AUTOMATE CLEARANCE SYSTEM & MAINTAIN EQUIPMENT LOGS

By

GC Waqas Ahmed Kanwar

GC Osama Kamal Bela

GC Ali Hassan Khattak

Submitted to the Faculty of Computer Software Engineering

National University of Sciences and Technology, Islamabad in partial fulfillment

for the requirements of a B.E. Degree in Computer Software Engineering

JUNE 2016

Abstract

Presently, clearance of students is done manually. This is done via printed forms which are signed by the designated authorities after cross checking the individual's entries on manually maintained log registers. This as a whole is a very cumbersome process and results in pointless fatigue both for the administrators and students.

This project aims out on automating the clearance system of department of CSE. It also includes maintenance of equipment logs of labs and stores incorporating the department of CSE. It is a web based System thus offering platform independency. Over the coming years, the respective administrators can maintain the records online. The available items would be displayed to the students and would be issued upon online request. All the record would be updated and stored on the system. Upon the clearance request, the system would automatically send the clearance request to the respective authorities, the status of which would be visible to the student. The request would strictly obey the hierarchy as per stated by the department. After the successful completion of Clearance request, the student can get the printed clearance slip.

If there is any requirement of checking the clearance approval of any student, Admin can see a student record that on what time his/her clearance request was approved. System admin would update all the accounts and inventory of the system.

DECLARATION

We declare that the work presented herewith is the result of sole effort of our group, comprising of GC Waqas Ahmed Kanwar, GC Osama Kamal Bela and GC Ali Hassan Khattak it is free of any kind of plagiarism in part. We also declare that the dissertation has never been submitted previously in part or whole in support of another award or qualification either at this institution or elsewhere.

CERTIFICATE OF CORRECTNESS AND APPROVAL

Certified that work contained in this thesis **"Automate Clearance System & Maintain Equipment Logs"** carried out by GC Waqas Ahmed Kanwar,GC Osama Kamal Bela and GC Ali Hassan Khattak under the supervision of Asst Prof Bilal Rauf for partial fulfillment of Degree of Bachelor of Software Engineering is correct and approved.

APPROVED BY

_____

Assistant Professor Bilal Rauf

Computer Software Department

Military College of Signals (NUST)

DATED:_____

DEDICATION

In the name of Allah, the Most Merciful, the Most Beneficent

To our parents & instructors, without whose unflinching support and cooperation,

a work of this magnitude would not have been possible.

ACKNOWLEDGEMENTS

There is no success without the will of ALLAH Almighty. We are grateful to ALLAH, who has given us guidance, strength and enabled us to accomplish this task. Whatever we have achieved, we owe it to Him, in totality. We are also grateful to our parents and family and well-wishers for their admirable support and their critical reviews. We would like to thank our supervisor Asst Prof Bilal Rauf for his continuous guidance and motivation throughout the course of our project. We would also like to thank our co-supervisor Dr.Naima Iltaf and Lab Demo Kabeer for helping us in making this project. Without their help we would have not been able to accomplish anything.

Table of Contents

CHAPTER 1: **13**

INTRODUCTION **13**

1. INTRODUCTION 14

1.1. Overview 14

1.2. Approach 15

1.3. Scope 16

1.3.1. Benefits 17

1.3.2. Objectives & Goals 17

1.3.3 Deliverables 18

CHAPTER:2 LITERATURE REVIEW **19**

2. LITERATURE REVIEW 20

2.1. In National University of Science and Technology : 20

2.2. In Pakistan Army: 20

2.3. Rest of the World: 20

2.4. Advancement in Information Technology 21

Chapter 3: SYSTEM REQUIREMENT SPECIFICATION **22**

3.SYSTEM REQUIREMENT SPECIFICATION 23

3.1 Overall Description 23

3.2.1Client Application: 25

3.2.2.1Provide login facility 25

3.2.2.2Provide password change 25

3.2.2.3Provide facility to manage personal profile 25

3.2.2.4Display Information 25

3.2.2.5Display activities rundown 25

3.2.2.6Generate Reports 25
3.1.2User Classes and Characteristics 26
3.1.2.1Common Users 26
3.1.2.2Special Users 26
3.1.2.3System Administrators 28
3.2Operating Environment 28
3.2.1Hardware: 28
3.2.2Software 28
3.3Design and Implementation Constraints 29
3.3.1Programming Languages: 29
3.3.2Tools & Development Environment 29
3.3.3Data and Content Constraints 29
3.3.4Timing Requirements 30
3.3.5Hardware Constraints 30
3.3.6Software Constraints 30
3.3.7User Documentation 30
3.4System Features 30
3.4.1ACS&EL Server Application 30
3.4.2Hardware Interfaces 37
3.4.3Software Interfaces 37
3.4.4Communications Interfaces 37
3.5 Other Nonfunctional Requirements 41
3.5.1Performance Requirements 41
3.5.2Response Time 41
3.5.3Throughput 41

3.5.4Concurrency..... 41
3.5.5Reliability 41
3.6Safety Requirements..... 42
3.6.1Integrity of Information..... 42
3.6.2. Backup & Recovery..... 42
3.7Security Requirements..... 42
3.7.1Data Transfer 42
3.8Usability..... 44
3.8.1 Graphical User Interface..... 44
3.8.2 Accessibility 44
3.9Reliability & Availability 44
3.9.1Software Quality Attributes..... 44
CHAPTER:4 SYSTEM DESIGN SPECIFICATION 45
4.SYSTEM DESIGN SPECIFICATION 46
4.1System Architecture Description..... 46
4.2Overview of Modules/Components: 47
4.2.1Software Components..... 47
4.3Pseudo Code of Components..... 57
4.3.1Server connectivity module:..... 57
4.3.2Desktop Application:..... 58
4.3.3Requests handling LogicComponent:..... 60
4.4Design decisions and tradeoffs 61
4.5Detailed Design 63
4.6Use Case Diagrams..... 64
CHAPTER:5 SYSTEM IMPLEMENTATION..... 79

CHAPTER:6 TESTING AND EVALUATION 87

6. TESTING AND EVALUATION 88

6.1. Test Items 88

6.2. Features to be Tested 88

6.3. Features not to be tested 91

6.4. Test Cases 92

6.5. System Testing 94

CHAPTER 7: FUTURE WORK 95

7. FUTURE WORK 96

CHAPTER 8: CONCLUSION 97

8. CONCLUSION 98

8.1. Overview 98

CHAPTER 9: 99

USER MANUAL 99

9. User Manual 100

9.1. Requirements: 100

9.2Installation: 100

9.3.Operations: 102

9.3.1. Login: 102

9.3.2. Adding new Student: 102

9.3.4. Adding new user: 103

9.3.5. Apply for Clearance: 103

9.3.6.Clearance Approval: 104

9.3.7.Cleared Slip: 104

9.3.8.Reserve the items: 104

9.3.9. Maintaining Equipment Logs: 105

CHAPTER 9: 106

BIBLIOGRAPHY 106

9. BIBLIOGRAPHY 107

CHAPTER: 10 108

GLOSSARY 108

10. GLOSSARY 109

List of Figures

Figure 1: Data flow Diagram.....31
Figure 2: Use-Case : client end.....34
Figure 3: Use-Case : server end.....65
Figure 4: Use-Case :SMT.....66
Figure 5: Use-Case :system admin.....67
Figure 6: Use-Case :server end.....68
Figure 7: Sequence Diagram :Request_approval.....72
Figure 8: Sequence Diagram :send_request.....73
Figure 9: Sequence Diagram :view_records.....74
Figure 10:Activity Diagram.....75
Figure 11: Class –Diagram 76
Figure 12: Home Page 101
Figure 13: New User.....102
Figure 14: Clearance generation.....103
Figure 15: Clearance Slip.....103
Figure 16: Reserving an item.....104

CHAPTER 1:
INTRODUCTION

1. INTRODUCTION

1.1. Overview

Globalized era and the advancement of technology made human life easier than it was. The more complex the problem is, the more efficient solution has been proposed. If we have to look in the world, we came across some facts which directly or indirectly affect human beings. In the past the systems were manual, but in this era the systems are being automated so the efforts of the humans are being sustained. Lab equipments log and clearance automation (EL&CA) is a system that that is proposed to develop a system that will automate the clearance system and to keep the records and details of items and equipments used in college. Currently, the system is totally manual and one have to go from office to office.

In this project we are focusing on the automatic management of the lab equipments for purpose of convenience in clearance at end of degree program, this project can be implemented in college

This Software Requirement Specification (SRS) is a document for the new proposed system that specifies about the main functionalities and attributes of the system. Following are the main users that would interact with the system directly or indirectly:

a. Head of Departments

b. Lab Heads

c. Students

d. Faculty

e. Lab Staff

f. SMT

1.2. Approach

Maintenance equipments log and clearance automation (EL&CA)is a self-contained project, aiming to automate the present working scenarios of clearance system in any institution from administrative perspective. The demands/requests will be initiated through different clients connected to the Database of college and then college server will be efficient enough to send the particular demand request to the desired destination for its respective approval/information. The college server while disseminating the demand request will also store it in a concerned database for future warning generations in case of non-completion. These warnings will be sent with the particular user for necessary immediate action, and these warnings will remain there until the desired action will be taken.

This project involves complete automation of the current manual system where all initial demand/clearance requests are prepared manually, which requires lot of human, physical resources, time and despite of this much effort there are many chances of errors. Further efforts are also required to be put in for correction of these errors. In order to reduce the consumption and efforts of human resource on this particular issue.

No doubt there is need of a system which can which can automate the current manual system of clearance involvement of human resource, in order to achieve more efficient output. This project covers some of the essential fields of software engineering discipline (networking, desktop application development, client-server communication, artificial intelligence and database management).

The plan to carry out this project consists of 2 main tasks these are:

1. Creation of Clients Application.
2. Server Side Application Development

1.3. Scope

The project basically involves the design of an automation system that will automate clearance system in college. This system will be accessed by all students of college, they will login with their respective id's. Equipments they ask for will be issued to them , database will be maintained to keep their record. Database will be maintained by the respective lab heads. Head of departments will be given facility to check the summary of lab equipments. Students will be able to check their status.
A system is required that will be able to manage demand management of different modules. A system will be required to manage user requests, manage lab equipments, process orders.

An algorithm will be developed which will direct the user request through proper channels after completing some pre-requisites for the execution of that request, the user request will be directly uploaded to the server with the authorized permission, the main server will then send this request to the concerned head/client, the concerned head will then take action accordingly to execute this user request. The system will automatically inform the sender/client about the availability of the intended host for its approval. This algorithm is to ensure the availability of minimum safe amount of a particular item or resources. This functionality is achieved by enabling the server to keep record and details of the available equipment with its clients. In this way the working of the organization will be made efficient and automated.

The server will also centrally keep the record of the activities performed which will generate summary.

This setup is aimed to be implemented in CSE and EE departments; it can be integrated with MIMS. Currently it will be working with data from CSE DEPT, with development it can be made part of CMS.

1.3.1. Benefits

The main objectives that could be achieved from this system are:

a. Time saving for Student.
b. More Accuracy in maintenance of the record.
c. Reduction in Man power for carryout daily tasks in college.
d. Running cost less than the manual system, except for the first time cost.
e. Flexible enough to be extended in future
f. High accuracy of readings, since there is no human error involved.

1.3.2. Objectives & Goals

a. Establish a client server based network in the department which will connect labs with administrative heads.
b. Connect project with department host network.
c. Ensure Network security.
d. Maintain hierarchy.
e. Balanced Authorities.
f. Establish intra department's network.
g. Creating client server based web application.
h. Database for the maintenance of the Complete Record
i. Keep the system easy-to-use for the users.
j. Ensure a system free of data loss.

1.3.3 Deliverables

a. The document deliverables include the SRS (Software Requirements Specifications) document and the design document. Final thesis and the user manual with it.
b. The software deliverable includes a **web application** to perform different clearance and lab equipment maintenance operations.

CHAPTER:2 LITERATURE REVIEW

2. LITERATURE REVIEW

2.1. In National University of Science and Technology :

The batch of 2014,SEECS proposed clearance and inventory system as their final year project which was readily accepted by authorities .But was not implemented due to development of Campus management system .

In MCS no such software has been developed which would automate the clearance. However an automated leave system has been proposed. However newly created CMS has module which deals with inventory of all schools of NUST , but it is not functional yet .

This module lacks clearance and hierarchy as per MCS pattern .

2.2. In Pakistan Army:

Pakistan Army is currently using Office Automation System (OAS) for carrying out all sort of written communication. There is no separate system for to address clearance specifically. However Pakistan Army is working on a separate system for this purpose named as e-Arms which is under development and deals with only and supply and demand and their clearance. GHQ is currently working on several Information Systems .Most eminent of them are

a. E-arms

b. Automated Supply

There are many other database systems maintained by Army for purpose of swift communication and fast delivery. Many records are shifted from manual registers to database.

2.3. Rest of the World:

Ebonyl University :

Work on clearance system has been done in this university, students created a software system for the clearance of logs. We read the research paper which helped us greatly in our project, a few screenshots from their software are as follows.

Figure 5.10: Clearance Slip

2.4. Advancement in Information Technology

Information Technology has been an integral part of academic system since almost four decades. According to (Hewlett, 1993), the world is entering "an era in which technology will literally transform every aspects of business, every aspects of life and every aspects of society

An information specialist Lucey (1991)define computer based management information system as: the combination of human and computer based

Resource that result in the collection, storage, retrieval, communication and use of data for the purpose of efficient management of operations and for business planning. Transaction processing system (TPS): these system record day-to-day transactions such as customer order, bills, inventory levels and production output. The TPS helps supervisors by generating data base that act as foundation for other information system.

Management information system (MIS). These summarize the detailed data of the transaction processing system standard report for middle level managers. Such report might include production schedules and budget summarizes.

Chapter 3: SYSTEM REQUIREMENT SPECIFICATION

3.SYSTEM REQUIREMENT SPECIFICATION

This part of the document contains information about the product, its features, perspective, user's characteristics and constraints.

3.1 Overall Description

3.1.1.Product Features

3.1.1.1.Receive Data/Requests from Clients

All the demand requests sent by the different clients will be received by the server. Furthermore, as soon as a request/request is received the server program should store the data in the database to maintain a record.

3.1.1.2AI based request distribution

Once a request is received, the server will extract the information for further automatically directing it to the concerned authority for approval/info depending upon the type of the demand request. This will be done by an algorithm based on Artificial Intelligence.

3.1.1.3Provide login facility

The system shall only be accessible to the authorized users only. The rights of authorization will be reserved with the administrator. No information should be accessible without user authentication.

3.1.1.4Add/Delete and Manage administrator user accounts

The server system administrator shall be able to add, delete or edit information of other users. Server administrator shall only have access to server user accounts. In addition to adding/ deleting accounts, features available to the clients can also be added or removed.

3.1.1.5Add/Delete and Manage Equipments

The system shall be flexible enough to add, delete or manage lab equipments incase of arrival of new items .This data will be managed SMT. Arrival our departure of any sort of items in department is under SMT observation .Items are further notified to respective lab heads . An inventory list is maintained.

3.1.1.6.Display real-time measurements

System shall provide facility to view real-time activities from the clients. This shall provide real-time monitoring department equipments.

3.1.1.7.Display Warnings

In case client has applied for clearance but is in possession of particular lab item , in such case warning will be initiated. If item requested is not available client will be notified upon request.

3.1.1.8.Generate Reports

The system shall be able to generate the approved status of clearance request after authentication from all the respective authorities.

3.2.1Client Application:

3.2.2.1Provide login facility

The client application of ACS &EL shall provide login facility to the clients of the system.

3.2.2.2Provide password change

In case that any user has forgotten his password, the system shall provide the facility to the user to change it and report about the matter to the administrator.

3.2.2.3Provide facility to manage personal profile

Once the user has logged in, the user can manage his personal profile.

3.2.2.4Display Information

The system shall also display some static information related to the available item, items issued date.

3.2.2.5Display activities rundown

The system shall also display some information related to current activities related to the requests being sent and received along with their types.

3.2.2.6Generate Reports

The system shall be able to generate reports based on data. Clearance once done successfully for an individual shall be followed by report generation. This report serves as proof of being cleared by department.

3.1.2User Classes and Characteristics

The following section describes the various types of users of the ACS&EL, and their interaction with the system.

3.1.2.1Common Users

These are the common users who shall be using ACS&EL via its client application. They have limited access. Type of users will be :

a. Student

b. Lab head

c. SMT

d. Training Clerk

e. HOD

f. Project Supervisor

g. Server Administrator

All of these users can perform the following tasks:

a. Register Request

b. Login

c. View Profile

d. View Equipment Status

e. View Notifications

3.1.2.2Special Users

They are common users with each having its own privileges. Users along with access are :

Student:

a. Check items status.

b. Request for items.

c. Initiate clearance request.

d. Generate-Report.

SMT:

a. Add items to department inventory.

b. Remove items from department inventory.

c. Add comments upon clearance request.

d. Update lab heads.

Training Clerk:

a. Add comments upon clearance request.

Project Supervisor:

a. Add comments upon clearance request.

Lab head :

a. Update equipment.

b. Issue items.

c. Accepts or Rejects clearance request.

HOD:

a. Generate report.

b. Check status.

.

3.1.2.3System Administrators

System Administrators are available at each level as per the structure of Pakistan Army. The system administrator will have access to all the data .All other accounts will be managed by Sys Admin.

3.2Operating Environment

3.2.1Hardware:

The ACS&EL operates, either directly or indirectly, with the following external hardware:

a. **Servers**: Intel Xeon core based server computer with at least 10 GB RAM, 0.5 TB hard disk, to host the server application of, run server application of EL&CA and maintain the database.
b. **User peripherals**: The PCs Connected to the ACS&EL Server.
c. **Network**, The present working network in the college is the medium of connection between the ACS&EL server and Clients (common users, special users and web system administrator).

