also show id ($results['id'])
                }

            }
            else{ // if there is no matching rows do following
                $tablebody= "No results available";
            }

        }
    else{ // if query length is less than minimum
        echo "Search query length is less than minimum. Minimum length is ".$min_length;
    }
}
else{
    $tablebody ="";
    $flag = 1;
 $sql = "SELECT
material.title,
material.material_id,
material.created_at,
users.full_name,
files.file_name,
users.profile_pic,
users.user_id
FROM
material
INNER JOIN users ON material.created_by = users.user_id
Left JOIN files ON material.file_id = files.file_id
WHERE
mat_status = 0
";
 $empResult  = $conn->query($sql);
    while($results = mysqli_fetch_array($empResult )){
    // $results = mysql_fetch_array($raw_results) puts data from database into array, while it's valid it does the loop
        if($flag % 2 == 0)
        {
            $color = "panel panel-info";
        }
        else
        {
            $color = "panel panel-success ";
        }

$tablebody .=  '<div class="row">
<div class="col-lg-10 col-lg-offset-1">
    <div class="'.$color.'">
    <div class="panel-heading"><strong>'.$results["title"].'</strong></div>
    <div class="panel-body">
        <div class="row">
            <div class="col-lg-2 text-center">
            <img src="images/profiles/'.$results['profile_pic'].'" alt="" height="120" class="profile_pic">
                <strong>'.$results['full_name'].'</strong>

            </div>
            <div class="col-lg-10">
```

Figure:Code for Material approve

Code for new User approve

```php
<?php
session_start();

IF(ISSET($_SESSION['username'])){
$user_id = $_SESSION['user_id'];
include "functions/db_con.php";

if(isset($_GET['approve']))
{
    $insertRating = "UPDATE users SET status = 1 WHERE user_id=".$_GET['user'].""";
    mysqli_query($conn, $insertRating) or die("database error: ". mysqli_error($conn));

}

if(isset($_GET['reject']))
{
    $insertRating = "UPDATE users SET status = -1 WHERE user_id=".$_GET['user'].""";
    mysqli_query($conn, $insertRating) or die("database error: ". mysqli_error($conn));
}

$results2 = $conn->query("SELECT
users.user_id,
users.user_name,
users.full_name,
users.user_level,
files.file_id,
files.file_name,
users.profile_pic,
users.joined_date
FROM
users
INNER JOIN files ON files.file_added_by = users.user_id
WHERE
users.`status` = 0 AND
files.file_type = 'Registration Proof'");
$tablebody = "";
 if(mysqli_num_rows($results2 ) > 0)
 {
while($results = mysqli_fetch_array($results2 ))
{
    if($results["user_level"] == 2)
    {
        $color = "panel panel-info";
        $level = "Coordinator";
```

Figure:Code for new User approve

```php
    }
    else
    {
        $color = "panel panel-success ";
        $level = "Manager";
    }
$tablebody .= '<div class="row">
<div class="col-lg-10 col-lg-offset-1">
    <div class="'.$color.'">
    <div class="panel-heading"><strong>'.$level.'</strong> <a href="functions/file_downloader.php?file=' . urlencode($results['file_name']) . '&file_id=' . $results['file_id'] . '"
    class="btn btn-primary btn-xs pull-right" role="button"><i class="glyphicon glyphicon-download-alt"></i> Download Proof Document </a></div>
    <div class="panel-body">
        <div class="row">
        <div class="col-lg-2 text-center">
        <input type="hidden" name="user" id="user" value="'.$results['user_id'].'" />
        <img src="images/profiles/'.$results['profile_pic'].'" alt="" height="120" class="profile_pic">
            <strong> User Id: '.$results['user_id'].'</strong>

        </div>
        <div class="col-lg-10">
        <p><h3>Name: '.$results["full_name"].'</h3></p>
        <p><h4>Email/ User Name: '.$results["user_name"].'<h4></p>
        <p>Requested Date: <span class="label label-info gi-1x">'.(new DateTime($results["joined_date"]))->format('Y-m-d').'</span></p>
        <br/>
        <button type="submit" name="approve"  href="#" class="btn btn-success " role="button"><i class="glyphicon glyphicon-ok"></i> Approve </button> <button name="reject"
        type="submit"  href="#" class="btn btn-danger " role="button"><i class="glyphicon glyphicon-remove"></i> Reject </button>
        </div>
    </div>
    </div>
    </div>
</div>';
}
}
else{

    echo '<center><span class="glyphicon glyphicon-alert"></span>  No users available to approve !</center>';
}
```

Figure:Code for new User approve

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Code for new Material approve

