

Block

4

STUDY CENTRE MANAGEMENT SYSTEM: A CASE STUDY

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Acknowledgement

To Prof. Parvin Sinclair for help in the coordination of this block.

May, 2005

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ISBN—

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Printed and published on behalf of the Indira Gandhi National Open University, New Delhi by the Director, SOCIS.

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1.0 INTRODUCTION

In the first two blocks of this course, we have mainly focused on the basic concepts of Database Management System, including Relational Model, ER Model, integrity constraints, normalization, SQL, transactions and many more concepts. These blocks are an attempt to enhance your basic information with some practical inputs.

Block 3 was devoted mainly to the process of an application development without giving much emphasis to systems analysis and design.

This block, Block 4, tries to covers an almost complete application development process along with the required security, based on your familiarity by now with all the

basic DBMS concepts. However, the implementation details in this block are needed to be worked out by you.

Please note that the case study here is small in nature. However, it opens up several development related issues for us. The strength of DBMS as one of the key ingredients of Industry can broadly be visualized from this case study. This case study is an attempt to bring you closer to industry as far as a student projects are concerned. The project/ software development provides you some theoretical and practical aspects of a software project development life cycle.

This block has five sections. Section 1 introduces the case study; Section 2 introduces the software and various models in details and provides an executive summary of the software being developed. Section 3 provides complete details on the Analysis of the proposed software development process. Section 4 lists the design of the software being developed and finally Section 5 provides details on implementation, validation checks and maintenance related issues.

Please note that we have not followed any standard methodology used in the industry. However, this project provides a first good point to move towards the industry standards.

Some of the main learning points of this block are the detailed description of a typical process. However, it should be noted that this is not an ideal process in any way. The industry follows many different standards, which you may study in your 4th Semester.

The tools used here are VB and SQL Server and only a sample code of VB is shown.

Ideally this case study is suited for finding errors, process related problems. But you get a detailed view of how DBMS forms part of an overall system.

Some suggestions about this case study:

- This case study does not attempt industry oriented process.
- There may be analysis/ design/ implementation errors. Discuss these in the group counselling sessions.
- You can improve and implement in software of your choice.

OBJECTIVES

After going through the case study, you should be able to:

- define basic software development issues;
- make simple table and graphical designs;
- describe models like DFDs/ ERDs, and
- revise your DBMS and System Analysis Design Concepts.

2.0 INTRODUCTION TO SOFTWARE

In this section we will discuss some of the basic thoughts about the software that is being developed. The section starts with an executive summary and provides overview of the study centre and the existing system.

2.1 Executive Summary

The software **Study Centre Management System** for IGNOU's Study Centre is a well-organised software developed to provide the user to get relief off from the manual system as it is basically automatized version of management. The software with its capabilities has ability to computerize the whole system. The system has features that are vital to the user such as Report Generation for the Students Marks, fees, attendance, etc. Manually creating a report takes hours but the built-in

functionality in the software allows user to create different reports in a few clicks and types. Of course it requires data entry to computer, yet this data if structured properly can be reused for many different reports.

Some of the key features of this system are:

Auto-complete feature allows user to enter the data in a quicker and faster way with few letter types as well as enhanced validation checks, and maintains the data integrity and consistency.

Backup and Recovery System allows user to take the backup copies of the database and recovery facility and allows recovering the system in case of system failure.

Color Themes and Background Pictures allow user to totally customize the look and feel of the software according to their demand in the same way as there are color themes in Windows.

Help to the operator is provided in terms of Tips Box and user manual so that user could get immediately help support from the software. Also the on-line help, i.e., mini-help on status bar, allows user to quickly know, the use of various forms.

The software has enough facilities for which it can be implemented and used. It provides various advance functionalities, which attracts user to use it. Its look is very attractive which makes the user comfortable to work on it.

That's all of the software which we have built. Now let us have a very brief diagrammatic representation of role of study centre in IGNOU

The figure describes the basic process of delivery of IGNOU courses to the students. The role of study centre is primarily in the student interface input, where they come in contact with the centre of their choice. All of you by now must be familiar with the system.