3.2.2Software

The ACS&EL operates with the following software:

a. **Operating System:**

a. Microsoft Windows Server 2012 or Microsoft Windows based operating system, In order to install the server application, maintain database and client application.

b. **Apache web server**

a. This software application is used to host the ACS&EL server application from the server computer.

3.3Design and Implementation Constraints

3.3.1Programming Languages:

a. **C# (C Sharp):** It is a multi-paradigm programming language encompassing strong typing, imperative, declarative, functional, procedural, generic, object-oriented (class-based), and component-oriented programming disciplines. It was developed by Microsoft within its .NET initiative. In our system it is used to develop the server & client side application of ACS&EL

b. **SQL (Structured Query Language):** SQL is a special-purpose programming language designed for managing data held in a relational database management system (RDBMS).

3.3.2Tools & Development Environment

a. **Microsoft Visual Studio 2013:** Microsoft Visual Studio is an integrated development environment (IDE) from Microsoft that shall be used to develop server & client application in C# for ACS&EL.

b. **.NET:** provides user interface, data access, database connectivity, cryptography, web application development, and network communications

3.3.3Data and Content Constraints

a. There should be no moving text or animation on the Forms of ACS&EL.

b. The system shall be populated with complete available data till date.

c. All passwords can only be alphanumeric of minimum length of 8.

d. No user other than the system administrators should have the authority to view passwords.

e. There should only be one database for the system located at the server at each subsequent level.

3.3.4Timing Requirements

a. The project should be completed by 1st April 2016.

b. Deployment of ACS&EL should not take more than one day.

3.3.5Hardware Constraints

All Microsoft Windows compatible hardware should be used in development of the system.

3.3.6Software Constraints

The system shall be a client and server application. The software should be compatible with databases (SQL Server etc.)

3.3.7User Documentation

A few documents shall be delivered along with the software:

a. Installation guides

b. Usage manuals with pictures and text for using the software.

c. Help manuals for removing errors and bugs

d. Product Requirements Specifications

3.4System Features

ACS&EL consists of two subsystems i.e.

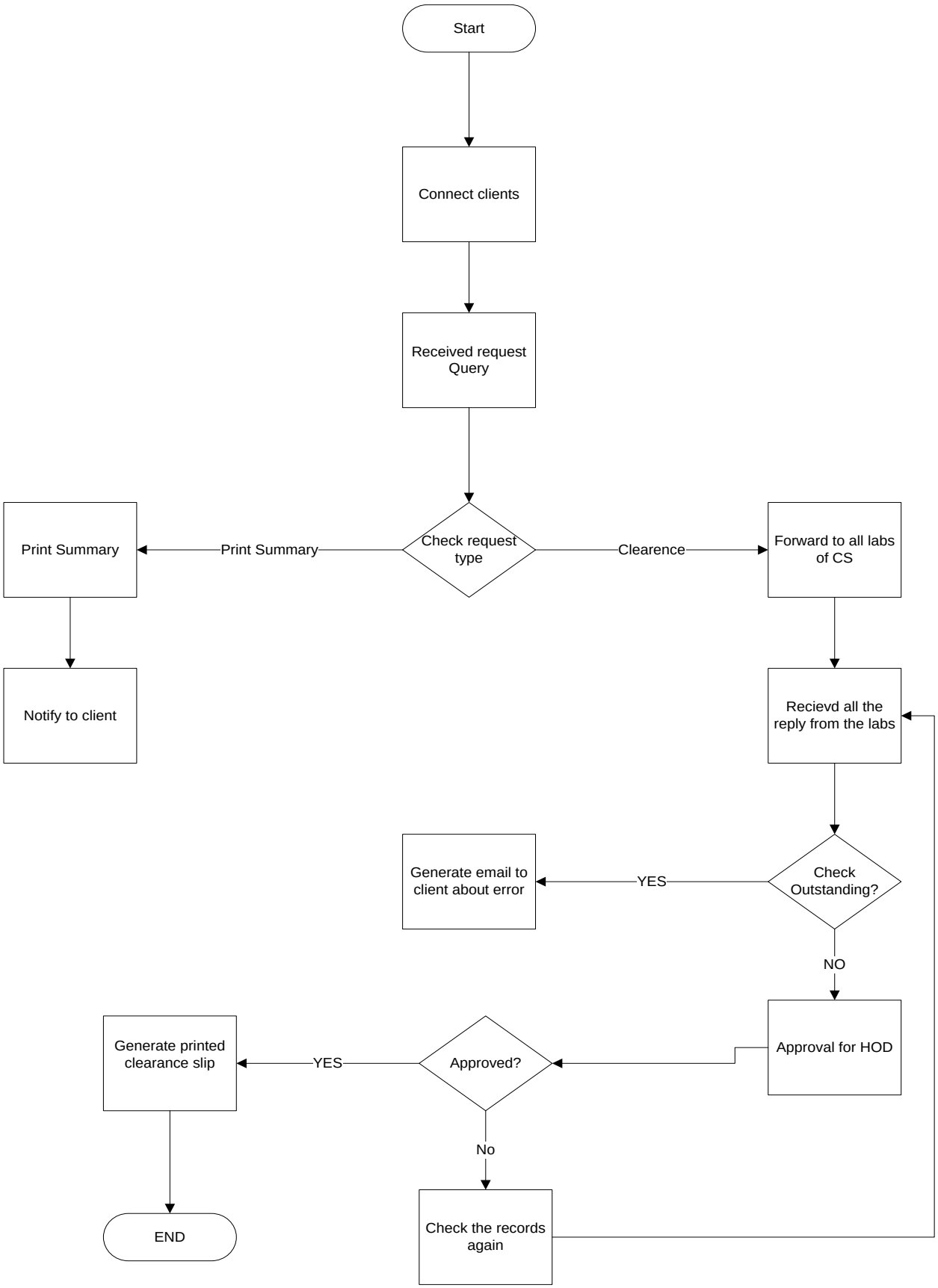
a. ACS&EL Server Application

b. ACS&EL Client Application

3.4.1ACS&EL Server Application

There is only one type of server in ACS&EL.

a. Department Server


Start
Connect clients
Received request Query
Check request type
Print Summary
Print Summary
Clearence
Forward to all labs of CS
Notify to client
Recievd all the reply from the labs
Check Outstanding?
YES
Generate email to client about error
NO
Approval for HOD
Approved?
YES
Generate printed clearance slip
No
Check the records again
END

The features of this system are as follows:

a. Establish network with department.
b. Maintain all sort of records.
c. Connect with clients.

SF-1 Establish network with clients

Description	All Clients systems need to be connected to department server and establish a network within the department between the clients and the server to issue requests.
Priority	High
Pre-Conditions	Clients need to be tuned on and logged in.
Stimulus/Response	**Clients and Server establish a LAN Network** Clients connect to their department server.
Post-Conditions	All nodes are connected in the LAN network
Frequency	Low
Risk	Medium

Functional Requirements:

REQ-1 System shall automatically establish a LAN within department .

SF-2 Generate Addresses on the basis of received request types

Description	Once connected, the clients can send the demand to the server. The server will then check their types and add records of the recipients on the basis of the request type and sender.
Priority	High
Pre-Conditions	The concerned client is connected and a request has been received on the server.

Stimulus/Response	**The clients initiates request to the server.** The Server takes appropriate action on receiving any request from any client and sends to the concerned recipient.
Post-Conditions	The client is notified about the action taken by the server.
Frequency	High
Risk	High

Functional Requirements:

REQ- 2 The server shall automatically receive requests from the clients.

REQ- 3 The system shall automatically send request to the concerned authority for approval.

REQ- 4 The system will notify the client in case of completion of a valid action.

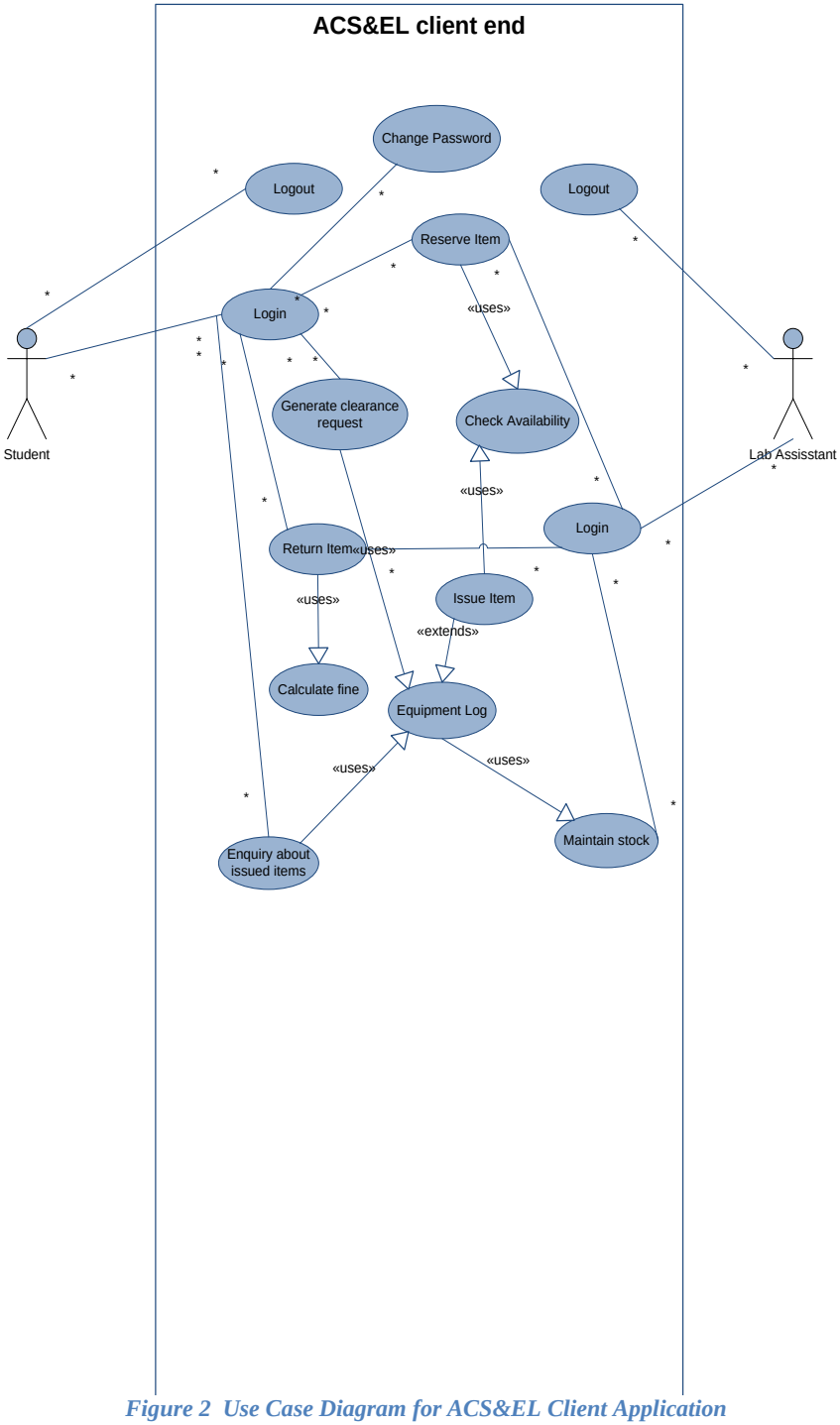


Figure 2 Use Case Diagram for ACS&EL Client Application

SF-7 Login

Use Case Description

The client application has the login facility which will allow its users to login to the system by entering their unique login information.

Use Case Name	Login
Actor(s)	Common users, special users & system administrators
Pre-Condition	Actors have already been registered in the system
Normal Course	**Login is Successful**
	• **enters username** • **enters password**
Post-Condition	**User has success fully logged into the system and get the authorized privileges**
Alternate Course	**Login Failed due to invalid login information** • **Password field got cleared after invalid password**
Post-Condition	**Login screen is displayed again to the user for re-entering the login information**
Assumptions	**The client application has been successfully connected to the respective server and there are no connection issues.**
Priority	**Medium**
Frequency	**High**
Risk	**Low**

Functional Requirements:

REQ- 14 The system shall only allow the authorized users to log into the system.

SF-10 Generate Report

Use Case Description

A report of desired data can be generated on request by providing the necessary information in a predefined way.

Use Case Name	Generate Reports
Actor(s)	Common users ,special users and system administrators
Pre-Condition	User is logged in and go to generate reports menu
Normal Course	. • User clicks on generate report button for generation of report
Post-Condition	A report based on record.
Priority	High
Frequency	High
Risk	High

Functional Requirements:

REQ- 17 The system will generate reports on the basis of activities performed.

3.4.2Hardware Interfaces

The hardware would be simple Pentium based personal computers as described already. Since the application must run over the department network, all the clients and servers shall require to connect to the network; will be hardware interface for the system. As for e.g. Ethernet cards and cables, switches and routers.

3.4.3Software Interfaces

a. System shall be installed on Microsoft windows server 2012.
b. The server application shall be developed using C# on Microsoft Visual Studio 2013.
c. .NET shall be used to connect server application with the database.
d. Microsoft SQL Server shall be used to maintain the database. It shall be stored in server and used by clients.

3.4.4Communications Interfaces

All clients and servers are interconnected via the department network. The communication media connecting clients and servers is Ethernet cable and wifi.

Functional Requirements:

Student:

1. Get data from user.

-This will be done via form filled by the user, and the data will be stored and associated with the user account.

-The data will be stored in tables maintained at the backhand in a central database available and accessible to the server.

-Editing rights would only be with the System administrator and any change required in

the system would be notified to the system administrator through which the change will take place.

2. Generate a unique username which would also serve as a login.

-At the time of making the account, a username would be suggested by the user and if found unique, it will be assigned to the user.

-This username would serve as a login while getting logged on to the system.

3. Maintenance of all student logs with a record list showing whatever item is upheld currently.

-A tab would be available to the user in his/her account which would show the current status of whatever item is currently upheld.

-It would also show the date and time of issuing as well as the deadline date.

4. A list showing the history of withheld items.

-The user would also have the facility of viewing his/her history.

-The user would also have the option to print it along with the digital signature of the system administrator which would serve as a proof.

5. Automatically send clearance request to the appropriate authority once applied by the user.

-A tab would be available to the user in which there would an option of clearance.

-Upon request for clearance, the system would send the clearance requests on the behalf of the users to the respective stations for approval.

6. Once Clearance has been applied, show the current status of application.

-Once Clearance has been applied by the user, the clearance tab would show the current status of the application.

7. Prompting for faster processing.

-If the application is withheld by a certain faculty member or administrator for too long, the user would have the option to prompt the respective member for faster processing.

-This prompting would be done by a simple notification message.

8. If some issue arises during the process of clearance, the system should notify the user.

-If there arises some problem during the process of clearance, the user would be notified immediately.

-The notification would be highlighted at the top of the user account with bright colors as so to make it unavoidable.

9. Notice page showing the current news, notices and updates.

-There would be a front page showing all the important news, notices and updates uploaded by the administrators and the faculty members.

-These updates could include anything to new inventory or up gradation of inventory to deadline dates.

Administrator:

1. Unique Log/Password.

-The administrator would be having a unique login and password.

-As the security of the system would lie in the security of administrator data security therefore it would be further secured.

2. Biometric Security.

-The further security to the administrator would be provided by the biometric system.

-The biometric system would store all the fingerprints of the respective administrators.

3. Create and Delete Accounts (System Administrator only).

-All the control of central database would be with the system administrator.

-The administrator would be having authority to access the database.

-The system administrator would be having the authority to add and delete some user account.

4. Maintenance Log.

-The administrator would be having a tab in his/her account which would show the entire available inventory.
-This tab would also show the current status of the inventory items.
-The issuing date, the issuer and the receiver, all data would be stored.

5. On issuing, update self and user account.

-On issuance of a certain item, the system would automatically update the administrator and the user account.
-For this update, the system would show the inventory item along with its issuance details and the user would also know about these details via his/her account.

6. Editing Rights.

-Being the administrators, they would also be having the editing rights.
-They could manipulate the data according to the need.

7. Upon Clearance request, check and forward request.

-Upon the request of clearance, the administrator would check the request and would process the request.
-The request would be sent to the appropriate administrators accordingly following the hierarchy protocol.

8. If some issue arises, notify the user immediately.

-If some problem arises while the process of clearance, the system administrator would immediately send the problem along with the information to the respective user.
-The respective user would also be notified with the appropriate action as a remedy.

8. Once all clear, notify the user for the collection of Form.

-Once all clear and the application would have returned, the system administrator would notify the user with the news.
-The administrator would also prompt the user for collection of form.

9. Apply unique digital signature on form and provide to user as proof.

-The System administrator would be having a unique digital signature which he/she would apply on the clearance form.

-This clearance form along with the digital signature would serve as a proof for the user.

10. Upload news, Updates and notices.

-The administrators would upload the news, updates and notices on the news tab.

3.5 Other Nonfunctional Requirements

3.5.1Performance Requirements

3.5.2Response Time

The college clients shall be able to send clearance demand requests anytime to college server within 5 seconds and the time for college server to send that application to respective departments within 2 minutes.

The client-server application shall not take more than 3 seconds in loading the app-page.

3.5.3Throughput

The client and server application shall be tested simultaneously for a throughput of 15 connected users/clients per server, 2 active system administrators, along with data coming from 25 connected clients. This throughput must be tested at least for 2 hours continuously.

3.5.4Concurrency

A minimum of 15 concurrently connected clients and 2 system administrators must support the above base lined response time and throughput.

3.5.5Reliability

a. Failure rate of applications/transactions and hardware must not exceed 5 in 10,000.
b. MTBF for client-server application should be 200 hours at minimum.

c. MTRS (mean time to restore service) must be 3 hours max for critical, 2 hours max for major and 1 hour max for minor faults.

