Project Report

On

IIT Program Office Accounting System

[Version 1.0]

Course Name: Project

Course Code: SE – 801

Submitted by:

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BSSE 0226

Submitted to:

BSSE Program Office

Institute of Information Technology

University of Dhaka

[Date: 28-11-2013]

Document Approval

The following Software Project Report on “IIT Program Office Automation System” has been accepted and approved by the following:

Printed Name	Title	Signature	Date
Dr. Kazi Muheymin-Us-Sakib	Project Supervisor		

Letter of Transmittal

28th November

BSSE Program Chair,

Institute of Information Technology,

University of Dhaka

Subject: Submission of Project Report on “IIT Program Office Automation System”.

Dear Sir,

I am here by submitting you the Project Report titled “IIT Program Office Automation System” for the partial fulfillment of the six credit course titled “SE 801: Project” of 8th semester of BSSE program. The report has been prepared based on the requirement analysis and designing of the system, product features developed as well as the testing of the project.

The target of the course for the project was to follow and practice the software development life cycle according to the procedures of software development. I have tried my level best to follow and implement the learning of software engineering in this project. I hope the project will meet the expectation of the end users.

Sincerely Yours

Rayhan Hossain
BSSE 0226
Institute of Information Technology
University of Dhaka

Acknowledgement

First of all I would like to thank almighty Allah for giving me the patience and proper time to complete the project successfully. It is pleasure to take this occasion to thank a few people who have assisted, encouraged, directed and supported throughout project life cycle.

At the very outset, I would like to thank the IIT authority for coming up with this outstanding course offering in the last semester of the BSSE course. From the beginning of the program we have learned the software development life cycle and have a chance to practice those rules at the last semester. Now, I find myself introduced and practical in practicing the software development life cycle.

My heartily thank goes to all the faculty members of IIT for their constant support providing information about the project as the project is related to IIT. A special thank goes to Dr. Kazi Muheymin-Us-Sakib for his inspiration to work according to the software development process and continuous support to practice the processes.

I’m also thankful to the stakeholders of the project for their timely assistance to understand the project requirements in different phases of the project development. In fact without the assistance of the listed support the project would not see the light of the day.

Preface

To be updated with the latest trend of the world of Software Engineering, practicing software development life cycle is mandatory. Institute of Information Technology successfully included this in their BSSE program which makes a student practical in using the software development lifecycle in software development.

From the starting of the BSSE program to the last semester the program has given us the knowledge of software development life cycle in different semesters of the program which makes a student comfortable to develop software with the learned scientific process.

To fulfill the requirement of my bachelor degree, the six credit course in the 8th semester was a must requirement and following the learning the of past seven semesters the project has been developed.

I have tried my level best to make the project successful following the rules and guidelines our teacher taught us in the previous semesters. This report is the reflection of the working done in the course.

Executive Summary

To be updated with the latest software engineering trend Institute of Information Technology, University of Dhaka managed to develop the outstanding course offering for its students. The undertaken project named “IIT Program Office Accounting System” is one of the most important courses in its BSSE Program under SE 801.

In this project document, the processes of software development life cycle have been followed as much as possible to develop the software. The first chapter has an introduction of this project document with an overall description in the second chapter. Software requirement specification (SRS) is the most important part of this document. The requirements for the Course and Result Management System has been gathered from its stakeholder from IIT and listed for the design and development purpose. The SRS has been included in the third chapter of the document with its analysis diagrams in the fourth chapter titled Requirement Analysis Diagrams. The implementation function has been included in the fifth chapter where the implemented functions have been described with its using process. The testing phase is so much important for a software development. In the next chapter a test plan for the software project has been included.

All the phases have been included in this document which has actually been followed during the project development life cycle. In the last chapter there is a conclusion on this project document based on the experience I got during the long duration of project development.

Revision History

Name	Date	Reason	Version
Rayhan Hossain	28.11.2013	Initial project report delivery	1.0

Table of Contents

Document Approval II

Letter of Transmittal III

Acknowledgement IV

Preface V

Executive Summary VI

Table of Content .... **Error! Bookmark not defined.**

List of Figures XII

Revision History VII

Chapter 01 13

Introduction 13

1 Introduction 14

1.1 Purpose 14

1.2 Intended Audience and Reading Suggestions 14

1.3 Document Conventions 14

1.4 Evaluation of this document 15

1.5 Product Scope 15

1.6 Definitions, Acronyms and Abbreviations 15

1.7 Glossary 16

1.8 References 16

Chapter 02 17

Overall Description 17

2.0 Overall Description 18

2.1 Product Perspective 18

2.2 Current Solution 18

2.3 Proposed Solution 18

2.4 User Classes and Characteristics 19

2.4.1 Admin 19

2.4.2 Program Chair 19

2.4.3 Accountant 19

2.4.4 Section Admin 19

2.5 Operating Environment 20

2.6 User Documentation........ 20

2.7 Development Language and Tools 20

2.8 Project Timeline........ 21

Chapter 03........ 22

Software Requirement Specification 22

3 Software Requirement Specification (SRS) 23

3.1 Inception........ 23

3.1.1 Identifying Stakeholders........ 23

3.1.2 Recognizing multiple viewpoints........ 24

3.1.3 Working towards collaboration........ 25

3.1.4 Asking the First Questions 26

3.2 Eliciting Requirements........ 26

3.2.1 Collaborative Requirements Gathering 26

3.2.2 Quality Function Deployment 27

3.4 Functional Requirement Specification........ 28

3.5 Non-Functional Requirements........ 29

3.5.1 Performance Requirements........ 29

3.5.2 Safety Requirements 29

3.5.3 Security Requirements 29

3.5.4 Maintainability Requirements........ 29

Chapter 04........ 30

Requirement Analysis Diagrams........ 30

4 Requirement Analysis Diagrams 31

4.1 Use Case Diagram........ 31

4.1.1 System Environment Use Case 31

4.1.2 Admin Use Case 32

4.1.3 Accountant Use Case........ 32

4.1.4 Program Chair Use Case 33

4.2 Activity Diagram 34

4.3 Class based Modeling........ 35

Chapter 05........ 36

Product Implementation........ 36
5.0 Implementation........ 37
5.1 Implemented Features........ 37
5.1.1 Role 37
5.1.2 Peon 38
5.1.3 Section........ 38
5.1.4 Semester........ 39
5.1.5 User 39
5.1.6 Item........ 40
5.1.7 Expense Management........ 40
5.2 Implementation Technology Assistance 41
5.2.1 ASP.NET MVC 4 41
5.2.2 Entity Framework 5 42
5.2.3 Angular JS 42
5.2.4 CSS 3........ 43
5.2.5 Bootstrap 44
5.2.6 Microsoft SQL Server 2008 R2 45
5.2.7 Microsoft Visual Studio 2012........ 45
Chapter 06........ 47
Product Testing & Quality Assurance 47
6. 0 Test Plan for Course and Result Management System for IIT........ 48
6.1 Test Plan Identifier........ 48
6.2 References........ 48
6.3 Objectives........ 48
6.4 Test Strategies 49
6.5 Test Items........ 49
6.6 Features to be tested 50
6.7 Item Pass/fail Criteria........ 51
6.8 Suspension Criteria 51
6.9 Test deliverable 52
6.10 Environmental Need 52

6.11 Schedule 53
Chapter 7 54
Conclusion.. 54
7 Conclusion.. 55

List of Figures

Figure 1 : System Environment Use Case 31
Figure 2 : Admin Use Case 32
Figure 3 : Accountant Use Case........ 32
Figure 4 : Program Chair Use Case 33
Figure 5 : Activity Diagram........ 34
Figure 6 : Class Digram........ 35
Figure 7 : Screen Shot of Role Page........ 37
Figure 8 : Screen Shot of Peon Page........ 38
Figure 9 : Screen Shot of Section Page 39
Figure 10 : Item page with section 40
Figure 11 : Expense Entry Page 41

Chapter 01

Introduction

1 Introduction

This section gives an overview of everything included in this project report document as well as purpose for this document is described. There is also a list of abbreviations and definitions are provided.

1.1 Purpose

The purpose of this document is to give detailed description of the project report for the "IIT Program Office Accounting System". The complete description of the development system will be described in this document. The intended audience includes all stakeholders in the potential system. Developer should consult this document and its revisions as the only source of requirements for the project as well as for the design, implementation details and testing report. They should not consider any statement, written and verbal as valid until they appear in this document or its revision history.

1.2 Intended Audience and Reading Suggestions

The intended audience of the proposed system is the program office of Institute of Information Technology (IIT), University of Dhaka and the developers of the system. The Program office of IIT will provide the requirements for the proposed system and the developers will design and develop the system for them as well as test the project to make the system more perfect to use. The non-technical audience will can have an assumption about the system from this document.