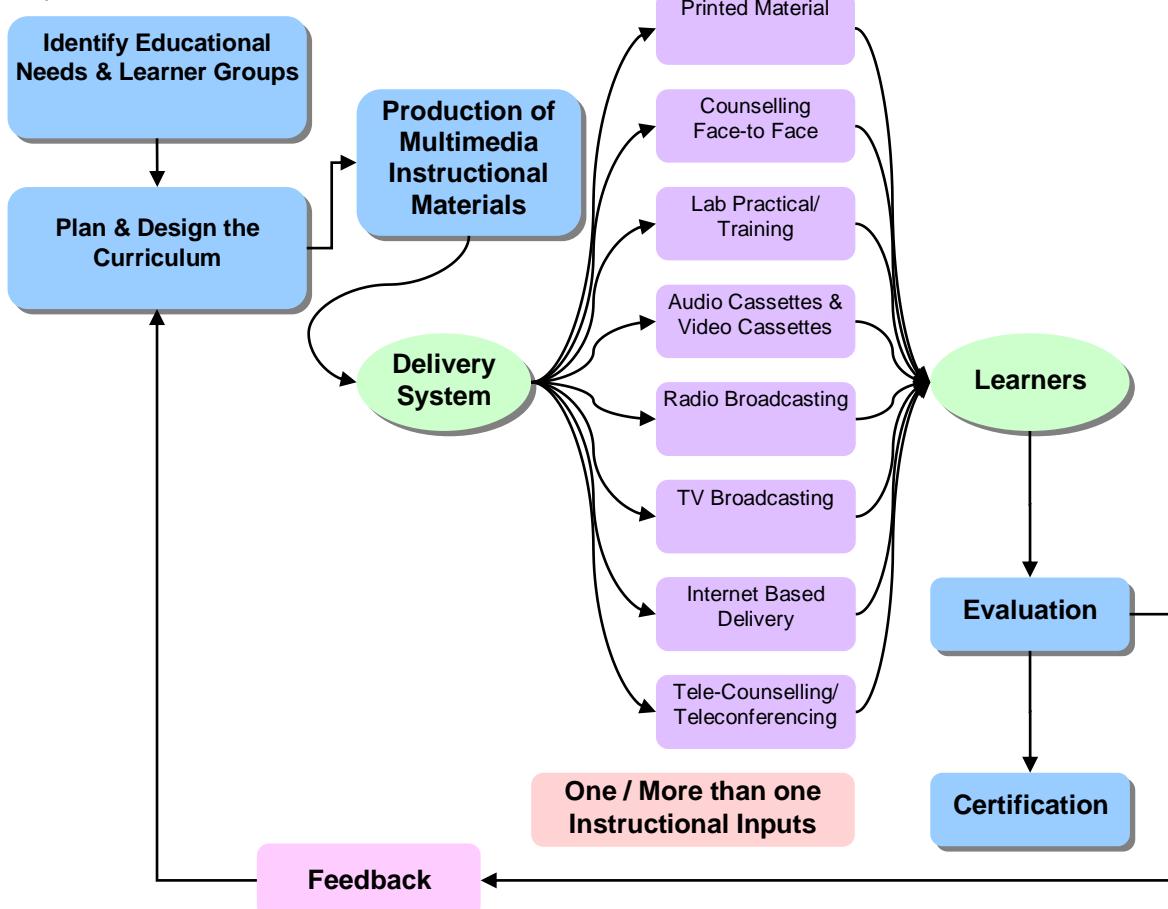


Figure 1: Diagrammatic representation of the instructional system of IGNOU

2.2 Brief Overview of Study Centre

In this system we are stressing more on Study centres because software is to be developed for the Administrative Management of Study Centres. We will discuss in detail its aim, goals and visions in later sections. At present let us have a brief idea of the Study Centres.