3.6Safety Requirements

3.6.1Integrity of Information

In case of any client connection failure or a registered user id has stopped responding (for at least 30 minutes) an appropriate error should be generated and displayed to server system administrator along with the other connected clients.
All data of EL&CA shall be stored in multiple connected database at respective locations i.e. college database. Requests coming from all clients should be in the same format and should be in the same given templates.

3.6.2. Backup & Recovery

Backups of the databases at all levels shall be maintained automatically after 6 hours every day. In case failure of server, database or the application, it should not take more than 30 min to install the application again and load the backup database.

3.7Security Requirements

3.7.1Data Transfer

a. The system shall automatically log out all connected clients after 1 hour of inactivity.
b. Commands, requests sent & received from clients/servers shall be human understandable.
c. The system shall not leave any authentication credentials on the user's computer containing any of user's confidential data like username & password.

3.7.2.Data Storage

a. The applications shall never display a user password. All confidential data will be completely encrypted with special characters.
b. The system shall not store user's and administrator's passwords as a readable string in the database, rather will use hashing.

c. The system shall only provide the password resetting service to only a valid user after asking and authenticating the previous password and for more security changing password messages will be sent to users after defined intervals.

d. The database will be secured through passwords that will only be changed by specific administrators .

The product must be secure from following viewpoint of following criteria:

Input Validation	Buffer overflow; cross-site scripting; SQL injection
Authentication	Network eavesdropping; brute force attacks; dictionary attacks; credential theft
Authorization	Elevation of privilege; disclosure of confidential data; data tampering;
Configuration management	Unauthorized access to administration interfaces; unauthorized access to configuration stores; retrieval of clear text configuration data; lack of individual accountability; over-privileged process and service accounts
Sensitive information	Access sensitive data in storage; network eavesdropping; data tampering
Exception management	Information disclosure; denial of service
Auditing a	User denies performing an operation;

3.8Usability

3.8.1 Graphical User Interface

a. The system shall provide an easily understandable and self-explaining uniform look to its users.
b. The client-server application shall provide colored icons and menu bars for easily handling and understanding of the system moreover it will allow better visualization & user experience.

3.8.2 Accessibility

a. Steering between different menus and screens shall also be possible using keyboard commands and shortcuts (individual commands and shortcuts yet to be decided).
b. The system shall only provide single language support i.e. English.

3.9Reliability & Availability

a. The availability of the system will be available during the college timings.
b. There should always be a backup server which will be an alternate computer sever, so that in any circumstance where main server goes down due to any failure , within a time span of 1 hour backup server should be up and operational.
c. Backup power source (UPS and Electric Generators) shall be provided in order to ensure maximum availability of the system.

3.9.1Software Quality Attributes

a. The application shall provide support for at least 50 connected clients.
b. System shall be modifiable if more department needs to be expanded.
c. Can be integrated with data from CMS .

CHAPTER:4 SYSTEM DESIGN SPECIFICATION

4.SYSTEM DESIGN SPECIFICATION

4.1System Architecture Description

Involves the design of an automation system that will automate clearance system in college. This system will be accessed by all students of college, they will login with their respective id's. Equipments they ask for will be issued to them , database will be maintained to keep their record. Database will be maintained by respective lab heads. Head of departments will be given facility to check the summary of lab equipments .Students will be able to check their status.

A system is required that will be able to manage demand management of different modules. A system will be required to manage user requests, manage lab equipments , process orders.

An algorithm will be developed which will direct the user request through proper channels after completing some pre-requisites for the execution of that request, the user request will be directly uploaded to the server with the authorized permission, the main server will then send this request to the concerned head/client, the concerned head will then take action accordingly to execute this user request. The system will automatically inform the sender/client about the availability of the intended host for its approval.

This algorithm is to ensure the availability of minimum safe amount of a particular item or resources. This functionality is achieved by enabling the server to keep record and details of the available equipment with its clients. In this way the working of the organization will be made efficient and automated.

The server will also centrally keep the record of the activities performed which will generate summary.

The plan to carry out this project consists of 2 main tasks these are:

1. Creation of Clients Application.
2. Server Side Application Development

4.2Overview of Modules/Components:

4.2.1Software Components

4.2.1.1.Operating Systems

Microsoft Windows Server 2012 or Microsoft Windows based operating system, in order to install the server application, maintain database and client application.

4.2.1.2.Software Packages

C# (C Sharp): It is a multi-paradigm programming language encompassing strong typing, imperative, declarative, functional, procedural, generic, object-oriented (class-based), and component-oriented programming disciplines. It was developed by Microsoft within its

.NET initiative. In our system it is used to develop the server & client side application of ACS&EL

a. **SQL (Structured Query Language):** SQL is a special-purpose programming language designed for managing data held in a relational database management system (RDBMS).

b. **Microsoft Visual Studio 2012:** Microsoft Visual Studio is an integrated development environment (IDE) from Microsoft that shall be used to develop server & client application in C# for ACS&EL.

4.2.2Hardware Components

N/A

Product Design Specifications Assumptions and Dependencies

The team of software engineers is obliged to state the following assumptions while making this SRS:

Hardware and software platforms

The software shall be developed on Intel based PCs and Microsoft Windows Based Operating Systems. However, since the final product has to be deployed on a server with Intel Xeon (10 core) processor with Microsoft Windows Operating System on it,

it is assumed (after some research over the internet) that the developed product shall also be deployable on the server and shall provide even better performance.

Testing and Debugging

The group shall try its best to remove all possible errors and bugs from the software that are able to be resolved within the limited expertise frame of the group.

ACS&EL Desktop Application

Identification	ACS&EL Desktop Application
Type	A subprogram.
Purpose	It provides the interface to the user from where he can perform all the required tasks. It is the bridge between the user and the system.
Subordinates	It consists of forms on which the user enters the information which is to be sent. Similarly it also displays the information which is received by the user. It is linked with the server.
Dependencies	As all the communication is carried out with the other clients and all the clients are connected to the server therefore the application depends upon the connectivity with the server.

Interfaces	It is a desktop application and runs on Windows Based systems. It contains the screen according to the user. It contains different forms. Some of the forms are to fill the data to put up a demand and some of the forms are to display information requested by the user. In addition to these it also provides a screen to give the current status and updates of the system and its activities. dialog/message boxes.
Resources	An intel/AMD microprocessor based personal computer with windows based operating system is required to run the Application
Processing	As this the interface the user comes across so it contains all the functionalities that the user can perform with the system. These functionalities are later completed with the help of the server. Some

of the functions that will run in the background of the GUI of the application can be :

log

in(

)

log

ut(

)

change_pasrd()

generate_reqst(

) view_status()

generate_report

()

view_equip_re

c() notify()

info_higher_au

th() approve()

send_request()

Data	The major work being done at the application is preparing demand requests and they will be prepared based on the information provided to the application in a form for the demand request. It will deal with strings and integer type data mainly. The data about the items used by the Application will be accessed through the server's database containing all the required information.

Requests Handling Logic

Identification	Requests handling logic
Type	Module/Subprogram.
Purpose	This is the part of the server which performs the Logical Tasks. Once the request will be drafted and sent to the server it will analyze the demand, ensure the approvals, and send to the concerned. Where ever the notifications are required it send them the notifications, store the necessary information to the database. Moreover it will monitor the supplies and generate warnings to the concerned.
Subordinates	It will consist of functions and classes which will ensure the fulfillment of the purpose stated in the above point.

Dependencies	This module depends upon the data from the database which will be acquired through queries whenever required after completing all formalities and the connection with the clients through which this module will receive data which requires processing or any action from initiating till its accomplishment.
Interfaces	It will have interface for the database, .NET Framework, LinQ and the ACS&EL Desktop Applications running on the clients. These interfaces will let this module to communicate and utilize all the services and data required.
Resources	For this Module we need Server Application of ACS&EL, .NET Framework. As far as the hardware is required, it can be implemented on the present working server of depatment. All that is needed from the hardware server is a processing capability equivalent to the intel Xeon processor.
Processing	It will carry out a major part of the processing of the entire incoming and outgoing data. This module will perform all processing for incoming/outgoing data in order to fulfill all desired requirement. Some of the functions to carry out few of the tasks are as follows: View_items_records() View_requests_records() Generate_report() Manage_Clients()

	Send_Requests() Recieve_Requests ()
Data	The data used is in different forms depending upon the type of the entity. The entity can be Requests, Items, Clients and the type of data being stored will be integers, float, string, varchar, date/time.

Database Server

Identification	Database server
Type	A Module containing the data.
Purpose	Any management system requires some data to be stored. In case of ACS&EL a large data about the Clients, Items and the Requests needs to be stored. For this purpose the database server will be used.
Subordinates	It contains tables and attributes which contain information about the entities related to our system.
Dependencies	As all the communication is carried out with the clients and all the clients are connected to the server therefore the database functionality depends upon the connectivity with the server.
Resources	SQL server based database with storage capacity of almost 1TB at each level.

Processing	All the data that will be saved in the database will be in some ordered form and all the data that needs to be acquired from the database will be through queries. The use of transactions will be made during fetching the data.
Data	The data stored is in different forms depending upon the type of the entity. The entity can be Requests, Items, Clients and the type of data being stored will be integers, float, string, varchar, date/time.

NET Framework

Identification	.NET Framework
Type	A framework
Purpose	.NET Framework provides language interoperability (each language can use code written in other language across several programming languages) across several programming languages. In the case of ACS&EL it is used to provide interoperability between the c# code and the SQL handling the database.
Subordinates	It contains tables and attributes which contain information about the entities related to our system.
Dependencies	As all the communication is carried out with the clients and all the clients are connected to the server therefore the database functionality depends upon the connectivity with the server.

Resources	SQL server based database with storage capacity of almost 1TB at each level.
Processing	All the data that will be saved in the database will be in some ordered form and all the data that needs to be acquired from the database will be through queries. The use of transactions will be made during fetching the data.
Data	The data stored is in different forms depending upon the type of the entity. The entity can be Requests, Items, Clients and the type of data being stored will be integers, float, string, varchar, date/time.

Server Connectivity Module

Identification	Server Connectivity Module
Type	A subprogram/Module.
Purpose	It provides connection between the clients and the server. This module involves the socket programming and will provide the clients the capability to connect to the server.
Subordinates	Ports will be opened for the clients. And once the connection has been established the clients/ server will be able to send data to each other using these ports.

Dependencies	The Server connectivity module is the core application on which the connection depends. The working of the complete ACS&EL system depends upon the connectivity. This server app only requires the server hardware to be running.
Interfaces	It is server Application and it will be connected to the clients through certain/defined ports and these ports will also be used for different servers connections placed at different levels.
Resources	It can be implemented on the present working servers of the Pakistan Army. All that is needed from the hardware server is a processing capability equivalent to the intel Xeon processor.
Processing	This application will ensure the connectivity of the clients and server. It will ensure the passage of data from different clients to logic component.
Data	The data from the clients and the data fetched from the database through the logical part of the server.

4.3Pseudo Code of Components

4.3.1Server connectivity module:

Initialize component();

//Starts the server and makes it ready to connect clients. It includes defining of the ports aswell.

Connect clients();

//open ports and wait for the clients. When some client wants to connect, connect it on an available port.

Client_activity(client id)
{

Receive data();

//receive data from the clients and send it to the respective component
Send data();
//send the data from components to clients.

}

View available clients();

//show the status and availability of the available clients.

4.3.2Desktop Application:

Establish connection(client_id, server_id);

//check and confirm client status

//connect the application with the server.

Login(username, password);

//allow_client(if(password == true && usename == true));

//get the user credentials of the user to ensure security

Changepassword(client_id, old_password, new_password);

//check_old_password(password);

//if (password == true);

// enter new password;

//facilitate the user to change his password.

View received Requests(client_id);

//display the request received for the particular client logged in.

Create new request();

//create a request. Utilize the information provided by the user in a form to create this Request.

View request record(request_no);

//select request

//display the record of the previous requests.

generate report(startdate, enddate, type, branch);

//generate a report about the details about any item or branch.

manage records();

select_particular_record(no,name);

//add, modify or delete specific record about items.

receive notifications(branch_id);

//receive any notification send from the server.

Logout();

//the user logs out from the system.

4.3.3Requests handling LogicComponent:

Receive request();

//receive requests form the clients as well as other servers.

Analyze request();

//check_request_type();

//check_request_source();

//analyze the request in detail to see its type, source and decide what to do with the request.

Save request to db();

//save the request to the storage for future references and report generation.

Check request status();

//check_req_approval();

//check the status of a request whether It has been approved, requires approval or pending.

Send for approval();

//send_request(file);

//if some request requires some approval, send it to the concerned.

Manage clients();

//add_client();

//Delete_client();

//edit_client();

//manage the data about the clients.

Maintain acitivity log()

4.4Design decisions and tradeoffs

The design decision to break the system up into a three-module system was made to promote modularity within separate parts of the system. Modularity provides encapsulation for the important pieces of the system. Using encapsulation, we are able to change important parts of the system without changing the whole system. For Example in safe distance keeping if we want to change the minimum speed from 2 sec to 5 sec between our vehicle and the next vehicle then we should only change in that that module not have any change in other two modules. In driver alertness, when we extract the frames we shall increase the drowsiness time from 2 sec to 6 sec then we only change that module, not change any other module.

The design decision is to use for microcontroller, our app should run on that microcontroller. It may have been possible that all information should be available on the microcontroller, so we shall choose any one from 3 module at a time.

The aim to use the client-server architecture/design is to achieve the required security related to our targeted working domain. As the main requirement in Pakistan Army in

paper/office work is to achieve the highest level of security by assuring confidentiality and integrity of the documents. Army is already using OAS (Office Automation System), which is using the same design/architecture. Client-server architecture allow us to establish a separate /isolated network and working domain which suits the most to our required working conditions.

It reduces the load on the workstation on which the application is running because queries are processed; tables are scanned, etc., on the central server. It also reduces the load on the network because only the result of a search is transported to the workstation and not all the data that was scanned. As the scope of the database grows, the workstations do not have to be equipped with additional disks or memory. These changes affect only the computer on which the server database runs.

Servers help in administering the whole set-up. Access rights and resource allocation is done by Servers. All the files are stored at the same place. In this way, management of files becomes easy. Also it becomes easier to find files. As all the data is stored on server it's easy to make a back-up of it. Also, in case of some break-down if data is lost, it can be recovered easily and efficiently. While in peer computing we have to take back-up at every workstation. Changes can be made easily by just upgrading the server. Also new resources and systems can be added by making necessary changes in server. Rules defining security and access rights can be defined at the time of set-up of server. Servers can play different roles for different clients.

In a tradeoff, we can use P2P network instead of client-server network, but in Pakistan it is very difficult to manage so many computers with every computer connected to the other.

In P2P network, the whole system is decentralized thus it is difficult to administer. That is one person cannot determine the whole accessibility setting of whole network. Also data recovery or backup is very difficult. Each computer should have its own back-up system. Security is not good other than setting passwords for files that you don't want people to access. If the connections are not connected to the computers properly then there can be problems accessing certain files. It does not run efficient if you have many computers, it is best to used two to eight computers. But our project is based on Army level, which contains more computers, so it is best to use Client-Server architecture/design.

4.5Detailed Design

4.5.1Entities & Attributes

User:

Field	Type	Description
User_id	Primary Key, int	Unique id assigned to each client
User_designation	varchar(20)	Appointment/Rank of the client
User_type	varchar(20)	Determines the rights i.e. Administrator or normal user.
Password	Varchar(20)	A password for every user.

Table 1 -
Entity: User

Requests_Record

Field	Type	Description
Request_id	Primary Key, int	Unique id for each request to identify it
Subj	varchar(50)	Subject/title of the request
Date	DateTime	Date and time the request is created
Items_qty	Int	Amount of items requested
Items	Varchar(200)	The detail of the requested items.

Table 3 – Entity: Requests_Record

Equipment_Record

Field	Type	Description
item_id	Primary Key, int	Unique id for every stock item
Item_name	Varchar(20)	Name of the item
Item_type	Varchar(15)	Type of the item
Qty_available	Int	Available quantity of the item in the stock
Qty_demanded	Int	Amount of item that has been requested.

Table 4 - Entity: Equipment_Record

Reports

Field	Type	Description
Report_id	Primary Key, int	Unique id for each Warning
Request_id	Foreign Key, int	Request id from which the report is generated
item_id	Foreign Key, Int	Stock it from which the report is generated
Report_content	Varcchar (500)	Contents of the report
Start_date	DateTime	The date onwards which the records need to be seen.
End_date	DateTime	The date up till which the records need to be seen.

Table 5 Entity: Reports

4.6Use Case Diagrams

Use Case for Server Application

All the data will be generated and sent to the server from the clients. The following use case diagram represents the functionality of this subsystem.