1.3 Document Conventions

This project report is divided up into sections detailing an overall description, software requirement specifications (SRS), implementation as well as test document. As this is the final draft, any future modifications of this document would involve adapting the product to changing systems and uses. We hope to have the product evolve to changing times as to ensure continued use and success. The Document and Specification team have prepared the overall information in this document to the best of their ability. Once read, it is evident that each section is important to the overall project report and significant to the project in its own right.

1.4 Evaluation of this document

The final goal of this document is to represent the total project report of the system for the clients, developers and persons related to this project which include SRS, design, implementation as well as testing. The document has been written by collecting requirements from the clients of the system after several meetings with our requirement engineer and we have tried to elicit all the requirements for the proposed system though it is not easy to give a boundary to the list of requirements. After the requirement the system design diagram has been placed and then the implanted task has been listed with the testing of the project.

1.5 Product Scope

The proposed software product titled “IIT Program Office Accounting System” is an accounting system which will be used to maintain the expenditure of a specific amount of money. The program office of IIT is given an amount of 42000 taka at the beginning of the semester. The amount of taka is used in four sections such as office stationary, exam time refreshment, general refreshment and gift. The system will provide an online solution to track the expenditure of the above described system. The teacher of the institute will have permission to a specific section to observe the expenditure and the director will have permission to view the expenditure of all sections. The user account for the teachers will be created by the system admin.

1.6 Definitions, Acronyms and Abbreviations

The following table explains the terms and abbreviations used in the document.

Term/Abbreviation	**Explanation**
SRS	Software Requirement Specification
IITPOAS	IIT Program Office Accounting System

1.7 Glossary

Terms	Definition
Exam time Refreshment	During different exam there are some cost of snacks and refreshment item for the teachers. Those are called exam time refreshment.
Gift	In different programs program office give gifts to the guests.
Office Stationary	To decorate program office needs some decoration item which is used to call office stationary.

Figure 2: Glossary

1.8 References

The following list defines materials those have been useful while writing this document:

1. IEEE 830-1998 standard [IEEE-830]
2. Software Engineering: A Practitioner’s Approach by Roger S. Pressman
3. SRS on “Competence Development Tool” between IIT and GPIT.

Chapter 02

Overall Description

2.0 Overall Description

This section has been designed to describe the overall characteristics of the proposed system. Why the system is going to be implemented and in which constraints the system will be implemented. The implementation criteria, product viewpoint, development environment will be included here.

2.1 Product Perspective

In the current age system automation is a common word due to the available technologies for automation of several types of system. Any kind of ERP type solution is now a common criterion for automation. The accounting system of Institute of Information Technology currently is a paper based which should be automated for better flexibility and efficiency. The perspective of the undertaken project is to automate the old paper based system to turn into a digital system.

2.2 Current Solution

In different modern institutions most of the official work activities are performed using automated system. In this modern age it is also very important to maintain those activities in an automated way as the information related to accounting system is so much sensitive and should have an accurate calculation of the expenditure. The current accounting system of IIT is paper based which is so much time consuming and unreliable to save information. The expenditure information, kept in traditional paper gives so much pain during the audit. So the system has a heavy need to be automated.

2.3 Proposed Solution

As the current accounting system of IIT program office is not a standard solution the system will be made automated where a system admin will maintain all the expenditure. Only the system admin have the read and write permission to the system. Admin will give entry the expenditure by creating a new voucher. The common item list of the voucher will be created by the admin and will be used later. If there is not the item he expects s/he can add that. The voucher will be created under one of the four sections. All the permitted use can see the expenditure details by clicking on the specific section.

2.4 User Classes and Characteristics

2.4.1 Admin

In the IIT Program Office Accounting System the major but silent role is played by the admin. An admin can add the other users of the system such as program chair, accountant as well as section admin. Admin will have the permission to operate on the major parts of the system.

2.4.2 Program Chair

The program chair is the most important user of the undertaken project as he is involved with the major parts of the project sections. The program chair will review the request for acceptance of the list of expense and he will accept or deny that request. The generated report can also be available to the program chair. In a word the program chair will observe what is going on to the system.

2.4.3 Accountant

The operational and core work is done by the accountant, as the system has been developed for his/her operation. The accountant will entry the different types of expense list for the storage and maintenance which will be reviewed and accepted/denied by the program chair of the system.

2.4.4 Section Admin

There are five sections of the system such as General Refreshment, Exam Time Refreshment, Office Stationary, Gift & Guest Attendance and Contingency. Each section has an admin who is called as section admin. The responsibility of the section admin is to review what is going on in his/her section.

2.5 Operating Environment

The “IIT program office accounting system” will be a web based project. The application will be available to be used using the web browser within an intranet network. Thus it will ensure its best usage and will ease the means of getting access to the system. Moreover it will remove the complexities of running the system in multiple platforms as it will be deployed in a web server.

2.6 User Documentation

The product has a unique way to operate on, so the project team will provide user documentation for the users of the system. This will help the users to operate the system without any difficulty as well as feedback may come from the end user to make the system more usable for the next version.

2.7 Development Language and Tools

The application will be developed using Microsoft’s .NET Framework 4. The used language will be C#, ASP.NET MVC4 framework, SQL database for backend environment. The front end will be developed using HTML 5, AngularJS and CSS3. Microsoft Visual Studio 2012 Professional edition and Microsoft SQL Server management studio 2008 R2.

2.8 Project Timeline

Inception	10 July’13- 20 July’13						
Elicitation		21 July’13- 30 July’13					
Requirements analysis			1st August’13- 5 Sept’13				
Design				6 Sept’13- 20 Sept’’13			
Implementation					21 Semt’13- 30 Oct’13		
Testing & Improvement						1st Nov’13- 26 Nov’13	
Release							27 Nov’13

Project Ending Date: 29.11.2013

Chapter 03

Software Requirement Specification

3 Software Requirement Specification (SRS)

3.1 Inception

In this chapter, the Inception part of the SRS will be discussed briefly.

Inception is the beginning phase of requirements engineering. It defines how does a software project get started and what is the scope and nature of the problem to be solved. The goal of the inception phase is to identify concurrence needs and conflict requirements among the stakeholders of a software project. During inception I asked a set of questions to establish

- A basic understanding of the problem
- The people who want a solution
- The nature of the solution that is desired
- The effectiveness of preliminary communication and collaboration between the customer and the developer

To establish the groundwork I have worked with the following factors related to the inception phases:

- Identify the stakeholders
- Recognize multiple viewpoints
- Work toward collaboration
- Break the ice and initiate the communication

3.1.1 Identifying Stakeholders

Stakeholder refers to any person or group who will be affected by the system directly or indirectly. Stakeholders include end-users who interact with the system and everyone else in an organization that may be affected by its installation. To identify the stakeholders we consulted with Accountant of program office and the respective teachers assigned for the related section and asked them the following questions:

- Who is behind the request for this work?

- Who will use the solution?
- What will be the economic benefit of a successful solution?
- Is there another source for the solution that you need?
- Who is paying for the project?
- Who will be using the project outcomes?
- Who gets to make the decisions about the project (if this is different from the money source)?
- Who has resources I need to get the project done?
- Whose work will my project affect?

I identified following stakeholders for IIT Program Office Accounting System**:**

1. **IIT program office:** IIT program office sanctions the required money for the program office expenditures such as exam refreshment, stationary etc. So program office seeks the system to work properly which meets up the demands in the automated way.
2. **Account office of IIT:** As the account office keeps all the calculation and documents for the sanctioned money, they are one of the important stakeholders of the system.
3. **Respective assigned teachers/ authority:** The sanctioned money is passed and billed with the signature of the teachers who are liable for different aspects of expenditures. So they are also important stakeholders of the system.
4. **System Operator:** System Operator will directly interact with this software.
5. **Developers:** I selected developers as stakeholder because they develop this system and work for further development. If occurs any system interruption, they will find the problem and try to solve it.

3.1.2 Recognizing multiple viewpoints

I collect these view points by discussing with the IIT program office, Account office of IIT, Accountant and respective teachers who are liable of expenditures in different fields.

– **Accountant's** view points:

  a. Easy to use and insert data
  b. No one will be able to update data without authorized person

c. Quality should be maintained

- **IIT Program Office's** view points:
  a. System should be secured
  b. Standard authorization system should be implemented
- **Respective Teacher's** view points:
  a. No one will be able to see the data of a specific section without authorized person
  b. Easy to use and generate reports

3.1.3 Working towards collaboration

Every stakeholder has their own requirements. I followed following steps to merge these Requirements:

- Identify the common and conflicting requirements
- Categorize the requirements
- Take priority points for each requirement from stakeholders and on the basis of this voting prioritize the requirements
- Make final decision about the requirements

Common requirements:

- Web-Based Interfaces
- The application can be accessed from any computer that has Internet access
- Error free system

Conflicting requirements:

- Easily Maintainable and Strong authentication and authorization system

Final Requirements:

I finalized following requirements for the system by categorizing and prioritizing the requirements:

- Error free system (Maximum 1% error may be considerable)
- Web application
- Accessible via the Internet.