```php
<?php
session_start();
$logged_user = "";
    $tablebody ="";
    $query = "";
IF(ISSET($_SESSION['username'])){
if($_SESSION['user_level'] != 3)
{
    header("location:".$_SESSION['user_home']);
}

$logged_user = $_SESSION['username'];
include "functions/db_con.php";
$showRecordPerPage = 10;
    if(isset($_GET['page']) && !empty($_GET['page'])){
        $currentPage = $_GET['page'];
    }
    else
    {
        $currentPage = 1;
    }

$startFrom = ($currentPage * $showRecordPerPage) - $showRecordPerPage;
$lastPage  = $firstPage = 1;
$nextPage = $currentPage + 1;
$previousPage = $currentPage - 1;

if(isset($_GET['btnSearch']))
{
    $fragments = "";
    $search_term = "";
    $query = $_GET['query'];
    $min_length = 0;

    if(strlen($query) >= $min_length){

        $query = htmlspecialchars($query);
        $query = mysqli_real_escape_string($conn,$query);
        $sql = "SELECT * FROM material
            WHERE (`title` LIKE '%".$query."%')";

        $allEmpResult = mysqli_query($conn, $sql);
        $totalEmployee = mysqli_num_rows($allEmpResult);
        $lastPage = ceil($totalEmployee/$showRecordPerPage);
```

Figure:Code for new Material approve

```php
        //echo $sql." LIMIT $startFrom, $showRecordPerPage";
        $empResult  = $conn->query($sql." LIMIT $startFrom, $showRecordPerPage");

        if(mysqli_num_rows($empResult ) > 0){ // if one or more rows are returned do following
            $tablebody ="";
            $flag = 1;
                while($results = mysqli_fetch_array($empResult )){
                // $results = mysql_fetch_array($raw_results) puts data from database into array, while it's valid it does the loop
                        if($flag % 2 == 0)
                        {
                            $color = "panel panel-info";
                        }
                        else
                        {
                            $color = "panel panel-success ";
                        }
                        $flag++;
                    //$tablebody .= $results['title']."<br/>";
        $tablebody .=  '<div class="row"><div class="col-lg-10 col-lg-offset-1">
    <div class="'.$color.'">
    <div class="panel-heading"><strong>'.$results["title"].'</strong></div>
    <div class="panel-body">'.$results["body"].'</div>
    <div class="panel-footer"> Uploaded at '.(new DateTime($results["created_at"]))->format('Y-m-d').' <a href="material.php?mat_id='.$results["material_id"].'" class="btn
    btn-success btn-xs pull-right" role="button"><i class="glyphicon glyphicon-th"></i> View More </a></div>
    </div>
    </div></div>';
                    // posts results gotten from database(title and text) you can also show id ($results['id'])
                }

        }
        else{ // if there is no matching rows do following
            $tablebody= "No results available";
        }

    }
    else{ // if query length is less than minimum
        echo "Search query length is less than minimum. Minimum length is ".$min_length;
    }
}
else{
    $tablebody ="";
    $flag = 1;
 $sql = "SELECT
material.title,
material.material_id,
material.created_at,
users.full_name,
files.file_name,
users.profile_pic,
users.user_id
FROM
material
INNER JOIN users ON material.created_by = users.user_id
Left JOIN files ON material.file_id = files.file_id
WHERE
mat_status = 0
";
 $empResult  = $conn->query($sql);
    while($results = mysqli_fetch_array($empResult )){
    // $results = mysql_fetch_array($raw_results) puts data from database into array, while it's valid it does the loop
        if($flag % 2 == 0)
        {
            $color = "panel panel-info";
        }
        else
        {
            $color = "panel panel-success ";
        }

$tablebody .=  '<div class="row">
<div class="col-lg-10 col-lg-offset-1">
    <div class="'.$color.'">
    <div class="panel-heading"><strong>'.$results["title"].'</strong></div>
    <div class="panel-body">
        <div class="row">
            <div class="col-lg-2 text-center">
            <img src="images/profiles/'.$results['profile_pic'].'" alt="" height="120" class="profile_pic">
                <strong>'.$results['full_name'].'</strong>

            </div>
            <div class="col-lg-10">
            <p><h3>Title: '.$results["title"].'</h3></p>
```

Figure:Code for new Material approve

Appendix B - Client Certification

………………………………….. …………………
Signature of the Candidate **Date**

Details of Project Supervisor(s):

Supervisor *			
Supervisor's Comments			
Name			
Designation		**Signature**	
		Date	

*- Supervisor must be a UCSC academic staff member

Advisor [+]			
Advisor's Comments			
Name			
Designation		**Signature**	
		Date	

[+] **- Advisor can be selected as candidate wish**