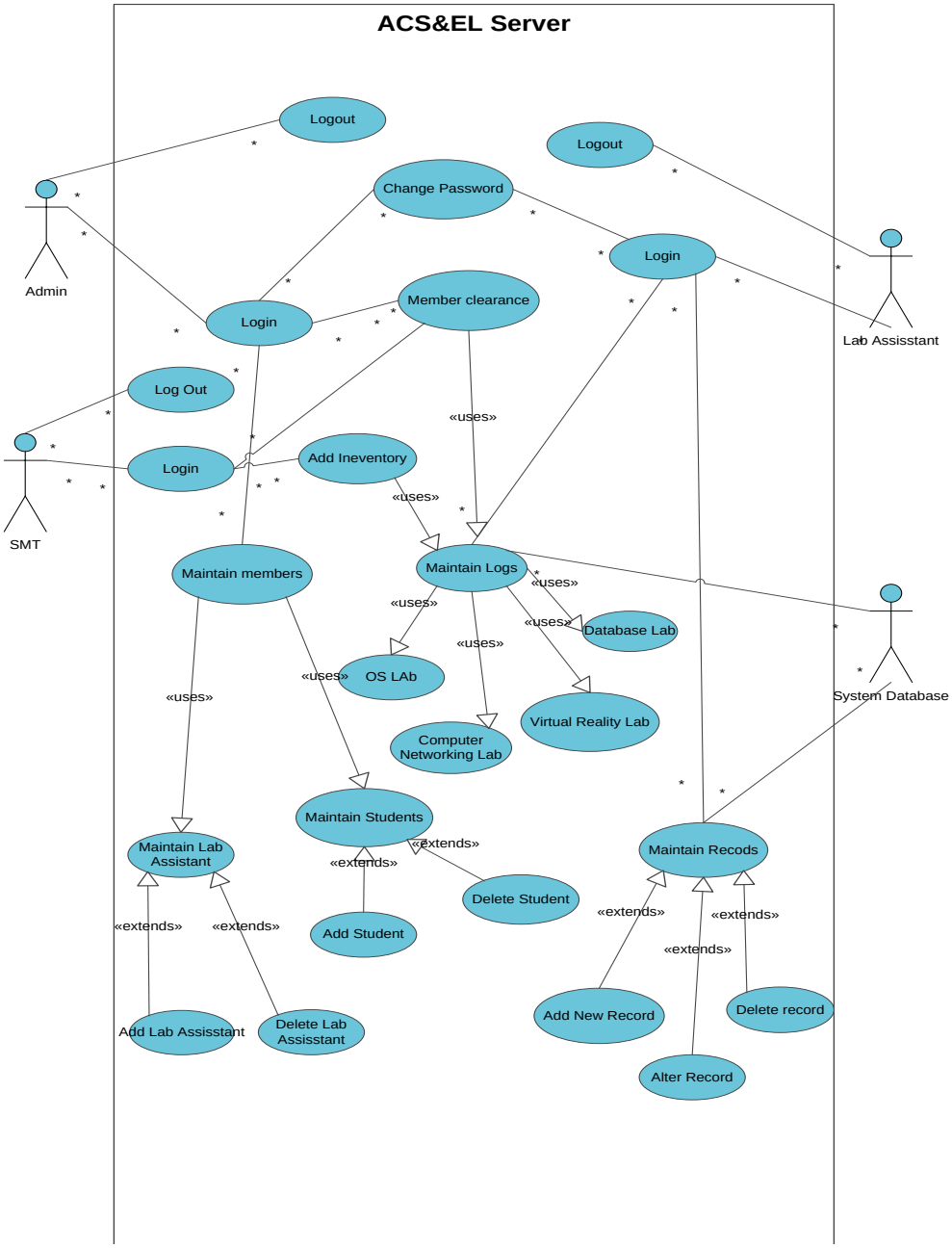


Fig 3 Use Case Diagram : Server End

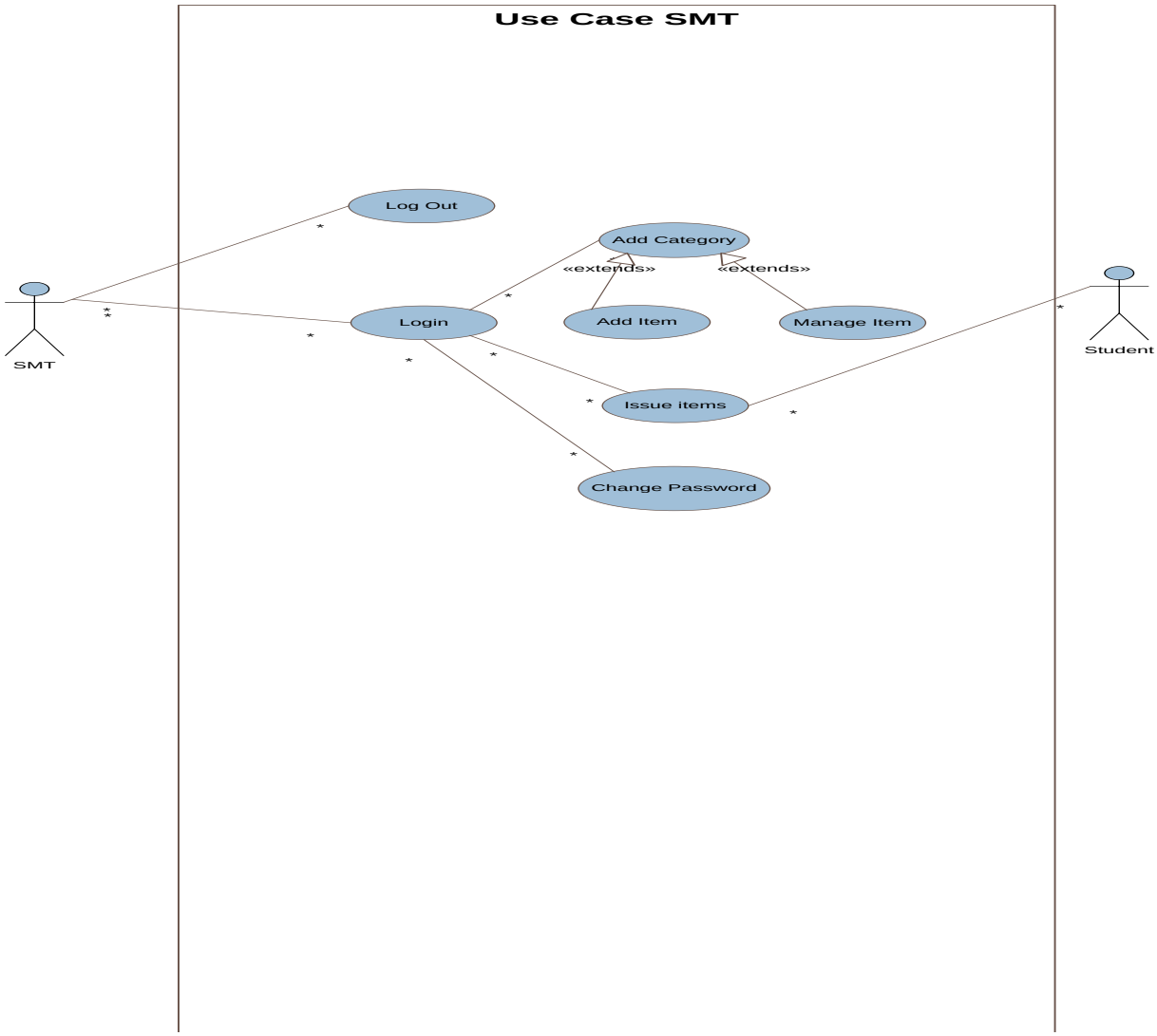


Figure 4 Use Case: SMT

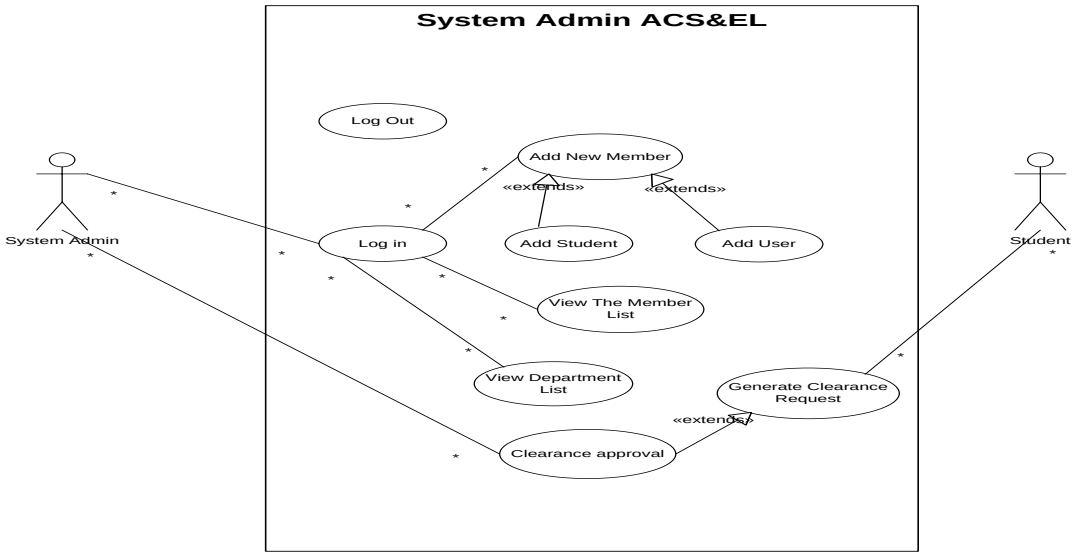


Figure 5 Use Case: system admin

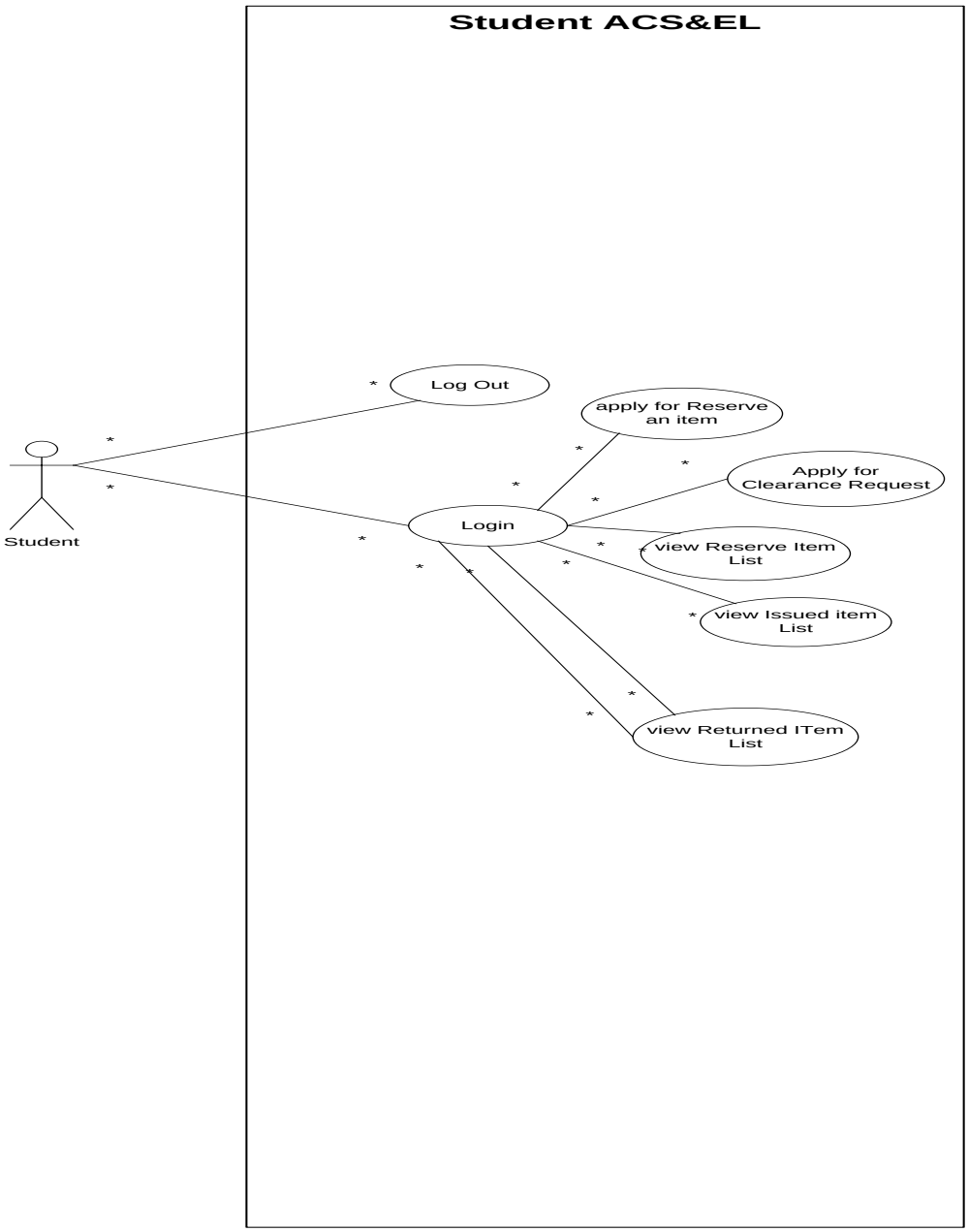


Figure 6 Use Case: Student

UC-1 Login - Server

Use Case Description

The server application shall enable the server system administrators and connected clients to Login using their respective login credentials i.e. by providing their user names and the associated passwords.

Business Justification

The clients and the system administrator will be trained enough to use the system.

Use Case Name	Login
Actor(s)	Sever System Administrator, Connected Clients
Pre-Condition	ACS&EL server application is started.
Normal Course	**Login is Successful** • Valid username entered • Valid password entered • User Clicks on Login Button
Post-Condition	User has logged into the system.
Alternate Course	**Login Failed** • Invalid User name or password or both. • Empty User name and password fields.
Post-Condition	Login screen is displayed again.
Assumptions	The server application has been successfully connected to the database.
Priority	Medium
Frequency	High
Risk	Low

Table 7 - Use Case: Login – Server

UC-2 Change Password

Use Case Description

The server application shall allow its users to manually change their login passwords by requesting the system administrator.

Business Justification

In case that the user of server application has forgotten the password, the user himself should be able to change it with the help of the system administrator.

Use Case Name	Change Password
Actor(s)	Sever System Administrator, Connected clients.
Pre-Condition	User has successfully logged into the system and has clicked on change password button on home screen. In case of forgotten password the user will click on Forgot password button.
Normal Course	**Password Successfully Changed** • Enter a valid current password • Enter new password • Click on Change Password button
Post-Condition	Message is displayed that password has been successfully changed.

Alternate Course	**Invalid Current Password is provided** • User enters invalid current password • User enters new password • User enters confirm new password • User clicks on Change Password **New password entered twice do not match** • User enters a valid current password • User clicks on change password button
Post-Condition	Error message is displayed .
Assumptions	Nil
Priority	Low
Frequency	Low
Risk	Low

Table 8 - Use Case: Change Password – Server

UC-3 Manage Clients

Use Case Description

The system administrator is allowed to add delete or modify any client i.e. change the passwords, edit other information etc.

Business Justification

According to the working structure of the Pakistan army the system administrator will be the over all in command of the formation/battalion.

Use Case Name	Manage Clients
Actor(s)	Server System Administrator

Pre-Condition	System Administrator is logged in.
Normal Course	**Add new Client** • Administrator clicks on Add New User Button. • Administrator defines type of the new user. • Administrator clicks on the Done button. **Delete User** • Administrator selects a User to be deleted. • Administrator clicks on delete button. **Edit Information**
	• Administrator selects a User and clicks on change information • All information of User is displayed on new screen. • Administrator edits the information and clicks on save button.
Post-Condition	Confirmation Message is displayed i.e. '1 Account successfully added' or '1 Account successfully deleted' or 'Information Successfully updated'
Alternate Course	**User already exists** A message is displayed that the user is already existing. **Information is missed in adding a User** When administrator clicks add button the textboxes are highlighted, which contain invalid information or information is missed out. **Deletion Failed** If administrator clicks on No when deletion confirmation message is displayed.

Post-Condition	No changes are done to database and user taken back to Manage Users screen
Assumptions	Database is consistent and well maintained and there are no unexpected software error.
Priority	Medium
Frequency	Low
Risk	Medium

Table 9 - Use Case: System admin– Server

UC-4 Generate Reports

Use Case Description

The system shall generate reports based on data fetched from the databases as per the request.

Business Justification

Report generation is an important function of ACS&EL. The server application shall have the facility to display reports for specified time durations. These reports are used to analyze the trend of the supplies and demands.

Use Case Name	Generate Reports
Actor(s)	Server System Administrator, Connected Clients
Pre-Condition	User is logged in and selects Generate Reports
Normal Course	• User sets parameter i.e. start data, end date, selects items.

	• User clicks on generate button to generate a report
Post-Condition	A detailed report based on the credentials input will be displayed.
Alternate Course	**Invalid input** • User puts up an in valid item request. • User clicks on generate report button **No Data is Available for the parameters defined** • User follows normal course of actions but no data is available for the range of parameters defined
Post-Condition	Error message is displayed i.e. 'Please specify correct parameters' or 'No data is available'
Assumptions	Nil
Priority	High
Frequency	High
Risk	High

Table 11 - Use Case: Generate Reports – Server

UC-5 Manage Profile

Use Case Description

Once a user has logged in he can view is profile by clicking on his name, User can edit his information.

Business Justification

User shall have the privilege to manage their profile information in order to accommodate changes once required.

Use Case Name	View Profile
Actor(s)	Common & Special Users
Pre-Condition	Actor is logged in and clicks on view profile button
Normal Course	**User edits his personal information** • Clicks on the box for which to change information. • User enters new information. • User clicks update information button.
Post-Condition	User's profile information is updated in database.
Assumptions	User enters valid information as per the input requirements
Priority	Low
Frequency	Medium
Risk	Low

Table 13 - Use Case: View Profile – client end

UC-8 Write Comments

Use Case Description

Special clients or request approving clients will write comments and recommendations on particular request if found some problem.

Business Justification

The higher/approving client when found some problem in request or require some amendments, will notify the under command by writing comments .