- Allow valid users to login and logout
- Maintain a strong authorization system
- Easy to use and maintain

3.1.4 Asking the First Questions

I set my first set of context-free questions focuses on the customer and other stakeholders, overall project goals and benefits. The questions are mentioned above. These questions helped me to identify all stakeholders, measurable benefit of the successful implementation and possible alternatives to custom software development. Next set of question helped me to gain a better understanding of problem and allows the customer to voice his or her perception about the solution. The final set of question focused on the effectiveness of the communication activity itself.

3.2 Eliciting Requirements

Requirements elicitation combines elements of problem solving, elaboration, negotiation, and specification. In order to encourage a collaborative, team-oriented approach to requirements gathering, stakeholders work together to identify the problem, propose elements of the solution, negotiate different approaches and specify a preliminary set of solution requirements.

3.2.1 Collaborative Requirements Gathering

Requirement gathering is a process to identify the scope of a project after several meeting with the clients. In the meeting, the main goal of the requirement engineer is to identify each and every single requirement from the stakeholders of the project. To accomplish that we, the project team met for several times to identify the requirements with the program chair of IIT and the accountant of IIT program office as well as some respected teachers. They provide their valuable opinions about the system and their much needed requirements for the project.

3.2.2 Quality Function Deployment

Quality function deployment (QFD) is a quality management technique that translates the needs of the customer into technical requirements for software. QFD "concentrates on maximizing customer satisfaction from the software engineering process"

3.2.2.1 Normal Requirement

1. **Authentication System:** The system will use form authentication system. No authenticated person will be allowed to access the system.

2. **Authorization System:** There will be four roles in the system as mentioned bellow –

   I. Admin
   II. Program Chair
   III. GR Admin
   IV. ETR Admin
   V. GGA Admin
   VI. OS Admin
   VII. Accountant

Authorization system should limit the access of unauthorized persons to any sections.

3. **Data insert, update and delete System:** There are five sections of program office accounting system as described below-

   I. Exam Time Refreshment
   II. Office Stationary
   III. General Refreshment
   IV. Gift and Guest Attendant
   V. Contingency

Accounting information should be inserted, updated and deleted easily as section wise.

4. **History Viewing System**

Previous records should be viewed in a well organized way.

3.2.2.2 Expected Requirement

1. **Report Printing System:** Report can be printed as user expect.

3.2.2.3 Exciting Requirement

1. Mobile data entry option for accountant.

3.4 Functional Requirement Specification

Before identification of the requirements we needed the comprehensive engagement and lighting quick coordination with the stakeholders. This accelerates the entire requirements management process by orchestrating the flow of information and processes across the stakeholders. Again this is combined with hybrid agile and waterfall development methodologies and tools. Flexible workflows and automatic notifications streamline communication, review, and approval of requirements across stakeholders, while common metrics and dashboards ensure everyone is on the same page. So, the listed requirements go with all the previous processes.

Requirement No.	Requirement Description
REQ-001	Admin can add user with username, password and email id
REQ-002	Password should be given twice to match
REQ-003	Username and password should be mailed to respective email id
REQ-004	Password should be in md5 format
REQ-005	User will have an option to retrieve password if s/he forgets.
REQ-006	To retrieve password user have to enter email address
REQ-007	System will send password recovery link to the user email.
REQ-008	User can reset his/her password click on the link which will forward him/her to a new page to give new password.
REQ-009	Admin can delete, edit user from user list.
REQ-010	Admin can create new voucher
REQ-011	There should have a voucher creating and editing log.
REQ-012	While creating and editing voucher an automated email will be sent to the respective section coordinator.
REQ-013	Admin and Program chair can view all the expenditure info.
REQ-014	Section coordinator can see only their section expenditure info.

Figure 2: Functional Requirement Specification

3.5 Non-Functional Requirements

3.5.1 Performance Requirements

Server software does not require any special hardware other than the minimum hardware required for running enterprise OS. Extra disk storage will be required for archives and electronic documents. Increases of memory enables efficient query processing, which is required for quick bibliographic search. Two server grade processors with clock speed 3.0 Ghz, at least 8GB RAM and 300 GB hard disk is recommended for the server. Client machine with recommended hardware required for desktop operating system and web browser (with open JavaScript enable).

3.5.2 Safety Requirements

As per IIT work place safety rules and the IIT server room where the server is supposed to be placed and the monitoring people.

3.5.3 Security Requirements

Each time there is a security violation, the log file will be updated with the login, date, and time. Again, high level cryptography and checking should be kept to make it more secured. However, while email or request from any unwanted client the request should drop and let that user know about the fault.

3.5.4 Maintainability Requirements

At least one backup server with same configuration as in main server is also recommended for fault tolerance and better performance. Separate storage (with backup) for database, electronic document, and manuscript is also recommended. Multiple computing nodes with the storage are required for high availability and to enhance the performance of the application. Again, after a certain period the preliminary manuscript files and other files related with that can be deleted manually from the database to increase the performance.