Use Case Name	Write Comments
Actor(s)	Special user(SMT ,Project Supervisor ,Clerk ,HOD)
Pre-Condition	User is logged in and view the particular request

Normal Course	• Special user view the request, write his observations beside the request in given field and send back to the respective initiating under command.
Post-Condition	The initiating client will receive the request along with the prescribed comments for corrections.
Alternate Course	• The higher client will just write the comments for discussion and request will be sent to the initiating
Post-Condition	The initiating client will come to know that he is required to the discuss the matter verbally
Assumptions	Nil
Priority	High
Frequency	High
Risk	High

Table 14 - Use Case: Generate Reports - Web Application

Sequence Diagrams

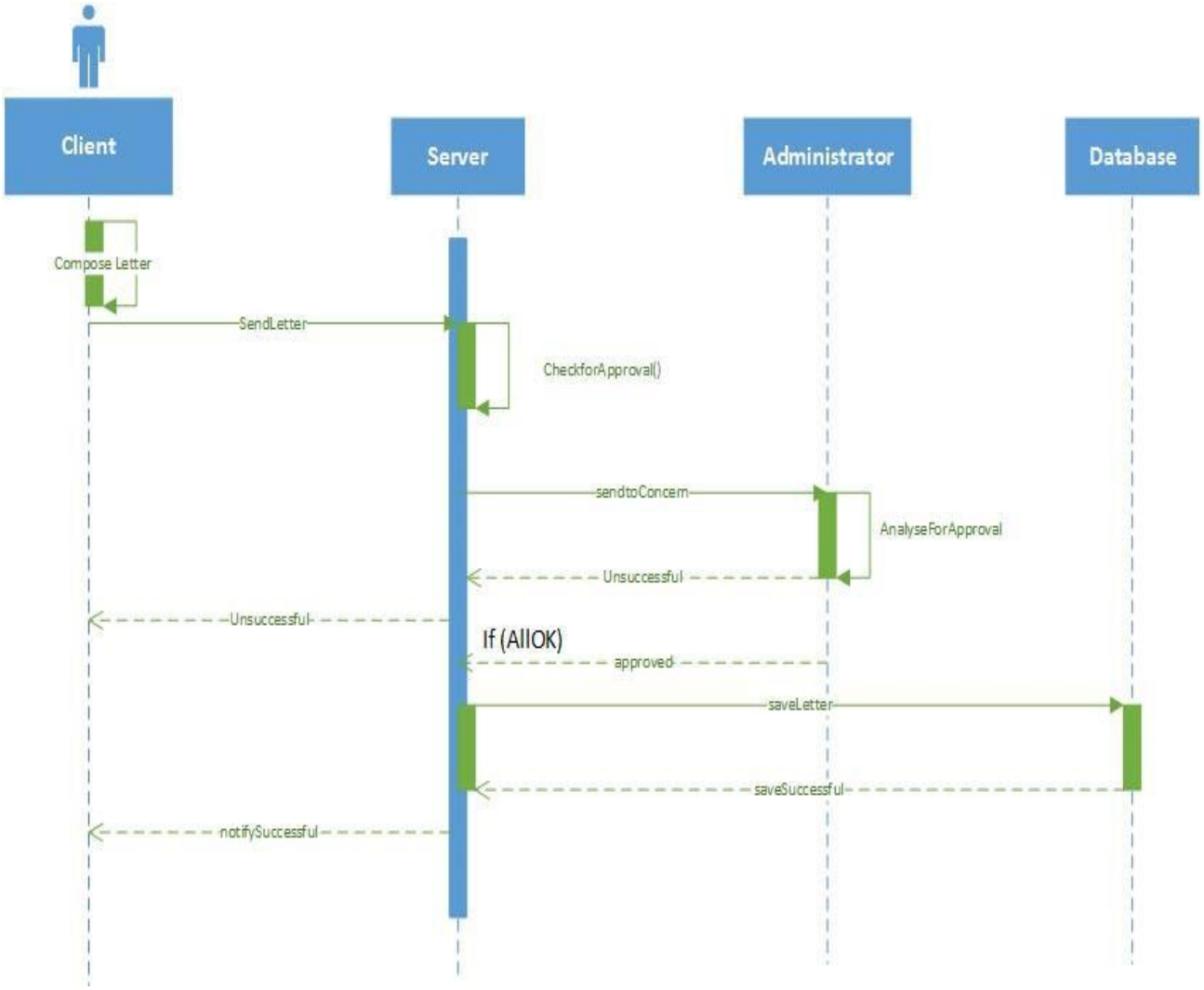


Figure 7 Sequence Diagram: Request Appro

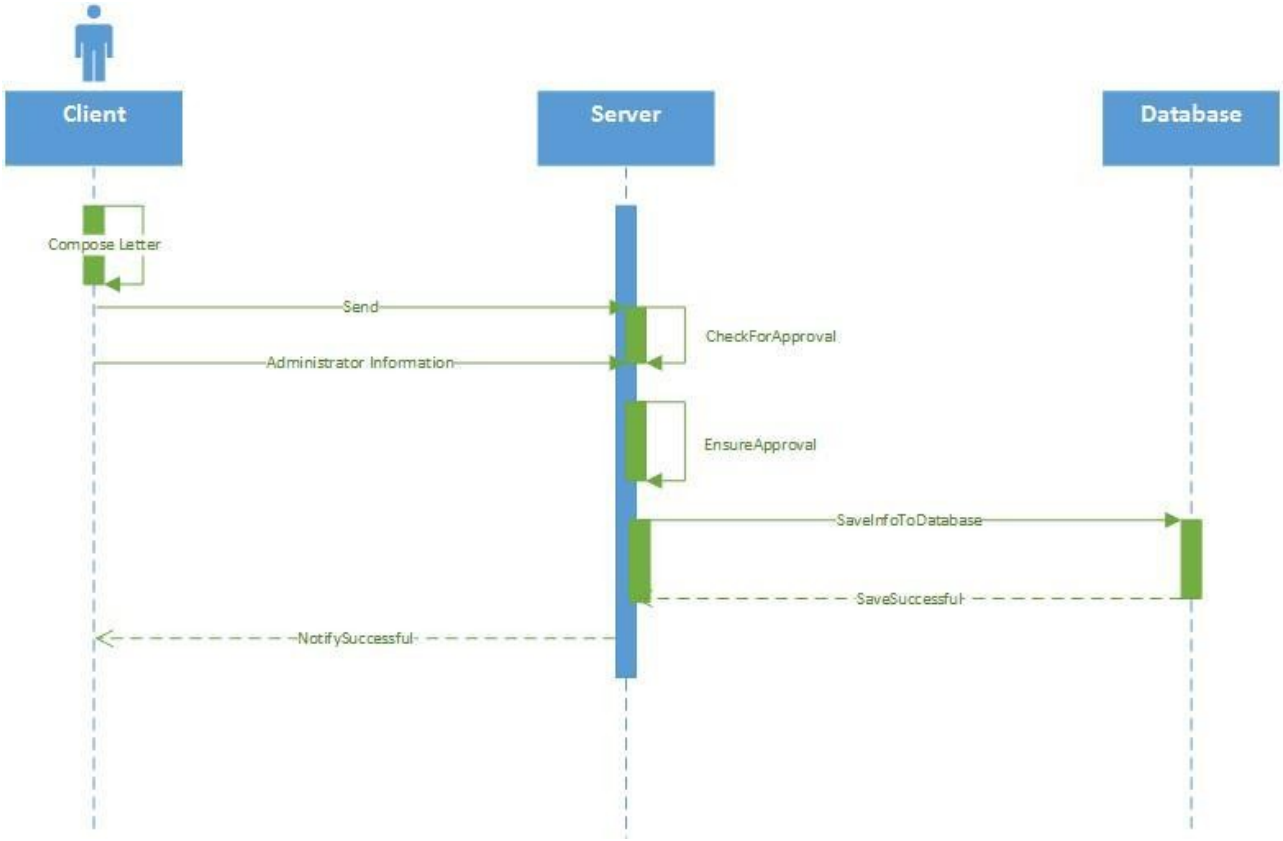


Figure 8 Sequence Diagram: Send Request

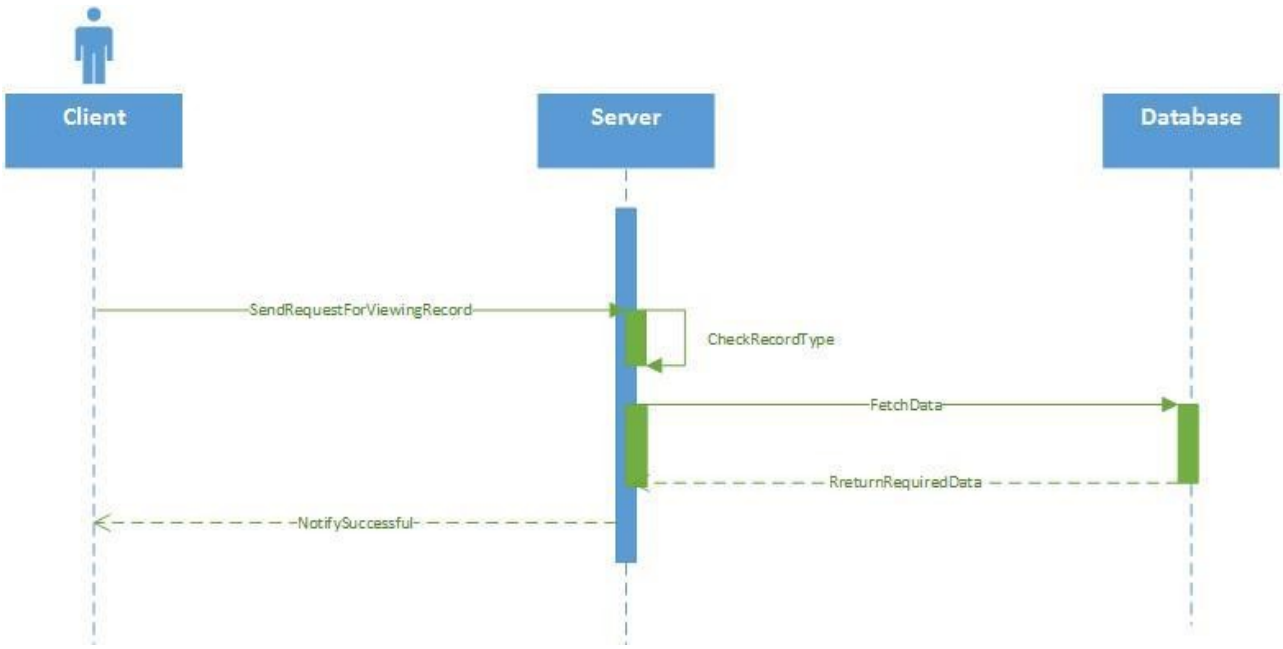


Figure 9 Sequence Diagram: View Record

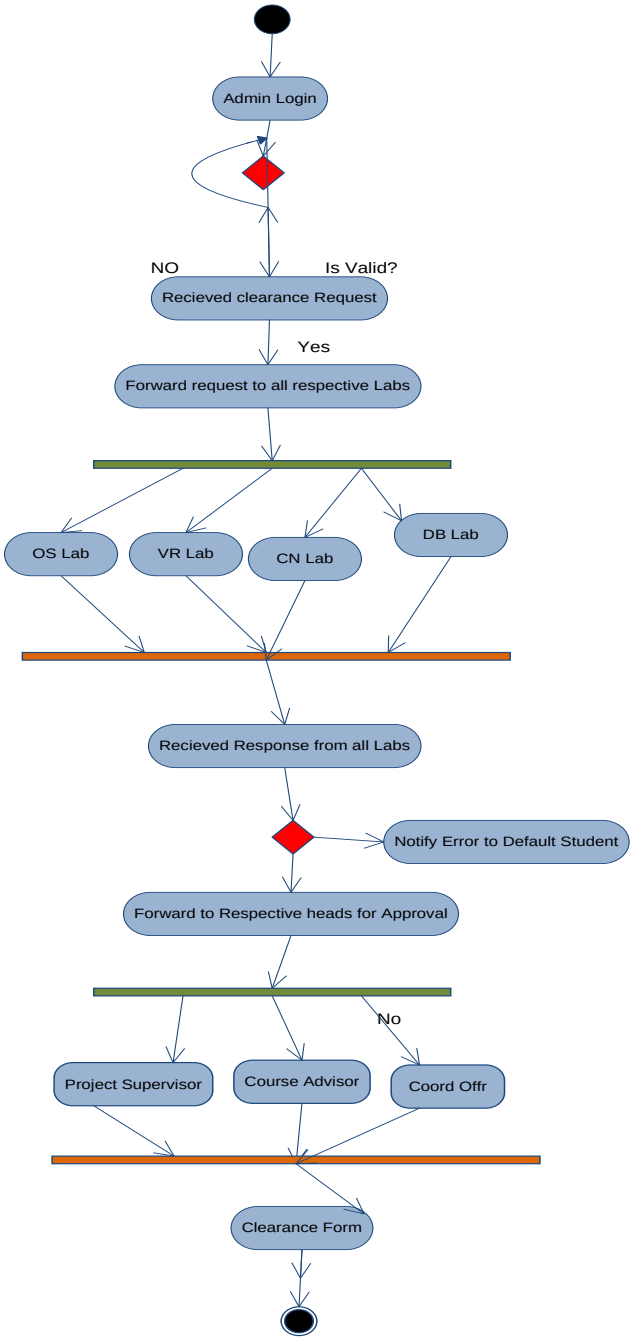


Figure 10 Activity Diagram Server-End

Class Diagram

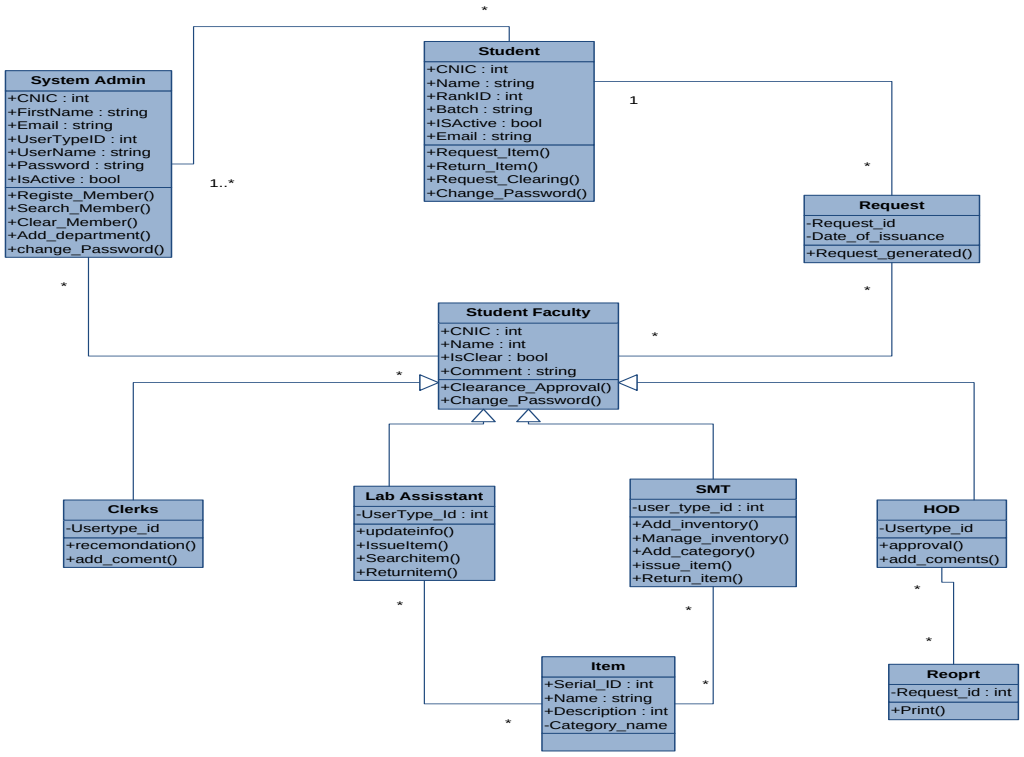


Figure 11 Class Diagram

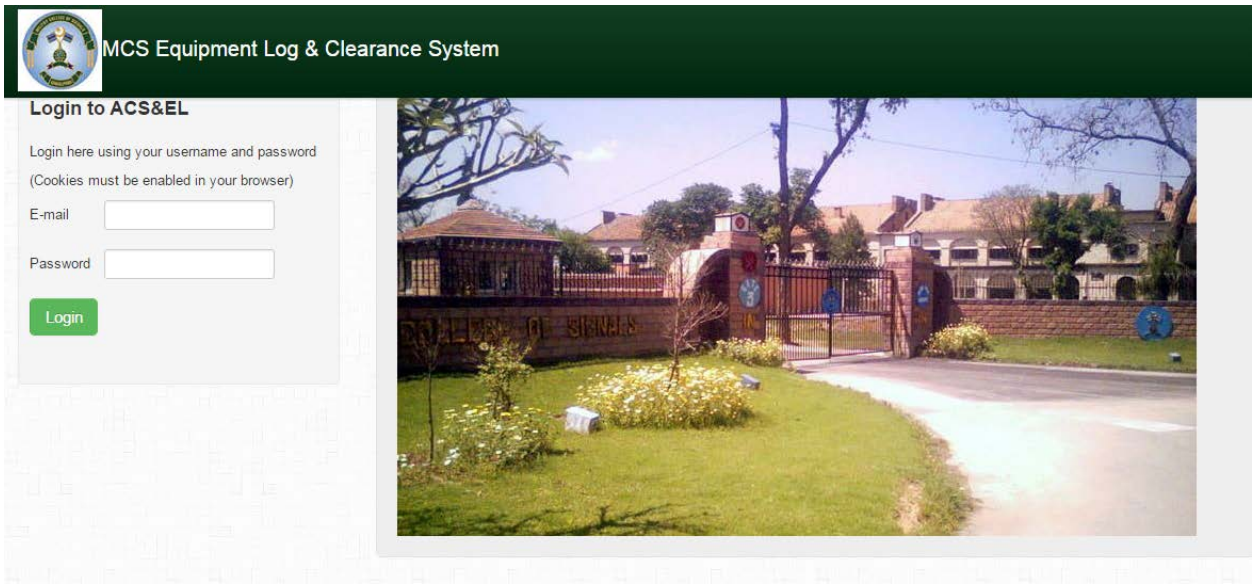
The following table briefly describes the roles & responsibilities of these classes:

Class Name	Description
Admiistrator	This class is responsible for managing, adding, deleting new clients in the network. It is also responsible for monitoring the overall working of the network.
Students	Students make their accounts .They are issued with respective Id. When registered they can apply for clearance ,request for items and check their status .
Request	Request is made via student .Clients login to initiate request.
Lab Assistants	Lab assistants are updated by SMT. They receive requests made by the clients. Clearance is issued by them .They counter check if item is available or not. Upon clearance request they counter check .
SMT	SMT keeps the record of all item going in and out of department .Updates are sent lab heads .JOB includes recommendation and adding comments upon clearance request .

Clerk	Includes only two functions : • Recommendation • Commenting
Report	Client type student is able to generate print slip which serves as proof of clearance .This is possible only if client has no outstanding charges and has returned all items received .
Items	Item includes • Type • Id • Category
HOD	Head of department who can make recommendations and can add comments .

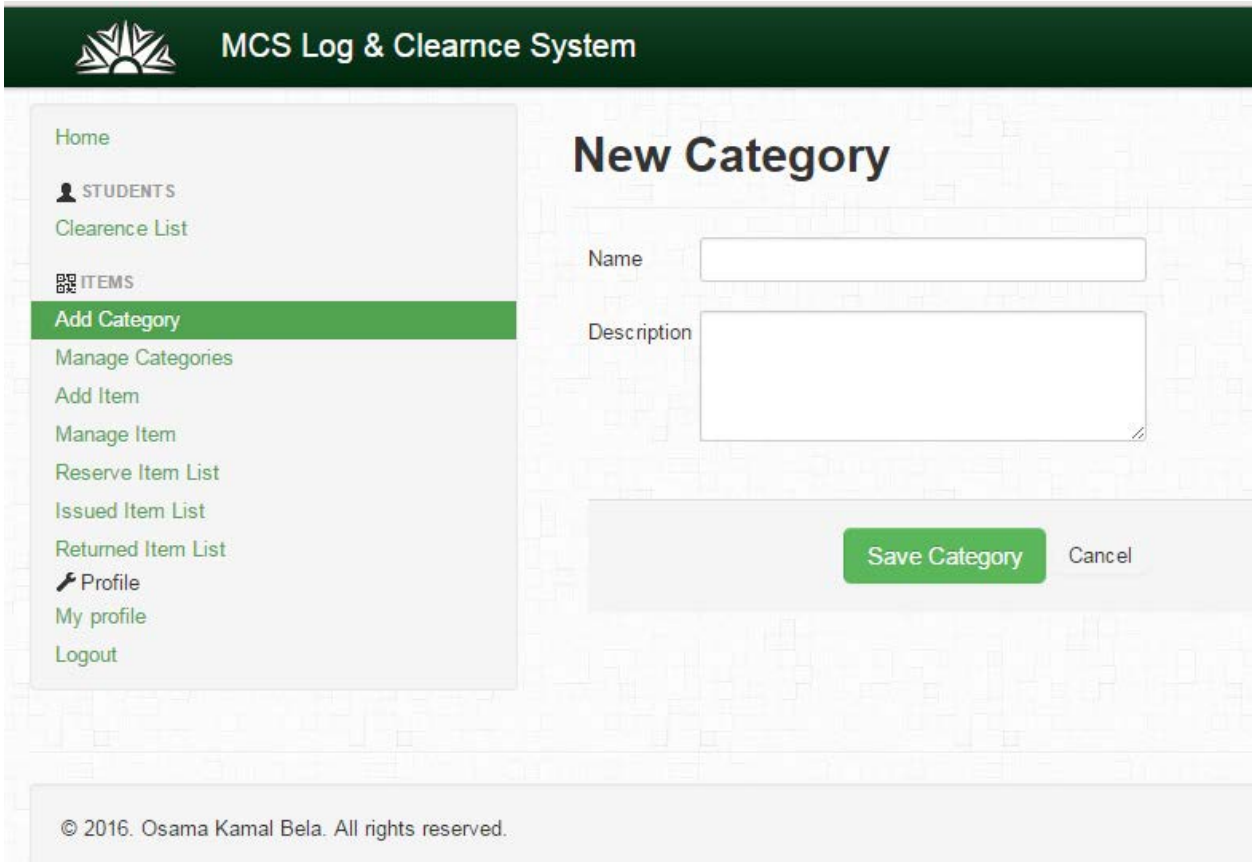
CHAPTER:5 SYSTEM IMPLEMENTATION

Login in the System



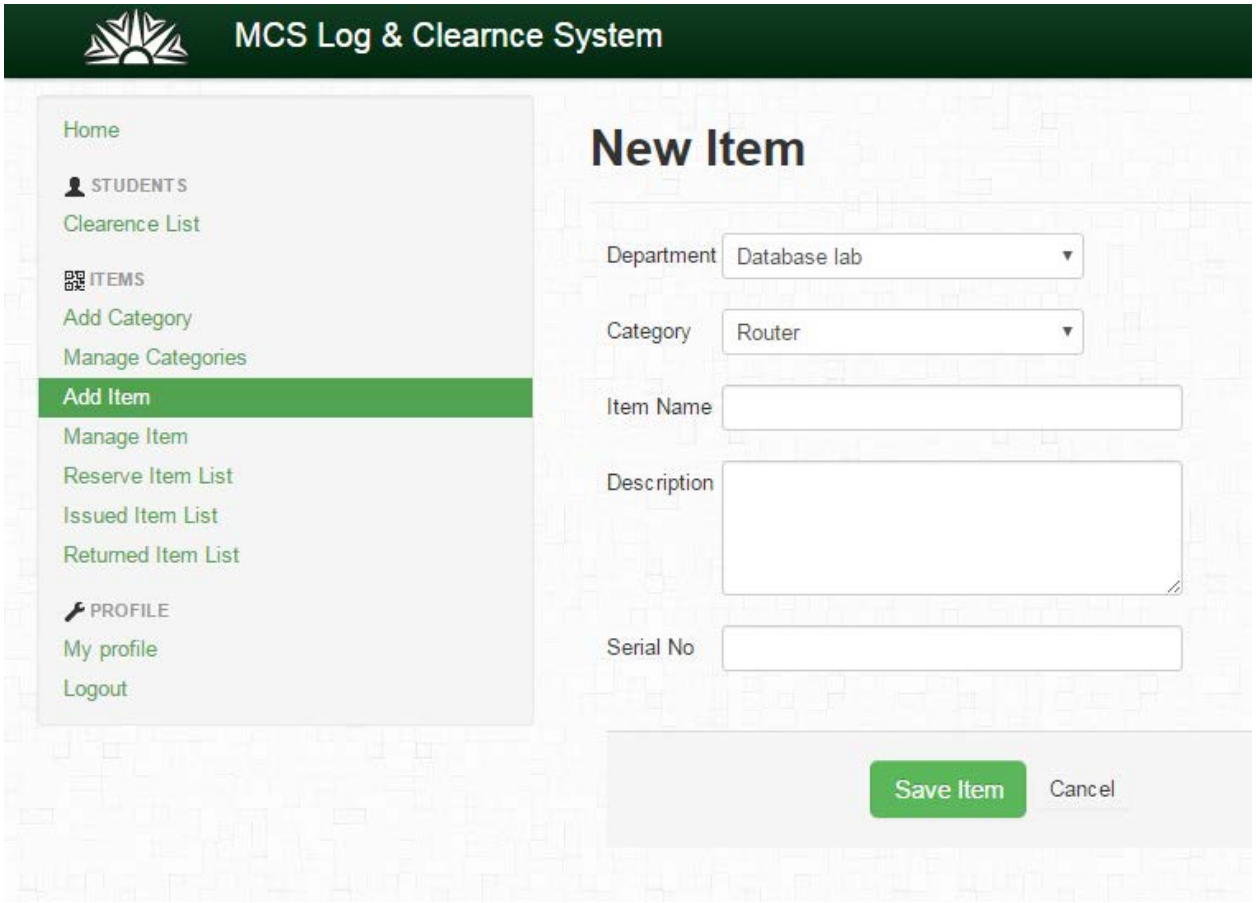

```
    protected void btnLogin_Click(object sender, EventArgs e)
    {
        string username = email.Text;
        string pwd = password.Text;
        int userID = 0;

        strConnString =
WebConfigurationManager.ConnectionStrings["library_db"].ConnectionStri
ng;
        objConn = new SqlConnection(strConnString);
        objConn.Open();

        //*** DataTable ***//
        SqlDataAdapter dtAdapter;
        DataTable dt = new DataTable();
        strSQL = "SELECT Username,Password , ID FROM tblStudent ";
        strSQL += " WHERE (Username = '" + username + "' ";
        strSQL += " AND Password = '" + pwd + "')";
        //strSQL = "SELECT * FROM Member_Info WHERE Member_id = 3";
        dtAdapter = new SqlDataAdapter(strSQL, objConn);
        dtAdapter.Fill(dt);
        //  Response.Write(strSQL);
        if (dt.Rows.Count > 0 && dt.Rows.Count <= 1)
        {
            Session["StudentAuthentication"] = username;
            userID = Convert.ToInt32(dt.Rows[0]["ID"]);
```

```
            //Session["User_id"] = username;

            Session["userID"] = userID;
        }
        else
        {
            Session["StudentAuthentication"] = "";
        }

        objConn.Close();
        objConn = null;
        if (userID > 0)
        {
            Session.Timeout = 20000;
            Response.Redirect("/student/profile.aspx");
        }
    }
}
```



```
protected void btnSubmit_Click(object sender, EventArgs e)
   {
       OsamaLMS.ItemInfo item = new OsamaLMS.ItemInfo();
       OsamaLMS.ItemInfoDAO itemDAO = new OsamaLMS.ItemInfoDAO();

       if (txtItemName.Text != "" && txtDescription.Text != "")
       {

           item.setCategoryName(txtItemName.Text.ToString());
           item.setCategoryDesc(txtDescription.Text);

           itemDAO.addNewCategory(item);
           Message.Text = itemDAO.getMessage();
           txtItemName.Text = "";
           txtDescription.Text = "";
       }
       else
       {
           Message.Text = "Please fill all box";
       }
   }
```

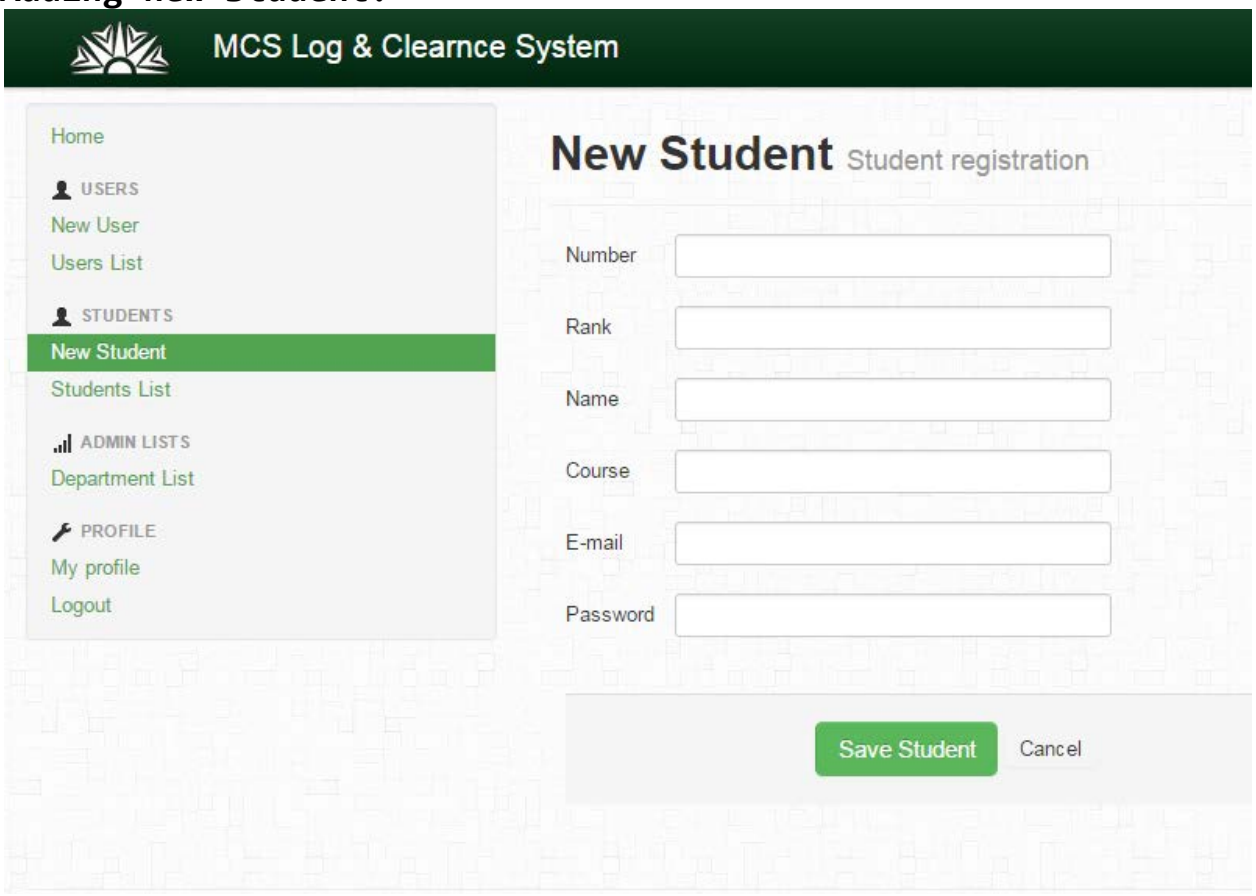
Adding new item to the inventory:




```
protected void btnSubmit_Click(object sender, EventArgs e)
    {
        OsamaLMS.ItemInfo item = new OsamaLMS.ItemInfo();
        OsamaLMS.ItemInfoDAO itemDAO = new OsamaLMS.ItemInfoDAO();

        if (txtItemName.Text != "" && txtQuantity.Text != "")
        {

            item.setName(txtItemName.Text.ToString());

item.setDepartment(Convert.ToInt32(ddlDepartment.SelectedValue));
            item.setQuantity(txtQuantity.Text);
            item.setItemDesc(txtDescription.Text);

item.setCategoryID(Convert.ToInt32(ddlCategory.SelectedValue));
            itemDAO.addNewItem(item);
            Message.Text = itemDAO.getMessage();
            txtItemName.Text = "";
            txtQuantity.Text = "";
        }
        else
        {
```

```
            Message.Text = "Please fill all box";
        }
    }
}
```

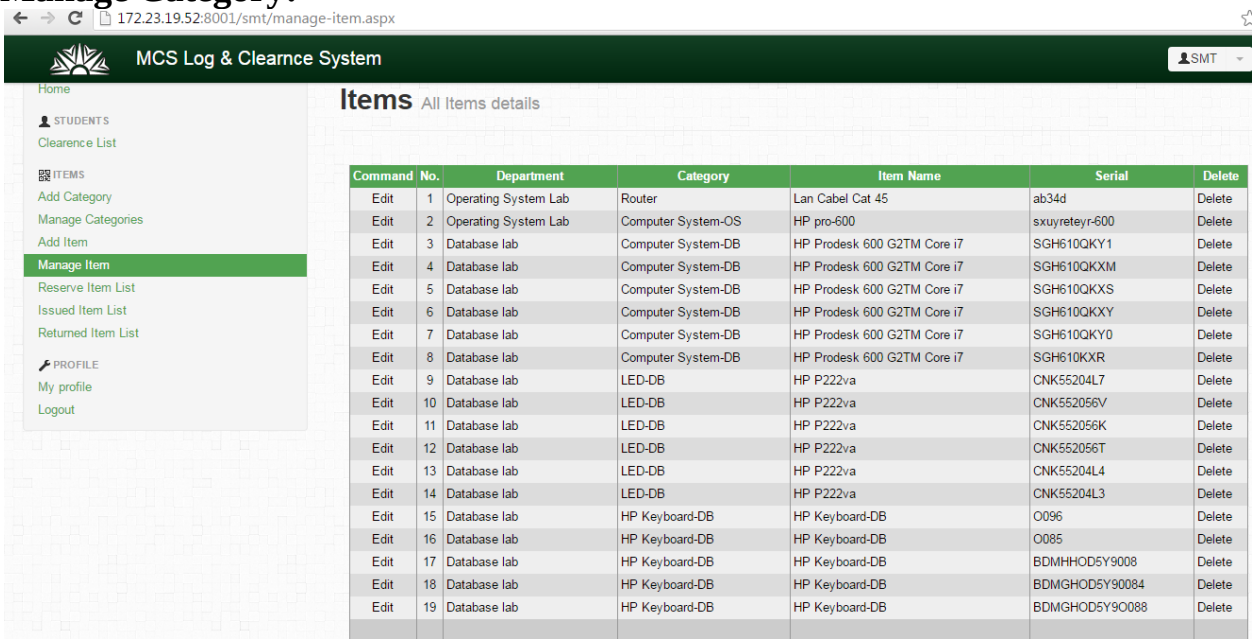
Adding new Student:




```
protected void btnSubmit_Click(object sender, EventArgs e)
    {
        student.setPA(txtPA.Text.ToString());
        student.setRank(txtRank.Text.ToString());
        student.setCourse(txtCourse.Text.ToString());
        student.setName(txtName.Text.ToString());
        student.setEmail(Email.Text.ToString());
        if (Password.Text == "")
        {
            student.setPassword(lblPassword.Text.ToString());
        }
        else
        {
```

```
            student.setPassword(Password.Text.ToString());
        }


        strSQL = "UPDATE tblStudent SET ";
        strSQL += "PANO = '" + student.getPA() + "',Name = '" +
student.getName() + "',Rank = '" + student.getRank() + "',Course='" +
student.getCourse() + "' ";
        strSQL += ",Username='" + student.getEmail() + "',Password='"
+ student.getPassword() + "' ";
        strSQL += " WHERE ID = " + lblID.Text + "";
        student.setSqlQueuery(strSQL);
            studentDAO.editStudent(student);
       //     Response.Write(strSQL);
        lblStatus.Visible = true;
        lblStatus.Text = studentDAO.getMessage();
        Member_panel.Visible = true;
        //Message.Text = "Update member information success";

    }
```

Manage Category:




```
    protected void modDeleteCommand(object sender,
GridViewDeleteEventArgs e)
    {
        strSQL = "DELETE FROM tblItem WHERE ID = '" +
myGridView.DataKeys[e.RowIndex].Value + "'";
        objCmd = new SqlCommand(strSQL, objConn);
```

```
        try
        {
            objCmd.ExecuteNonQuery();
            text.Text = "Category Deleted successful";
        }
        catch (Exception ex)
        {
            text.Text = "Can't delete Category";
            //Response.Write("Cannot delete");
        }

        myGridView.EditIndex = -1;
        BindData();
    }

    protected void modUpdateCommand(object sender,
GridViewUpdateEventArgs e)
    {
        //*** Name ***//
        TextBox txtItemName =
(TextBox)myGridView.Rows[e.RowIndex].FindControl("txtEditItemName");
        TextBox txtDescription =
(TextBox)myGridView.Rows[e.RowIndex].FindControl("txtEditDescription")
;

        strSQL = "UPDATE tblItem SET Name = '" +
txtItemName.Text.Replace("'", "''") + "', Description = '" +
txtDescription.Text.ToString() + "' WHERE ID = '" +
myGridView.DataKeys[e.RowIndex].Value + "'";

        objCmd = new SqlCommand(strSQL, objConn);
        try
        {
            objCmd.ExecuteNonQuery();
            text.Text = "Category updated successful";
            //Response.Write(txtName.Text);
        }
        catch (Exception ex)
        {
            text.Text = "Can't update Category";
            //Response.Write(ex.Message);
```

CHAPTER:6 TESTING AND EVALUATION

6. TESTING AND EVALUATION

This software test plan is to provide the description of test cases for ACS&EL , describing the scope and approach of intended test activities. This document will describe the test cases for different features of the system such as login, create and send request, manage equipments etc.