Chapter 04

Requirement Analysis Diagrams

4 Requirement Analysis Diagrams

4.1 Use Case Diagram

4.1.1 System Environment Use Case

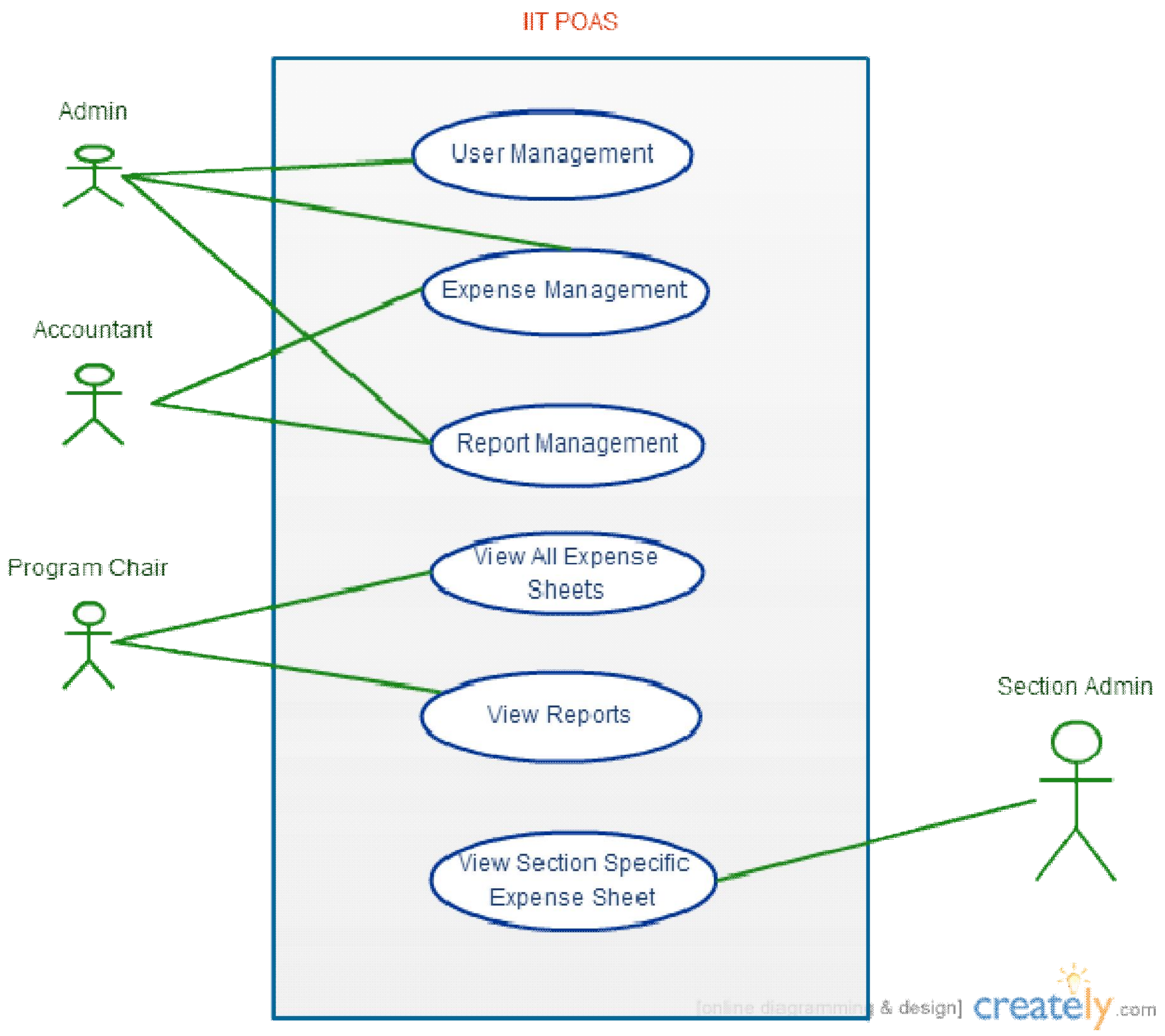


Figure 1 : System Environment Use Case

4.1.2 Admin Use Case

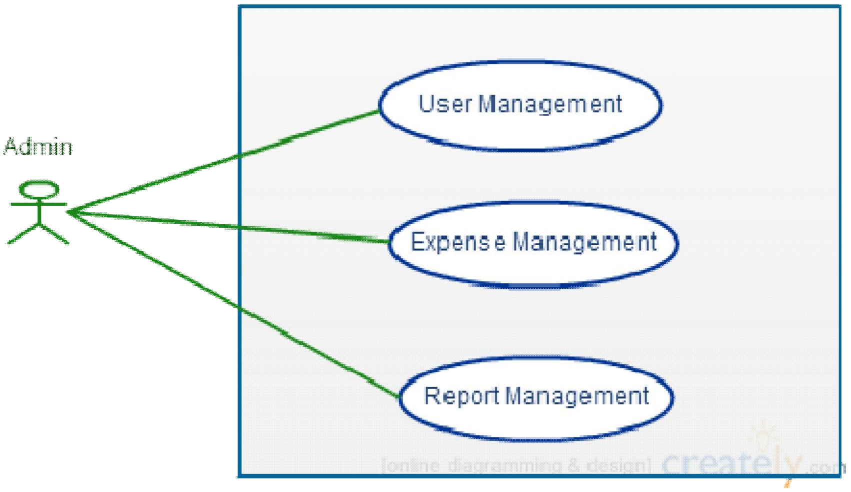


Figure 2 : Admin Use Case

4.1.3 Accountant Use Case

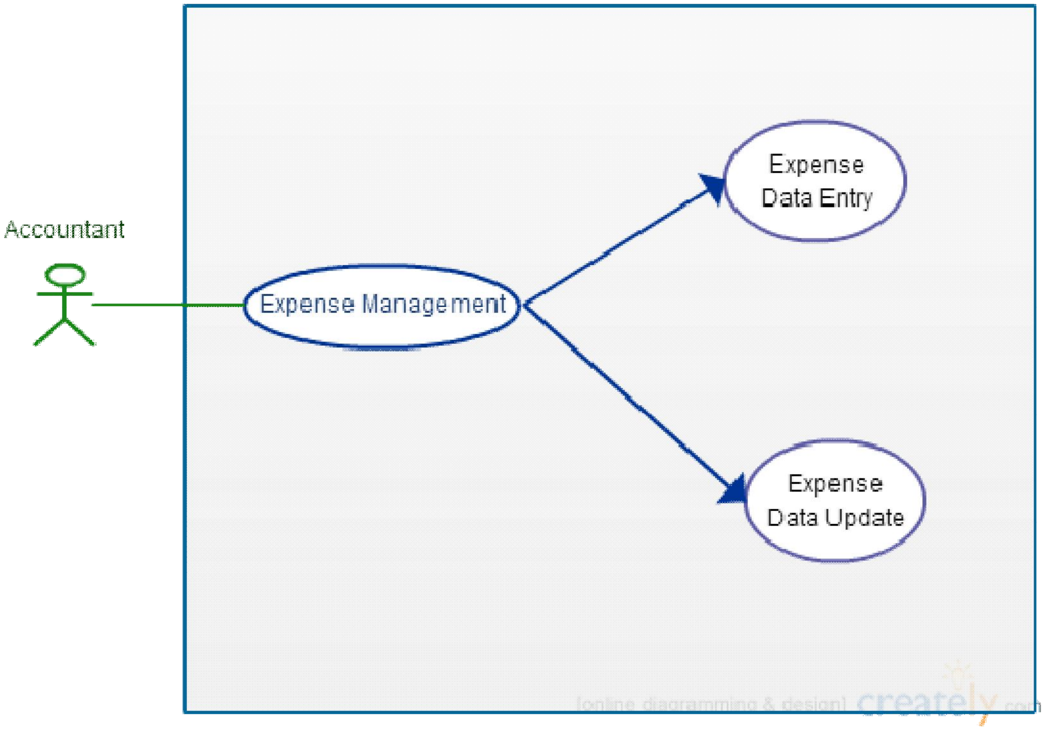


Figure 3 : Accountant Use Case

4.1.4 Program Chair Use Case

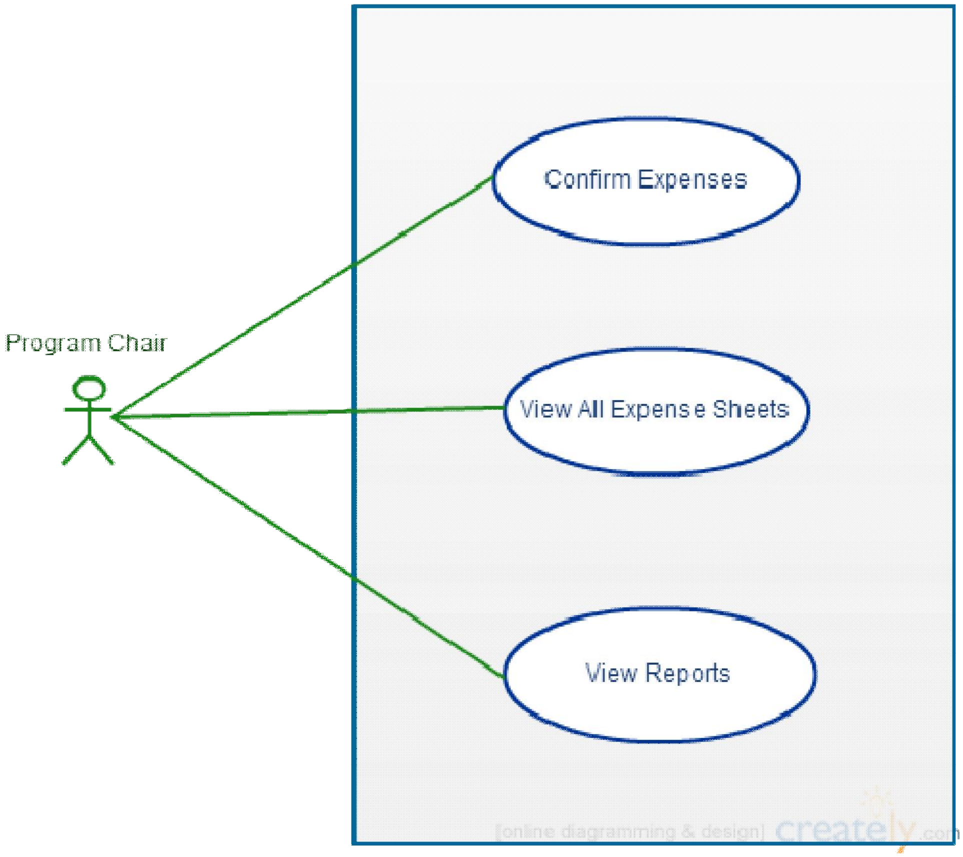


Figure 4 : Program Chair Use Case

4.2 Activity Diagram

Yes

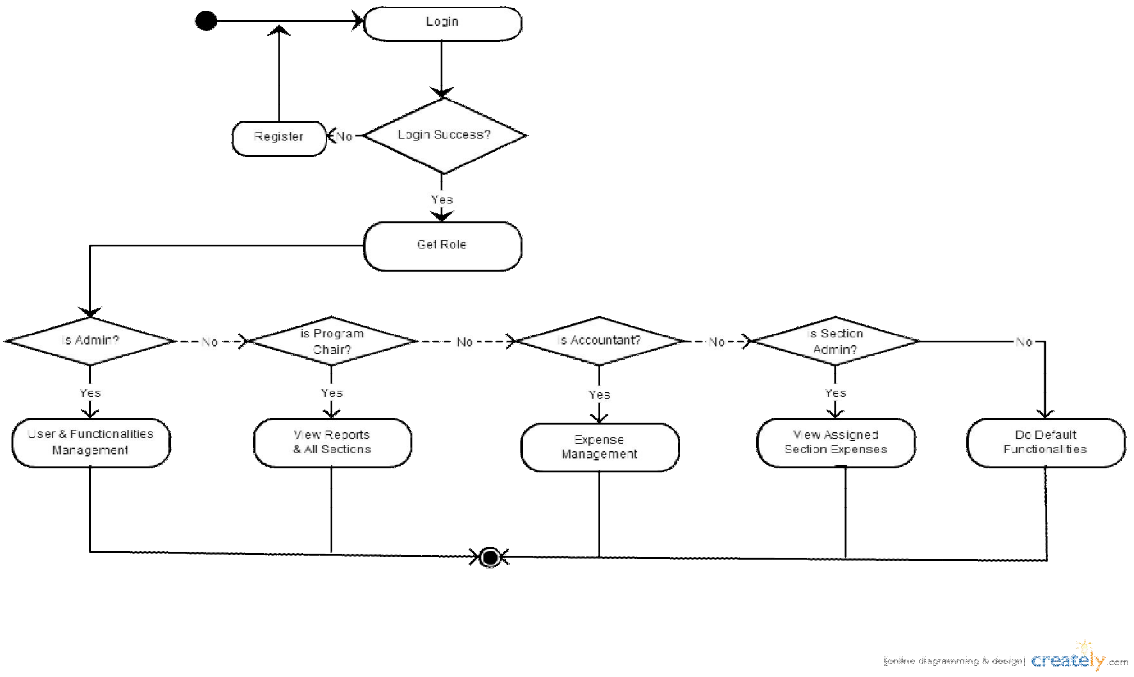

Login
Register
No
Login Success?
Yes
Get Role
Is Admin?
No
Is Program Chair?
No
Is Accountant?
No
Is Section Admin?
No
Yes
Yes
Yes
Yes
User & Functionalities Management
View Reports & All Sections
Expense Management
View Assigned Section Expenses
Do Default Functionalities
[online diagramming & design] creately.com