Software Requirement and Specification document of ACS&EL supports this test plan.

6.1. Test Items

Following are the test items and their version:

Test Item Name	Test Item Version Number	Test Type
Add Unit Success	Version 1	Black Box
Add Unit Failure	Version 1	Black Box
Add User	Version 1	Black Box
Login	Version 1	Black Box
Send request	Version 1	Black Box
Add Equipment	Version 1	Black Box

6.2. Features to be Tested

Features	Overview
Login	Open the application
	Go to Login Form Enter required information Check the status
Add Unit	Login as administrator Go to Home Page Click Add Unit Button Enter Unit name Its type Check Hierarchy to confirm

Add User	Login as administrator Go to Home Page Click Add User Button Enter Unit name Enter all Information of user Its role and status Check Hierarchy to confirm
Add Appointment	Login as administrator Go to Home Page Click Add appointment Button Enter new appointment Its role/status Check Hierarchy to confirm
Create Request	Login as any user Enter Subject of Request Enter Authority to be marked Type of equipment Quantity Request will be created by the
Send Request	Login as any user Create Request

	Mention Authority to be marked Click Send Button
Approve Request	Login as Approving User Receive a request Approve by using Approved Button
Return Request	Login as Approving authority View request In case of error, return the request back to Originating user by commenting the desired. Send the request back by using Return Button
Search Request	After Log on, enter the desired Request ID to search the request
Add Equipment	Login as a particular Battalion user Go to Add equipment Enter details of the particular item It's held and Authorised quantity Check status
Mark Request	Create Request Mention Authority to be marked Enter the Comments Click Ok Button
Warning	Login Check the quantity of any item If quantity is below threshold, warning will be generated

6.3. Features not to be tested

All features of ACS&EL will be tested

6.3.1 Approach

No separate tool will be used to test the system. Code will be reviewed on Microsoft Visual Studio 2013.Testing will be comprehensive so that high quality of the system should be achieved. All features should be tested at least once in order to achieve the minimum degree of comprehensiveness.

6.3.2 Item Pass/Fail Criteria

The entrance criteria's for each phase of testing must be met before the next phase can commence. Any test item will be declared pass if it conforms to the requirements specified in the SRS and fail if it does not.

6.3.3 Suspension Criteria and Resumption Requirements

The only case in which test activity needs to be suspended is failure of a feature. In that case the development team will be reported to fix the error of the feature after which the testing of the whole system will start again.

6.3.4 Environmental Needs

Windows based system is required for the testing of the system Microsoft Visual Studio 2013 and .NET Framework 4.5 is required to run the software.

6.3.5 Schedule

Testing process has taken 25 days.

6.3.6 Functional Testing (Black Box)

The software program or system under testing is viewed as a "black box". The selection of test cases for functional testing is based on the requirement or design specification of the software entity under test. Functional testing emphasizes on the external behavior of the software entity.

6.4. Test Cases

Test Case Number	1
Description	Testing New account for Student
Preconditions	Web Application should be open
Input	Click on Make new Student Button
Steps	Select the Make new account from menu.
Expected output	Student Enrolled .
Results	Student added successfully .

Test Case Number	2
Description	Testing new user for Lab administrator .
Preconditions	Web application should be open.
Input	Click on administration login.
Steps	Enter the credentials and click save user button.
Expected output	Lab administrator registered .
Results	lab administrator registered successfully.

Test Case Number	3
Description	Testing Server administrator .
Preconditions	Server must be up , web interface must be open .Super user must have privileged access to server .
Input	Click administration login
Steps	Enter user name and password.
Expected output	Gets access to all features of his account.
Results	Access to all registrations , equipments and clearance .

Test Case Number	4
Description	Testing new account for HoD .
Preconditions	Web Application must be open.
Input	Click on administration login .User Enters Data.
Steps	user clicks on new account in interface and selects type HoD .After this click save user .
Expected output	HOD enrolled.
Results	New HoD account is registered.

Test Case Number	5
Description	Testing Student Login
Preconditions	The user must have account .
Input	User enters name and Password.
Steps	Student user clicks on login on interface.
Expected output	Student gets access to equipment and clearance facility .
Results	Students logins normally .

Test Case Number	6
Description	Testing Lab Administrator login .
Preconditions	Lab Administrator must have id.
Input	Click on administrative login on web interface .
Steps	Enter id and password, Click Login Button.
Expected output	Lab administrator interface opens.
Results	Not working Yet.

Test Case Number	7
Description	Testing HOD Login .
Preconditions	User must have Username and password.
Input	Click on administration login .
Steps	Login with user name and password on Web Application ,
Expected output	HOD logins ,can approve and reject .
Results	HOD logins without facilities .

Test Case Number	8
Description	Testing server user login .
Preconditions	Web application must be open.
Input	Click on administration login .
Steps	Enter user name and password , click login .
Expected output	Server user gets access to all activities.
Results	Successful access to his facilities .

Test Case Number	9
Description	Testing Reserve item from student id .
Preconditions	User must have account .
Input	Click on reserve item button .
Steps	Select lab and item from list .
Expected output	Request successful for item .
Results	Not working yet .

Test Case Number	10
Description	Testing Clearance request From Student user .
Preconditions	Student must have logged in .
Input	Click on apply for Clearance
Steps	Click on Apply for Clearance from respective lab .
Expected output	Student generates request for Clearance
Results	Working

6.5. System Testing

System testing was performed at the end of development. Complete system was tested in different inputs in different conditions to verify that those conditions do not disrupt the performance of the system and then testing the whole system for performance and other attributes (failures, response delays etc).

CHAPTER 7: FUTURE WORK

7. FUTURE WORK

ACS&EL addresses a neglected side of institutions . The handling of supplies/logistics has been made more efficient. The design of the system is in such a way that it can be extended to any level of the MCS. Initially its scope has been limited to department of MCS level but in the future it can be extended from the highest level entire college As far as the stocks are concerned, as per the present proposed scope the stocks include ration, Store Items and MT. in the future the stocks being handled by the system can be increased to a no of variety like ammunition, oil supplies.

From the development point of view ACS&EL has been designed keeping in view the present online system of OAS (office Automation System). It can be integrated with the OAS to establish one large online system for the Pakistan army, or it can be taken along as a separate project as well.

The working of the system has been made as flexible as possible to meet the changing needs. With a few amendments the system can be supplied to the armies of friendly countries as well or in some other civil organization as well.

CHAPTER 8:

CONCLUSION

8. CONCLUSION

8.1. Overview

"Making the supplies handling efficient strengthens the backbone of the institution ".

ACS&EL is not just a final year project of an engineering degree but it was the passion of the group to work on something as to solve the problems of department .

There are a systems deployed in a number of foreign countries which serve the same purpose but the issue is the extremely high cost and different deployment scenario of this system in our country. So that's why a dedication to create a system that will provide efficient and automated management of an organization. It will be of great use for military, and/or any organization in the corporate world that intends to efficiently manage its system.

CHAPTER 9:

USER MANUAL

9. User Manual

This Manual is a guide to the "Automate Clearance System & maintaining equipment Logs(ACS&EL)". It contains essential instructions for setup and operations. In this user manual we will go step by step exploring each option and helping to get around this software as easily and effectively as possible. The user manual of ACS&EL will include graphical guidelines for the operations. It will be provided in both hard and soft copy. The manual would not be exhaustive, but provide help on the most common features. It is recommended to read this manual for easy usage of ACS&EL system. So that there would be no difficulty in using this system.

Given Order must be followed while reading the manual.

9.1. Requirements:

AS&SAS requires the following to operate:

- Microsoft SQL Server Management Studio 2008 R2(at the server).
- Microsoft visual studio 2012

SQL Server needs to be deployed at the server. (It can vary according the type and deployment of the server).

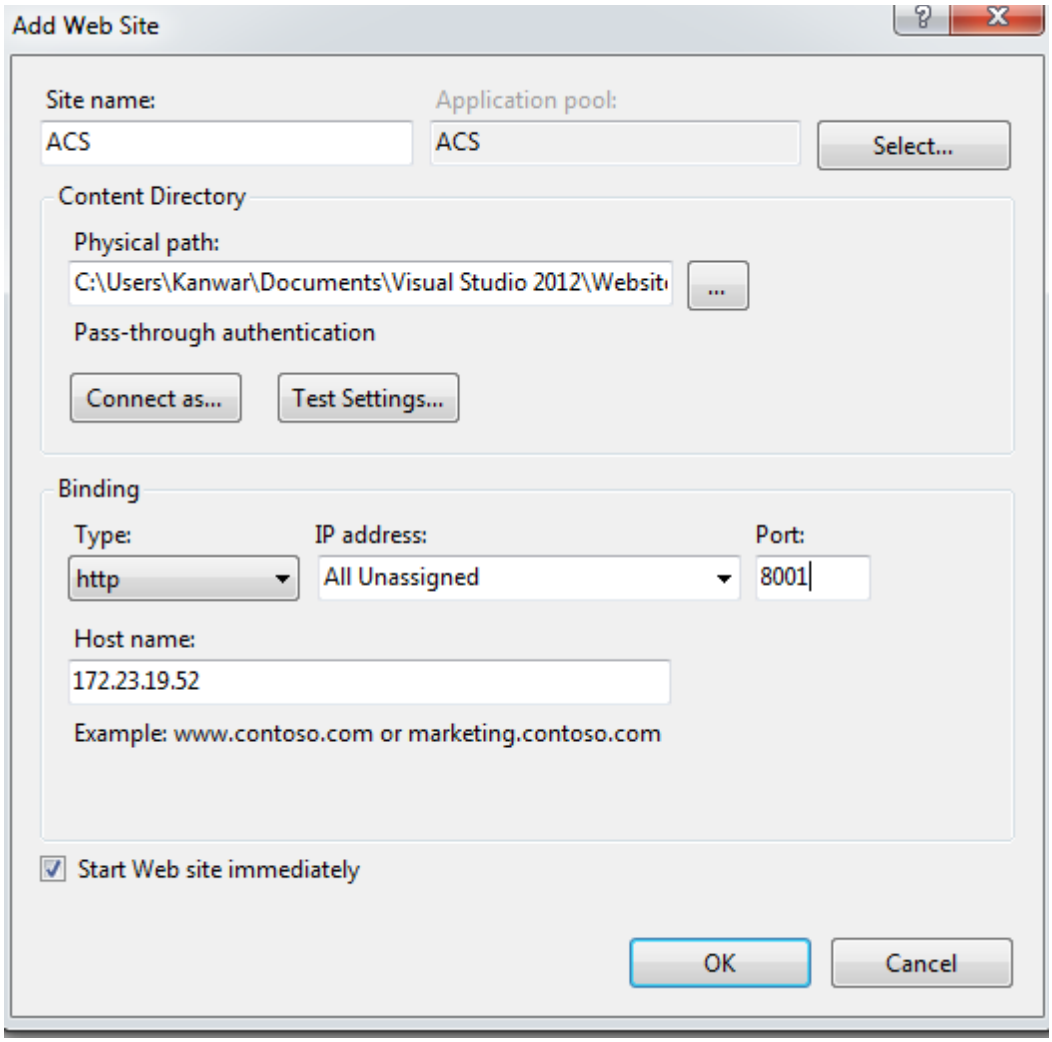
Framework follow the following link:

Offline Installer: http://www.microsoft.com/en-pk/download/details.aspx?id=42642

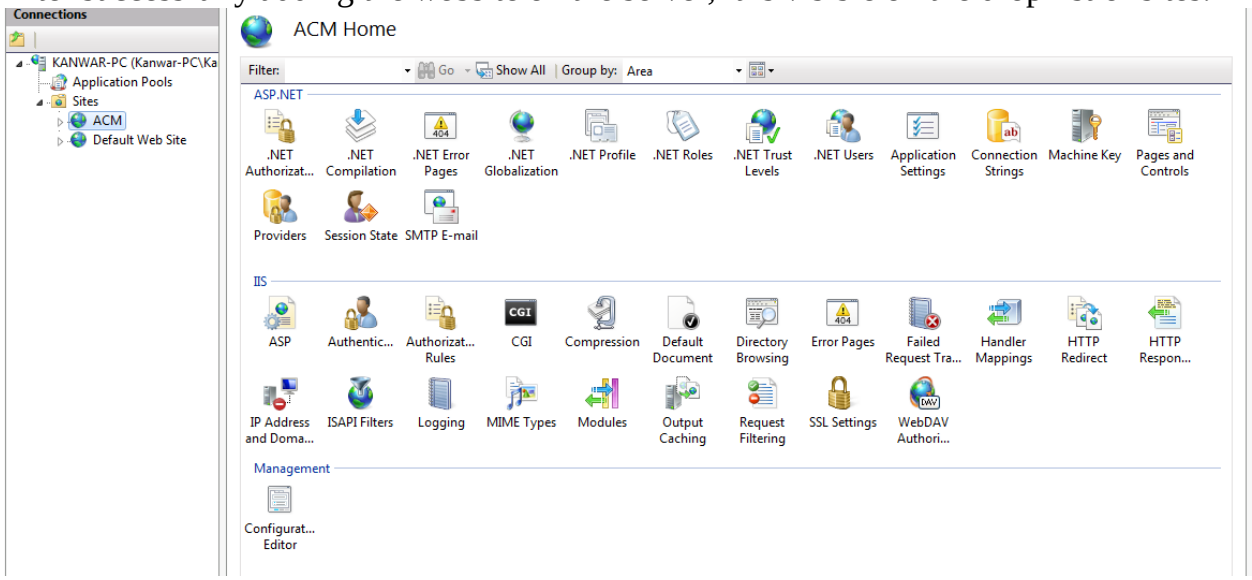
Web Installer: http://www.microsoft.com/en-us/download/details.aspx?id=42643

9.2Installation:

you must have to add the website on the server.



After successfully adding the website on the server, it is visible on the drop list of sites.