Figure 5 : Activity Diagram

4.3 Class based Modeling

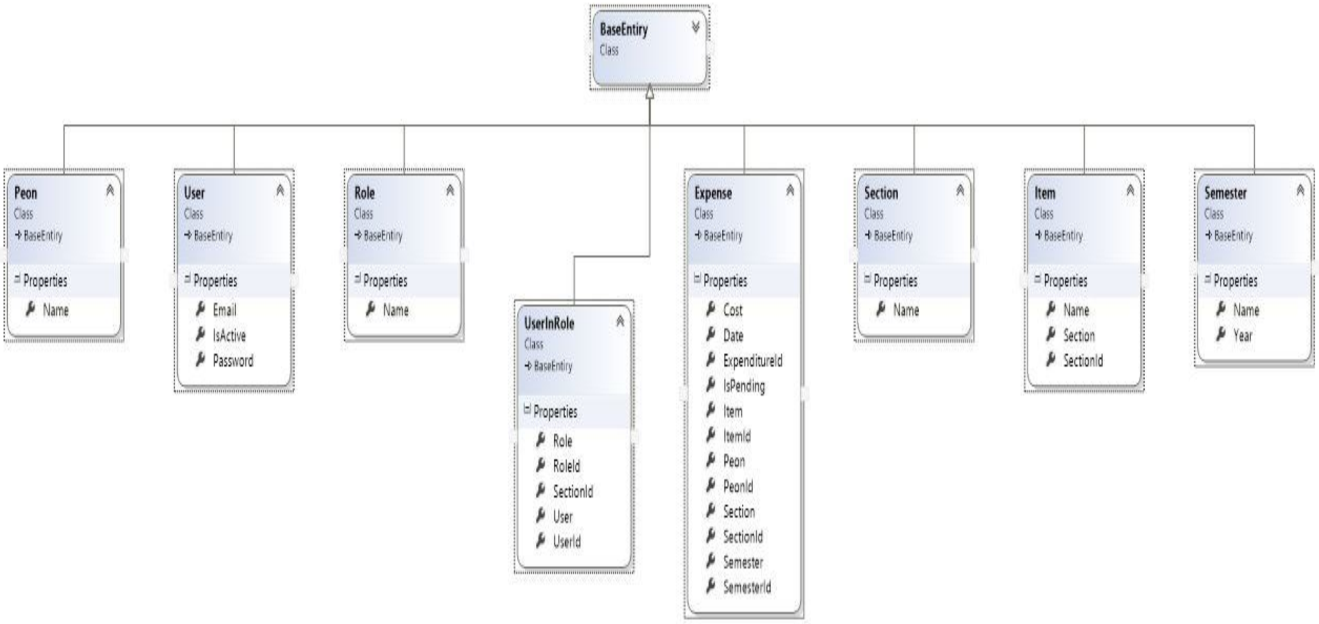


Figure 6 : Class Digram

Chapter 05

Product Implementation

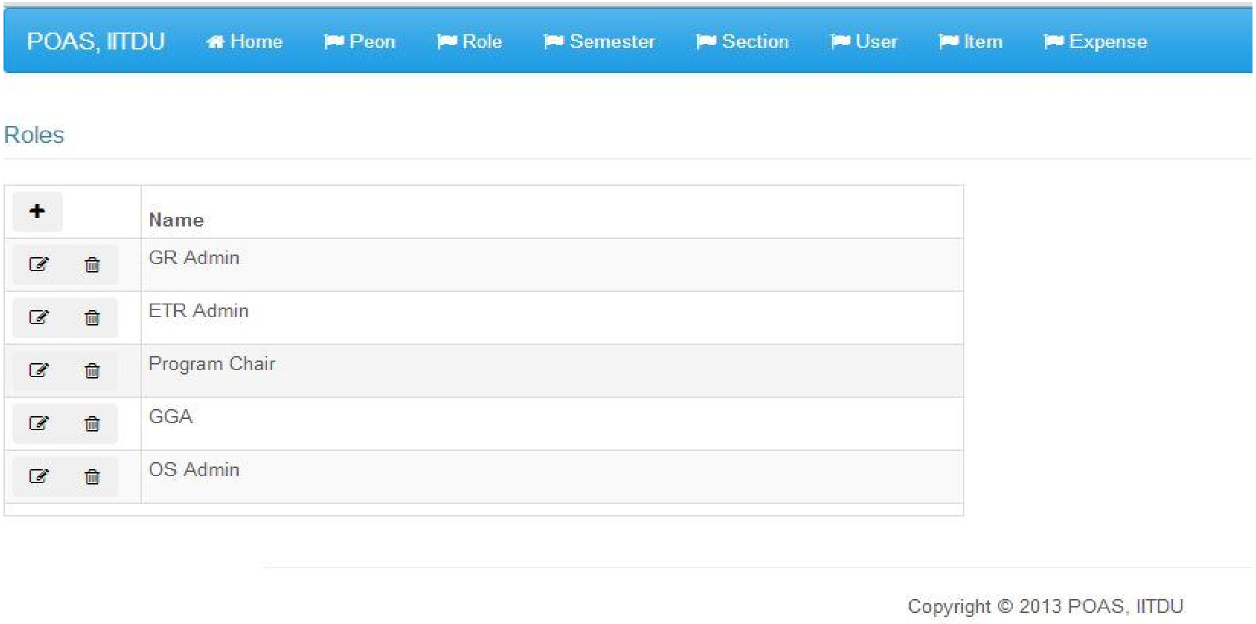
5.0 Implementation

5.1 Implemented Features

The SRS chapter contains the list of requirements to be implemented for the project. The development team has tried to implement those features to be functioned in the real world for the use of IIT Program Office Accounting System. The features which have been implemented will be described here along with its implementation technology.

5.1.1 Role

There are five roles implemented in the Role section of the IIT Program Office Accounting System such as GR Admin, ERT Admin, Program Chair, GGA and OS Admin. Each role has some sorts of works to do for his/her section.



Roles

+	Name
	GR Admin
	ETR Admin
	Program Chair
	GGA
	OS Admin

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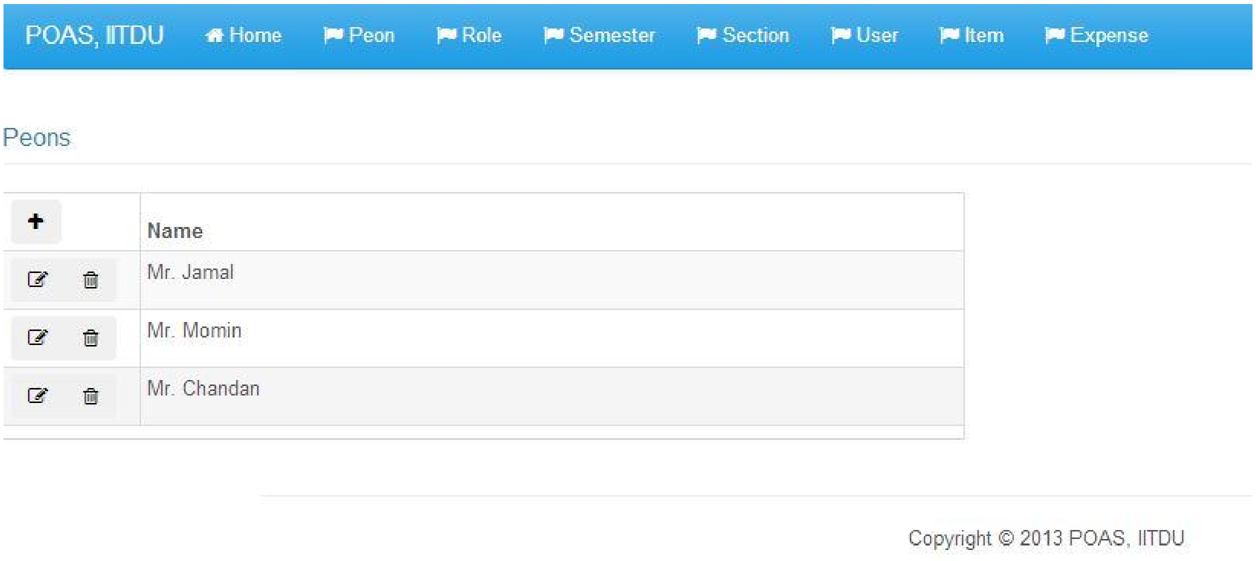
Figure 7 : Screen Shot of Role Page

5.1.2 Peon

Peons are the source of input of our system; the actual expense is performed by them. They submit that expenditure to the accountant and the accountant stores those to the specific section after acceptance from the program office. The peon section contains the list of peons of IIT which can be added, deleted or updated.