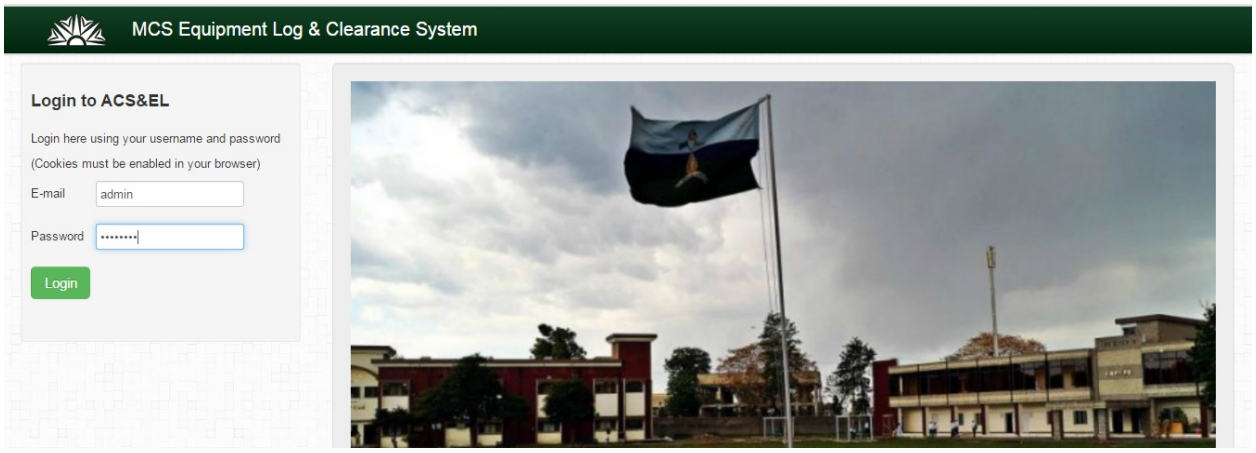
9.3.Operations:

9.3.1. Login:

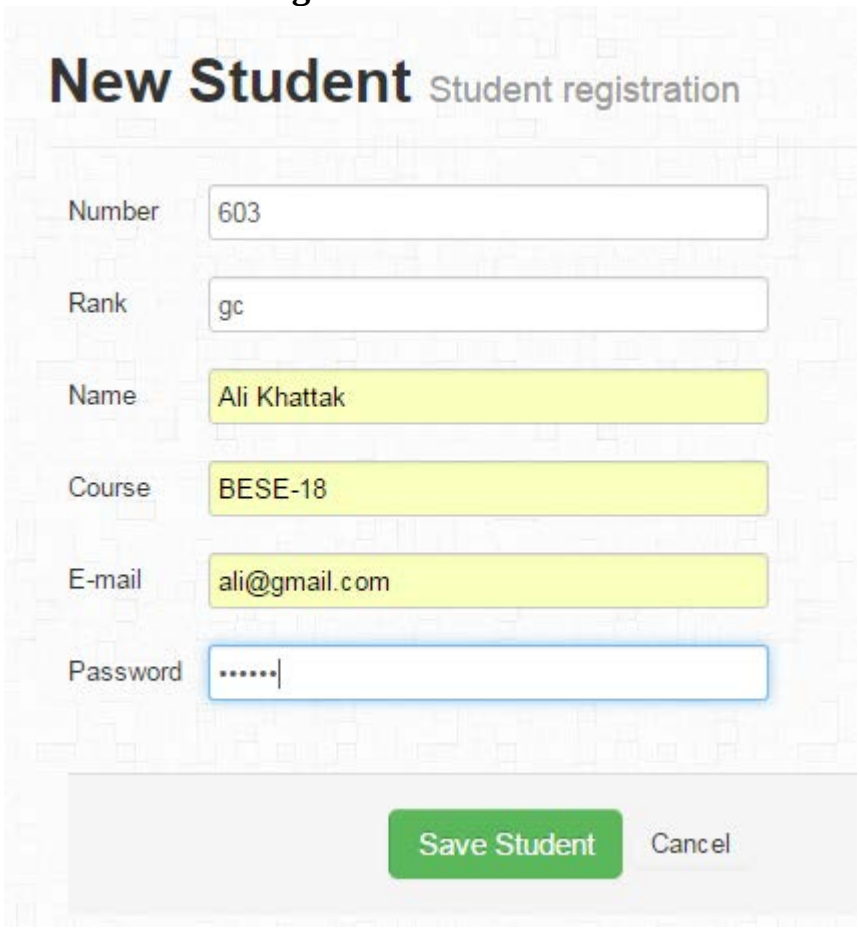
The System Administrator get login the system by using its own default password & username.

i.e Username=admin & Password=12345678

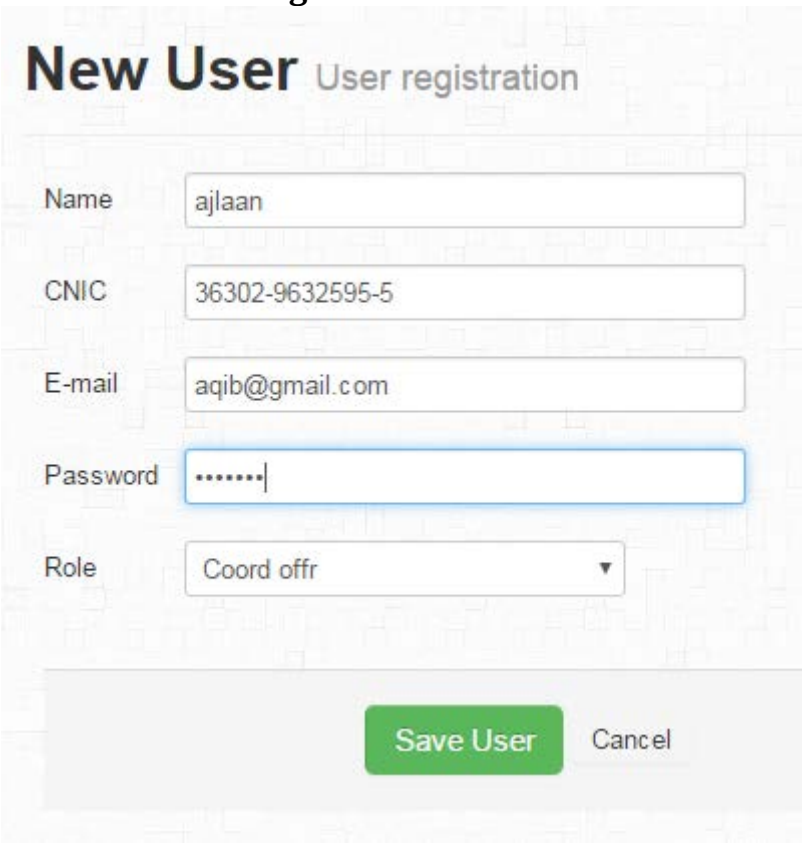
..



9.3.2. Adding new Student:



9.3.4. Adding new user:



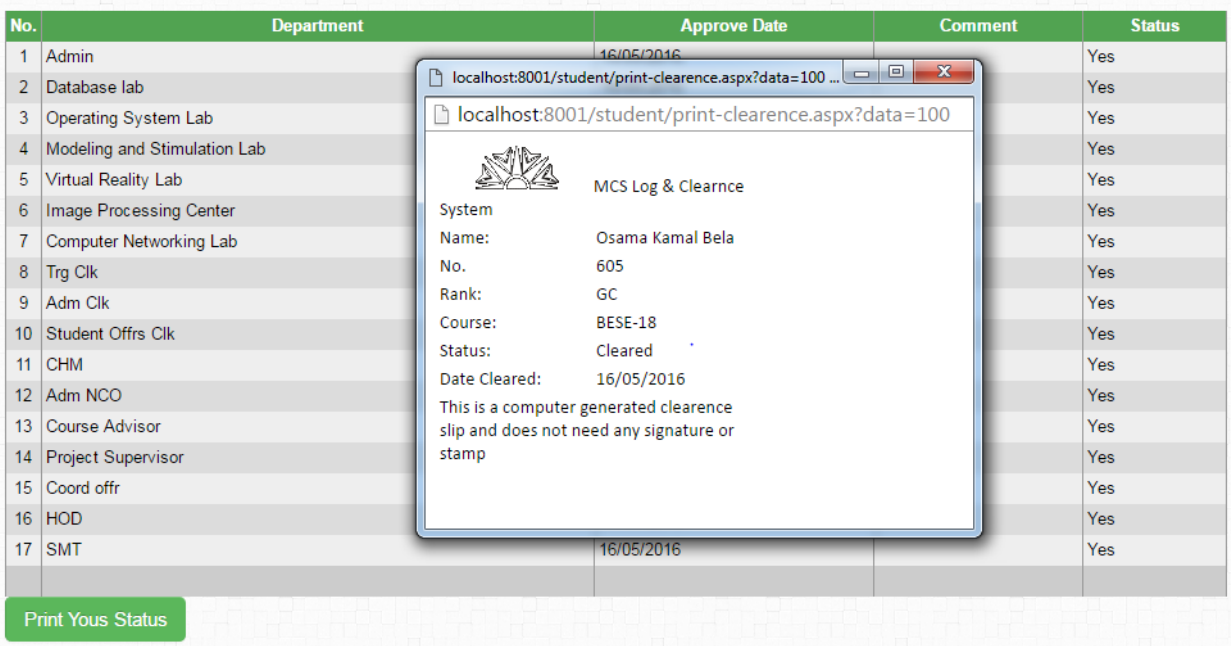
9.3.5. Apply for Clearance:

No.	Department	Approve Date	Comment	Status
1	Admin	25/05/2016		Not Yet
2	Database lab	25/05/2016		Yes
3	Operating System Lab	25/05/2016		Not Yet
4	Modeling and Stimulation Lab	25/05/2016		Not Yet
5	Virtual Reality Lab	25/05/2016		Not Yet
6	Image Processing Center	25/05/2016		Not Yet
7	Computer Networking Lab	25/05/2016		Not Yet
8	Trg Clk	25/05/2016		Not Yet
9	Adm Clk	25/05/2016		Not Yet
10	Student Offrs Clk	25/05/2016		Not Yet
11	CHM	25/05/2016		Not Yet
12	Adm NCO	25/05/2016		Not Yet
13	Course Advisor	25/05/2016		Not Yet
14	Project Supervisor	25/05/2016		Not Yet
15	Coord offr	25/05/2016		Not Yet
16	HOD	25/05/2016		Not Yet
17	SMT	25/05/2016		Not Yet

9.3.6.Clearance Approval:

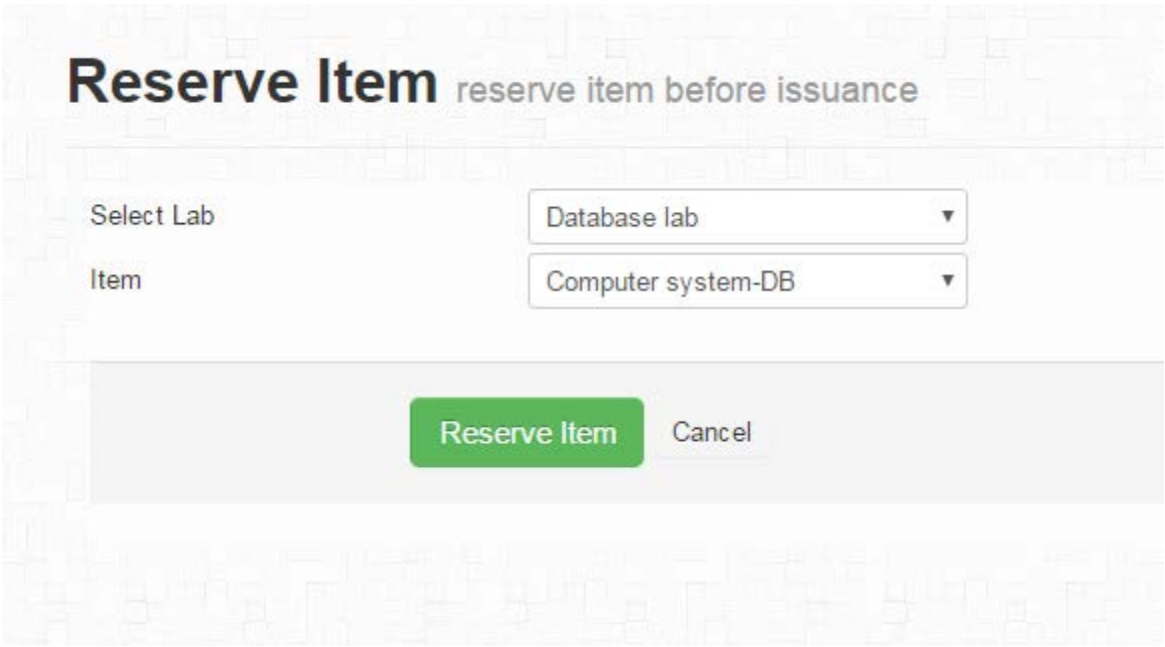
9.3.7.Cleared Slip:

After Successful approval of all the authorities , the student can get the clearance slip after submitting the button of print summary.



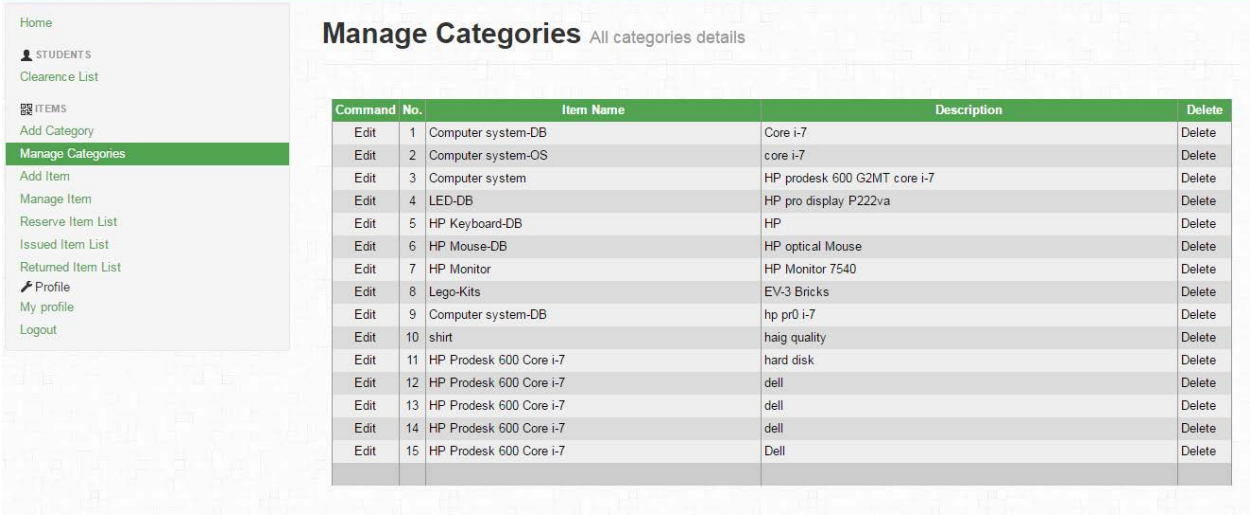
9.3.8.Reserve the items:

The student can issue an item through the following way.



9.3.9. Maintaining Equipment Logs:

Store Man technician(SMT) is responsible for maintaining all the equipment of department.



Command	No.	Item Name	Description	Delete
Edit	1	Computer system-DB	Core i-7	Delete
Edit	2	Computer system-OS	core i-7	Delete
Edit	3	Computer system	HP prodesk 600 G2MT core i-7	Delete
Edit	4	LED-DB	HP pro display P222va	Delete
Edit	5	HP Keyboard-DB	HP	Delete
Edit	6	HP Mouse-DB	HP optical Mouse	Delete
Edit	7	HP Monitor	HP Monitor 7540	Delete
Edit	8	Lego-Kits	EV-3 Bricks	Delete
Edit	9	Computer system-DB	hp pr0 i-7	Delete
Edit	10	shirt	haig quality	Delete
Edit	11	HP Prodesk 600 Core i-7	hard disk	Delete
Edit	12	HP Prodesk 600 Core i-7	dell	Delete
Edit	13	HP Prodesk 600 Core i-7	dell	Delete
Edit	14	HP Prodesk 600 Core i-7	dell	Delete
Edit	15	HP Prodesk 600 Core i-7	Dell	Delete

CHAPTER 9:
BIBLIOGRAPHY

9. BIBLIOGRAPHY

9.1. What is already done in domain?

9.1.1 In Military College of Signals:

In MCS no such project for the military has been developed which would automate the clearance and equipment issuance . However an Integrated Supply Chain management system was developed in BESE 15 but it does not fulfil the objectives enlisted in this application which are specific for clearance .

9.1.2 In Pakistan Army:

Pakistan Army is currently using Office Automation System (OAS) for carrying out all sort of written communication including the supply and demand. There is no separate system for to address the supply and demand issue specifically. However Pakistan Army is working on a separate system for this purpose named as eArms which is under development and deals with only and supply and demand.

9.1.3 Short Comings in existing system:

In the existing system of OAS in Pakistan Army all supply and demand communication is taking place manually like ordinary requests being sent in electronic form. All such demand requests are required to be typed manually all the times. Furthermore the sender first needs to find out the concerned recipient first and then mark the request to them. In case of their absence the sender are not notified. This whole process is almost working manually, not addressing this issue specifically. Moreover involving wastage of resources in terms of human and time.

9.1.4 Issues ACS&EL will address:

ACS&EL will specifically deal with Automation of the Clearance and equipment logs . All the demand forms will be available to the concerned clients in predefined format with just few fields to be filled by the clients. All the calculations and the generation of the recipient’s addresses will be done by the system itself. The sender is not required to mark the request to the specific recipient.

CHAPTER: 10
GLOSSARY

10. GLOSSARY

- **API:** Application Programming Interface
- **FAQ:** Frequently Asked Questions
- **ACS&EL:** Automated clearance system and equipment log
- **GOC:** General Officer Commanding
- **CO:** Commanding Officer
- **SMT:** Senior Master Transport
- **MTO:** Mechanical Transport Officer
- **ASC:** Army Supply Corps.
- **GUI:** Graphical User Interface
- **HTTP:** Hypertext Transfer Protocol
- **HTTPS:** Secure Hypertext Transfer Protocol is a HTTP over SSL (secure socket layer).
- **LINQ:** Language Integrated Query
- **PC:** Personal Computer
- **SQL:** Structured Query Language
- **TBD:** To Be Decided
- **TCP/IP:** Transmission Control Protocol/Internet Protocol
- **UPS:** Uninterruptible Power Supply

REFERENCES

[1] HTML
http://www.w3schools.com/

[2]CSS
http://www.w3schools.com/css/default.asp

[3] C#
http://www.csharp-station.com/Tutorial.aspx
https://www.youtube.com/channel/UCq9_1E5HE4c_xmhzD3r7VMw

[4]ASP.NET
http://stackoverflow.com/questions/tagged/asp.net
http://www.w3schools.com/aspnet/
http://www.tutorialspoint.com/asp.net/

[5]SQL
http://www.sqlcourse.com/
https://www.codementor.io/learn-sql-online