Peons

+	Name
✎ 🗑	Mr. Jamal
✎ 🗑	Mr. Momin
✎ 🗑	Mr. Chandan

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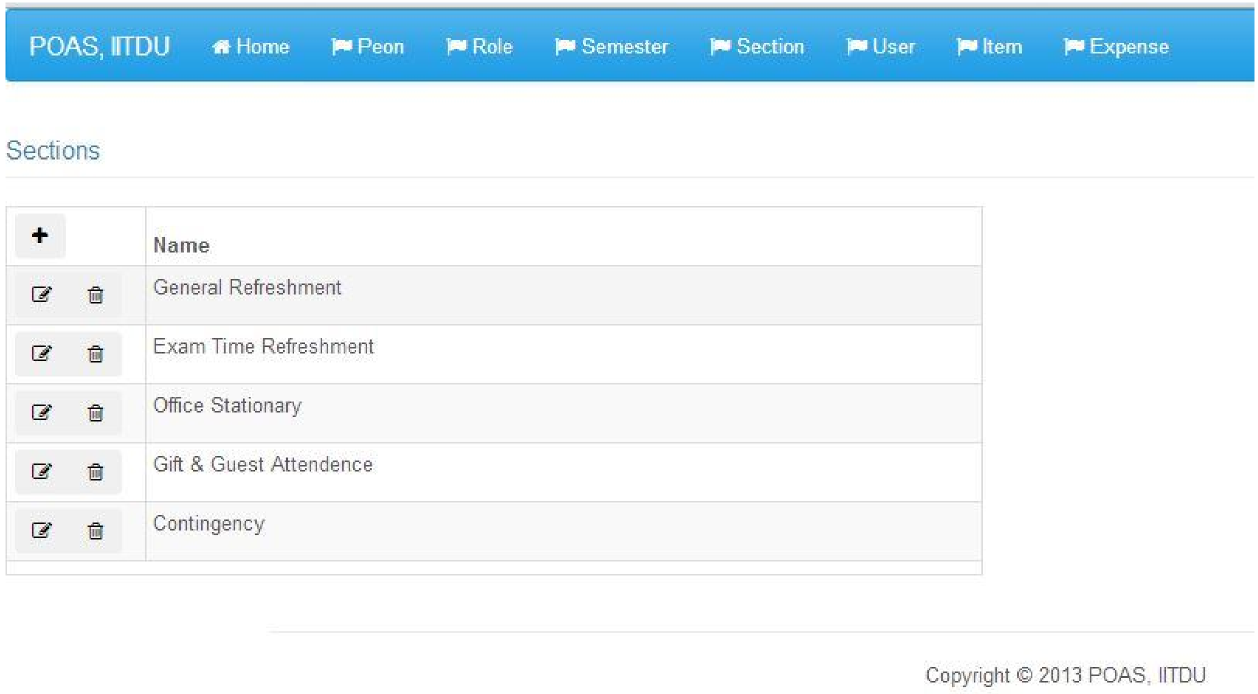
Figure 8 : Screen Shot of Peon Page

5.1.3 Section

There are five section of expense of the IIT Program office Accounting System; those are General Refreshment, Exam Time Refreshment, Office Stationary, Gift & Guest Attendance, and Contingency. Each of the section has unique expense for them. Those expense lists are stored under this section given by the peons of the IIT.



Sections

+	Name
✎ 🗑	General Refreshment
✎ 🗑	Exam Time Refreshment
✎ 🗑	Office Stationary
✎ 🗑	Gift & Guest Attendence
✎ 🗑	Contingency

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Figure 9 : Screen Shot of Section Page

5.1.4 Semester

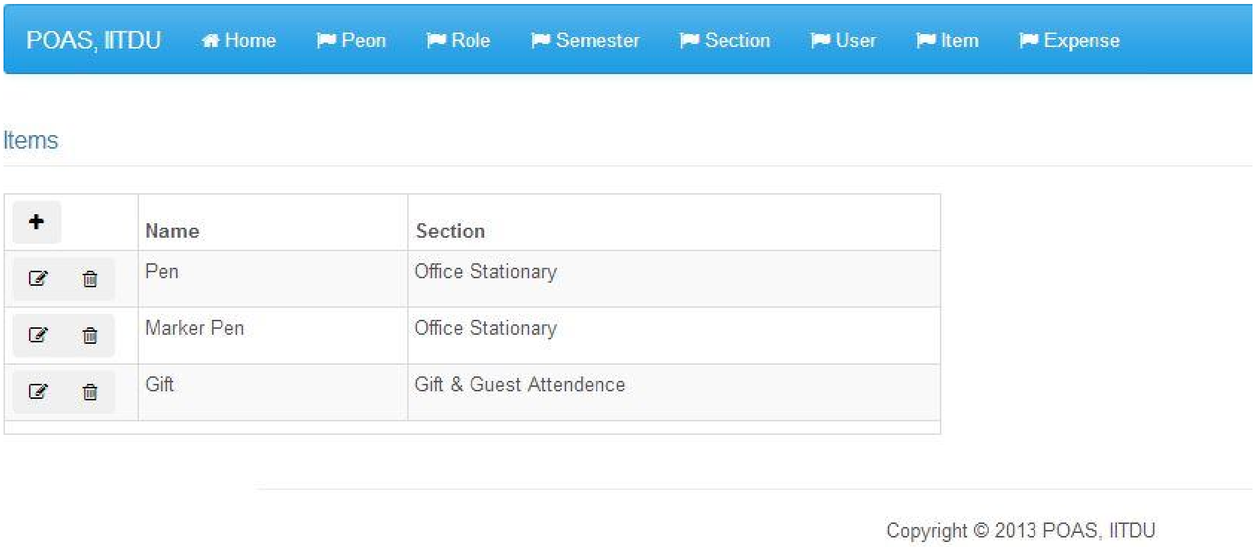
Actually the expense management is for six month duration of a semester. So all the section goes under a semester where each semester has some expense under each of the expense section of the system such as General Refreshment, Exam Time Refreshment etc. Program office can view semester wise expense history.

5.1.5 User

There are five types of user of the system mentioned in the above paragraphs. Each user has an email and password for their unique identity and login for the system. After creating a user the username and default password is sent to the user email address by which he/she will enter into the system.

5.1.6 Item

The expense has several items where the money is used such as tea, banana, gift items etc. The most common items have been added to the system. When the accountant needs to more items s/he can add those items to the system.



	Name	Section
	Pen	Office Stationary
	Marker Pen	Office Stationary
	Gift	Gift & Guest Attendence

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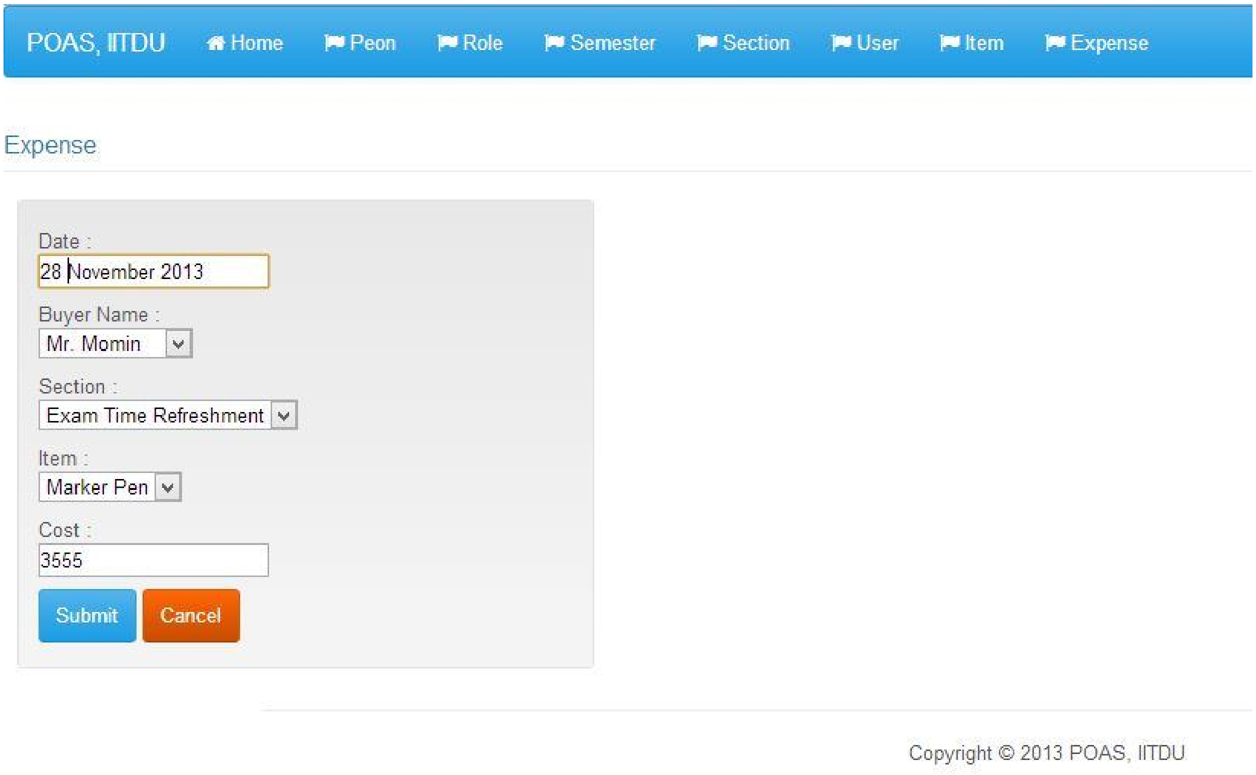
Figure 10 : Item page with section

5.1.7 Expense Management

Expense Management is the core part of the IIT Program Office Accounting System. When the accountant add an expense s/he has to give the date, in which section the expense for, item name, cost and also the buyer of that expense. Those can also be updated in the review time by the program office.



Expense

Date : 28 November 2013

Buyer Name : Mr. Momin

Section : Exam Time Refreshment

Item : Marker Pen

Cost : 3555

Figure 11 : Expense Entry Page

5.2 Implementation Technology Assistance

There are several types of technology support needed to implement the project. Few of them are introduced below:

5.2.1 ASP.NET MVC 4

Based on ASP.NET, ASP.NET MVC allows software developers to build a web pplication as a composition of three roles: *Model*, *View* and *Controller*. A *model* represents the state of a particular aspect of the application. A *controller* handles interactions and updates the model to reflect a change in state of the application, and then passes information to the view. A *view* accepts necessary information from the controller and renders a user interface to display that information. In April 2009, the ASP.NET MVC source code was released under the Microsoft Public License (MS-PL).ASP.NET MVC framework is a lightweight, highly testable presentation framework that is integrated with existing ASP.NET features. Some of these integrated features are master pages and membership-based authentication. The MVC framework is defined in the System. Web. Mvc assembly. The ASP.NET MVC Framework couples the models, views, and controllers using interface-based contracts, thereby allowing each component to be easily tested independently.

5.2.2 Entity Framework 5

The Entity Framework is a set of technologies in ADO.NET that support the development of data-oriented software applications. Architects and developers of data-oriented applications have struggled with the need to achieve two very different objectives. They must model the entities, relationships, and logic of the business problems they are solving, and they must also work with the data engines used to store and retrieve the data. The data may span multiple storage systems, each with its own protocols; even applications that work with a single storage system must balance the requirements of the storage system against the requirements of writing efficient and maintainable application code.

The Entity Framework enables developers to work with data in the form of domain-specific objects and properties, such as customers and customer addresses, without having to concern themselves with the underlying database tables and columns where this data is stored. With the Entity Framework, developers can work at a higher level of abstraction when they deal with data, and can create and maintain data-oriented applications with less code than in traditional applications. Because the Entity Framework is a component of the .NET Framework, Entity Framework applications can run on any computer on which the .NET Framework starting with version 3.5 SP1 is installed.

5.2.3 Angular JS

AngularJS is an open-source JavaScript framework, maintained by Google, that assists with running single-page applications. Its goal is to augment browser-based applications with model–view–controller (MVC) capability, in an effort to make both development and testing easier. The library reads in HTML that contains additional custom tag attributes; it then obeys the directives in those custom attributes, and binds input or output parts of the page to a model represented by standard JavaScript variables. The values of those JavaScript variables can be manually set, or retrieved from static or dynamic JSON resources.

AngularJS is built around the belief that declarative programming should be used for building UIs and wiring software components, while imperative programming is excellent for expressing business logic. The framework adapts and extends traditional HTML to better serve dynamic content through two-way data-binding that allows for the automatic synchronization of models and views. As a result, AngularJS deemphasizes DOM manipulation and improves testability.

Design goals:

- Decouple DOM manipulation from application logic. This improves the testability of the code.
- Regard application testing as equal in importance to application writing. Testing difficulty is dramatically affected by the way the code is structured.
- Decouple the client side of an application from the server side. This allows development work to progress in parallel, and allows for reuse of both sides.
- Guide developers through the entire journey of building an application: from designing the UI, through writing the business logic, to testing.

Angular follows the MVC pattern of software engineering and encourages loose coupling between presentation, data, and logic components. Using dependency injection, Angular brings traditional server-side services, such as view-dependent controllers, to client-side web applications. Consequently, much of the burden on the backend is reduced, leading to much lighter web applications.

5.2.4 CSS 3

Cascading Style Sheets (CSS) is a style sheet language used for describing the presentation semantics (the look and formatting) of a document written in a markup language. Its most common application is to style web pages written in HTML and XHTML, but the language can also be applied to any kind of XML document, including plain XML, SVG and XUL.

CSS is designed primarily to enable the separation of document content (written in HTML or a similar markup language) from document presentation, including elements such as the layout, colors, and fonts. This separation can improve content accessibility, provide more flexibility and control in the specification of presentation characteristics, enable multiple pages to share formatting, and reduce complexity and repetition in the structural content (such as by allowing for tableless web design). CSS can also allow the same markup page to be presented in different styles for different rendering methods, such as on-screen, in print, by voice (when read out by a speech-based browser or screen reader) and on Braille-based, tactile devices. It can also be used to allow the web page to display differently depending on the screen size or device on which it is being viewed. While the author of a document typically links that document to a CSS file, readers can use a different style sheet, perhaps one on their own computer, to override the one the author has specified.

CSS specifies a priority scheme to determine which style rules apply if more than one rule matches against a particular element. In this so-called *cascade*, priorities or *weights* are calculated and assigned to rules, so that the results are predictable.

5.2.5 Bootstrap

Bootstrap is a free collection of tools for creating websites and web applications. It contains HTML and CSS-based design templates for typography, forms, buttons, navigation and other interface components, as well as optional JavaScript extensions. It is the most popular project on GitHub[2] and has been used by NASA and MSNBC among others. Bootstrap was developed by Mark Otto and Jacob Thornton at Twitter as a framework to encourage consistency across internal tools. Before Bootstrap, various libraries were used for interface development, which led to inconsistencies and a high maintenance burden.

Bootstrap has relatively incomplete support for HTML5 and CSS 3, but it is compatible with all major browsers. Basic information of compatibility of websites or applications is available for all devices and browsers. There is a concept of partial compatibility that makes the basic information of a website available for all devices and browsers. For example, the properties introduced in CSS3 for rounded corners, gradients and shadows are used by Bootstrap despite lack of support by older web browsers. These extend the functionality of the toolkit, but are not required for its use. Bootstrap is modular and consists essentially of a series of LESS stylesheets that implement the various components of the toolkit. A stylesheet called bootstrap.less includes the components stylesheets. Developers can adapt the Bootstrap file itself, selecting the components they wish to use in their project. Adjustments are possible to a limited extent through a central configuration stylesheet. More profound changes are possible by the LESS declarations.

5.2.6 Microsoft SQL Server 2008 R2

Microsoft SQL Server is a relational database management system developed by Microsoft. As a database, it is a software product whose primary function is to store and retrieve data as requested by other software applications, be it those on the same computer or those running on another computer across a network (including the Internet). There are at least a dozen different editions of Microsoft SQL Server aimed at different audiences and for workloads ranging from small single-machine applications to large Internet-facing applications with many concurrent users. Its primary query languages are T-SQL and ANSI SQL.

5.2.7 Microsoft Visual Studio 2012

Microsoft Visual Studio is an integrated development environment (IDE) from Microsoft. It is used to develop console and graphical user interface applications along with Windows Forms or WPF applications, web sites, web applications, and web services in both native code together with managed code for all platforms supported by Microsoft Windows, Windows Mobile, Windows CE, .NET Framework, .NET Compact Framework and Microsoft Silverlight.

Visual Studio includes a code editor supporting IntelliSense as well as code refactoring. The integrated debugger works both as a source-level debugger and a machine-level debugger. Other built-in tools include a forms designer for building GUI applications, web designer, class designer, and database schema designer. It accepts plug-ins that enhance the functionality at almost every level—including adding support for source-control systems (like Subversion and Visual SourceSafe) and adding new toolsets like editors and visual designers for domain-specific languages or toolsets for other aspects of the software development lifecycle (like the Team Foundation Server client: Team Explorer).

Visual Studio supports different programming languages by means of language services, which allow the code editor and debugger to support (to varying degrees) nearly any programming language, provided a language-specific service exists. Built-in languages include C/C++ (via Visual C++), VB.NET (via Visual Basic .NET), C# (via Visual C#), and F# (as of Visual Studio 2010). Support for other languages such as M, Python, and Ruby among others is available via language services installed separately. It also supports XML/XSLT,HTML/XHTML, JavaScript and CSS. Individual language-specific versions of Visual Studio also exist which provide more limited language services to the user: Microsoft Visual Basic, Visual J#, Visual C#, and Visual C++.

Microsoft provides "Express" editions of its Visual Studio at no cost. Commercial versions of Visual Studio along with select past version are available for free to students via Microsoft's DreamSpark program.

Chapter 06

Product Testing & Quality Assurance

6. 0 Test Plan for Course and Result Management System for IIT

6.1 Test Plan Identifier

This is the test plan is on IIT Program Office Accounting System (IITPOAS) where the functional test plan has been included. The test approach, different types of testing criteria as well as a test report will be given in the final document.

This is the first version of test plan and it is at level 1 at this moment because, when new feature will include in it, software test team will enrich this test plan according to change. Though in this project we only cover the result part so we emphasize on the result relevant activities, relevant test scenarios.

6.2 References

To develop the test plan there are some supporting documents. The following are those supporting documents:

- ✓ IITPOAS Software Requirement Specification Version 1.0.
- ✓ Test plan template IEE-829.
- ✓ International Standard Testing [4].

6.3 Objectives

The IIT Program Office Accounting System has a few numbers of features. So the test plan has been developed to test those features so that those features work well after the deployment of the product. Most of the test will be tested manually. Now this is the master test plan to test the project. This document describes which feature will be tested, which will not to be tested developing risk metrics. The objectives of the test plan are given below:

- ✓ Recommended and describe the testing strategies to be employed.
- ✓ List the recommended test requirements.
- ✓ Identify the required resources and provide an estimate of the test efforts.
- ✓ Identify existing project information and the software that should be tested.
- ✓ List the deliverable elements of the test activities.
- ✓ The duration of the testing phase and how that will be done
- ✓ Identifying the test strategies to perform the test.

6.4 Test Strategies

A useful test strategy includes automated, manual, and exploratory tests to efficiently reduce risk and tighten release cycles. There are some sorts of test management tools for testing, but manual testing is more important for this. We will test the product manually by taking the help of one of those selected testing tools. So the Tests come in several flavors:

- ✓ **Unit tests** validate the smallest components of the system, ensuring they handle known input and outputs correctly. Unit test individual classes in your application to verify they work under expected, boundary, and negative cases.
- ✓ **Integration tests** exercise an entire subsystem and ensure that a set of components play nicely together.
- ✓ **Functional tests** verify end-to-end scenarios that your users will engage in.

For IITPOAS we will perform unit testing first. Because unit testing will ensure that the all components of the system is working properly or not. If a single unit not work properly the integration test is not necessary to perform because in the smallest component is not working well.

If the unit testing is work properly then we will perform integration test. Total system will be divided in some subsystem. And we will test that sub system work properly or not.

If the integration test perform well then we will move to functional test for total system is it work properly or not.

6.5 Test Items

This Test Plan describes the integration and system tests that will be conducted on the all the components identified in the IIT Program Office Accounting System. It is assumed that unit testing will be done thorough black box testing, testing of all module interfaces will be ensured.

The items of the project that will be tested:

- ✓ Manage Roles
- ✓ Manage Peon
- ✓ Manage Semester
- ✓ Manage Section
- ✓ Manage User
- ✓ Manage Item
- ✓ Manage Expense

The external interfaces to the following browser will be tested:

- ✓ Mozilla Firefox.
- ✓ Google Chrome.

The basic performance test:

- ✓ Add/Delete/Update Section
- ✓ Add/Delete/Update Role
- ✓ Add/Delete/Update Peon
- ✓ Add/Delete/Update User
- ✓ Add/Delete/Update Expense
- ✓ Add/Delete/Update Item

The most critical performance measures to test are:

- ✓ Response time for remote login.
- ✓ Response time for updating information.

6.6 Features to be tested

This is a listing of what is to be tested from the USERS viewpoint of what the system does.

Feature	Priority	Description
Create Role	1	There are some roles for every user which should be tested sincerely.
Create Peon	1	Peon list should be created and maintained carefully.
Create Section	1	The sections are the important part of the system, so this will be tested carefully because depending on the section all the expense is maintained.
Create Semester	1	Every expense is of a semester, so creating and maintaining semester is very important.
Create Item	1	There are some items for every sections.
Create Expense	1	Successful expense creation and storage is very important for the system.
Manage Expense	2	Successful expense creation and storage is very important for the system.

Technological Feature		
Database	1	Access to database information is essential work related to database this is a technical feature which should be tightly in control for management system. so database structure test is get the priority 1.
	Priority	**Description**
Quality Feature		
Manage Expense and Report	1	Each section has some expense report that should be act perfectly.
Ensure the Email is sent to the expected receiver	1	When a user is created the username and default password is sent to the corresponding email. This should be tested sincerely.
Authentication	1	Without authentication confidentiality and integrity are not guaranteed.
Proper information update	2	Proper information update procedure should work properly. otherwise updated information will not work for the system

6.7 Item Pass/fail Criteria

The criteria's for pass and fail of the features to be tested are given below.

- According to the given scenario the expected result should be take place then the scenario will be considered as pass otherwise that criteria should be failed.
- If an item tested 10 times, 9 times perfectly worked and single time do not work properly then it will consider as fail case.
- System crash will be considered as fail case.
- After submitting a query in the system, if expected page won't appear then it will be considered as fail case.

6.8 Suspension Criteria

Testing work is performed by the test team to ensure that all the functional activities are working well in the system properly. If some of these functions are not working properly in the system the further test procedure should not be continued to the next level.

So here are so criteria's for which we will pause the test work for IITPOAS

a. If sanity check failed.
b. If smoke test failed.
c. If interdepended modules are not working well.
d. If the number or type of defects reaches a point where the follow on testing has no value, it makes no sense to continue the test; it just wasting resources.

6.9 Test deliverable

- ✓ Acceptance Test plan.
- ✓ Unit test plan.
- ✓ Screen Prototypes.
- ✓ Test report.
- ✓ Test scenario and expected result in an excel sheet.
- ✓ System manual.

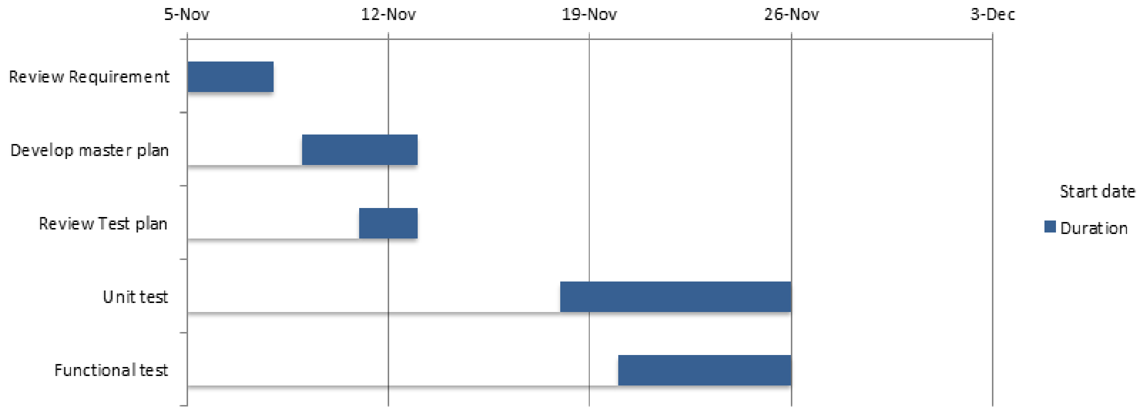
6.10 Environmental Need

The following elements are required to support the overall testing effort at all levels of IITPOAS

- ✓ Access to the IITPOAS.
- ✓ Systems functional structure created by Mind map.
- ✓ Session tester to find out how much time a feature needs to be tested.
- ✓ Access to the database.

6.11 Schedule

Software testing or Quality assurance procedure starts at the very beginning of the Software development, when the requirement specification gathered by the requirement engineer. Then test team has to analyze requirement create relevant test scenarios, test case. From the beginning to the end; the test process for online school management system will follow this schedule.



[4]http://www.wada-ama.org/rtecontent/document/ist_en_2009.pdf

[5]http://sce.uhcl.edu/helm/RUP_course_example/courseregistrationproject/artifacts/test/plans/test_plan_arch.htm

Chapter 7

Conclusion

7 Conclusion

Throughout the semester I have tried to follow all the steps of proper software engineering to make the project success. The project document is an evidence of what has been done in the undertaken project from the software requirement specification to Software testing and quality assurance. I have tried to follow and practice those processes as much as possible. I hope this will help me in my future software development. This document also will be helpful for further extension and management of the project.