The study centres are the student support centres of IGNOU and are controlled by the Regional Centres. The students are serviced by effective networks of 48 Regional Centres and 1068 Study Centres located all over the country. With this large cross network, IGNOU endeavours to provide seamless access to higher education using innovative technologies and methodologies.

Now, let us see the various study centres categorised according to their working:

- Regular Study Centres:
- Programme Study Centres
- Recognised Study Centres
- Sub Study Centres
- Special Study Centres
- Study Centres (North Bihar Project)
- CWDL Down Link Centres
- DLF (Distance Learning Facilitator)
- Army Recognised Centres
- Navy Recognised Study Centres.

Now, let us point out the various functionalities and dimensions of a Study Centre.

Some of the major functions are as follows:

- Appointment of Local Tutors / Counsellors.
- Academic Support through face-to-face services
- Conduct of Practical / Hands on Experience.
- Library Facilities
- Teaching through Media
- Individual Teaching / Counselling
- Evaluation of TMAs
- Maintenance of Learner Records
- Venue for Peer-Group Interaction
- Conduction of Term End Examinations
- Co-ordination of Staff Members.

The main entities of a Study Centre are as follows:

- **Coordinator of study centre:** S/he is one of the executives who will look after the working of the Study Centre and its functionality.
- **Counsellors/ Teachers or Faculty Members:** The teachers are also an important part of the SC as they will use the proposed software and would evaluate students' performance.
- **Different Programmes and Courses:** Programmes and their courses are also an important part of SC. As there are a large number of courses, we need proper handling, so we need the proposed system.
- **Students:** They are also an important part of a Study Centre.

Programmes/ Courses on offer:

A study centre may offer many UG and PG Programmes/ courses as offered by IGNOU.

2.3 Brief overview of The Software

In this section we like to provide a brief information on our software which is named as Study Centre Management System. As the name suggests, the software is for the administration of the Study Centre. We hope that you know about the study centre functioning. So let us have a look at the functionalities, financial planning, courses offered, and administrative support provided by the study centre, which we are going to computerize through this software project. Now let us study each aspect in more detail.

Please note that our attempt is not to replicate the functioning of a single type of study centre of IGNOU. We have added some features, which may be desirable in many different study centres being considered for this software development project.

The main functionalities of our project are the maintenance of all records of Courses, Teachers, Faculty and Students. These are:

- Study Centre Details
- Teacher Details
- Students Affiliated and their Marks, Fees, Attendance Records
- Course Structure
- Schedules Maintenance
- Assignment Submission
- Study Centre Allotment Facility
- HTML Reports Creation of Marks, Fees, Attendance, etc.
- Query about all the Resources available in Study Centre.

A detailed cost benefit analysis may be difficult to work out as many of the benefits are more on the side of providing better service to the students. In this matter this system would definitely be more advantageous. Thus, a study centre person's work now can be focused on intellectual abilities rather than wasting time on doing trivial work. This provides great benefits to the students and staff.

Figure 2 shows a very brief plan for the development of the software project. It is a Gantt chart showing various important activities of the Life cycle for the software project development.

2.3.1 Long-term model for study centre

The student at an Open University undertakes a methodology of instruction which is different from that of conventional universities. The University follows a multimedia approach for instruction. It comprises:

- Self - instructional written material
- Audio-Visual Material Aids
- Counselling Sessions at the Study Centres
- Live one-way video two-way audio Teleconferences
- Practical / Project Work at the Study Centres
- Repeated telecast on Gyan Darshan Education Channel
- Interactive Radio-Counselling through Gyan Vani the Radio Channel.

A student primarily visits the Study Centre for watching audio-video programmes, counselling sessions, live teleconferences (as they are on specific channel at present not widely telecast by cable operators), and practical work. However, in the long run it is expected that IGNOU would reach the home of the students through its Teleconferencing, Radio sessions, and using EDUSAT. Then the role of the Study

Centre in such cases may primarily be to provide on-line Administrative support and practical work.

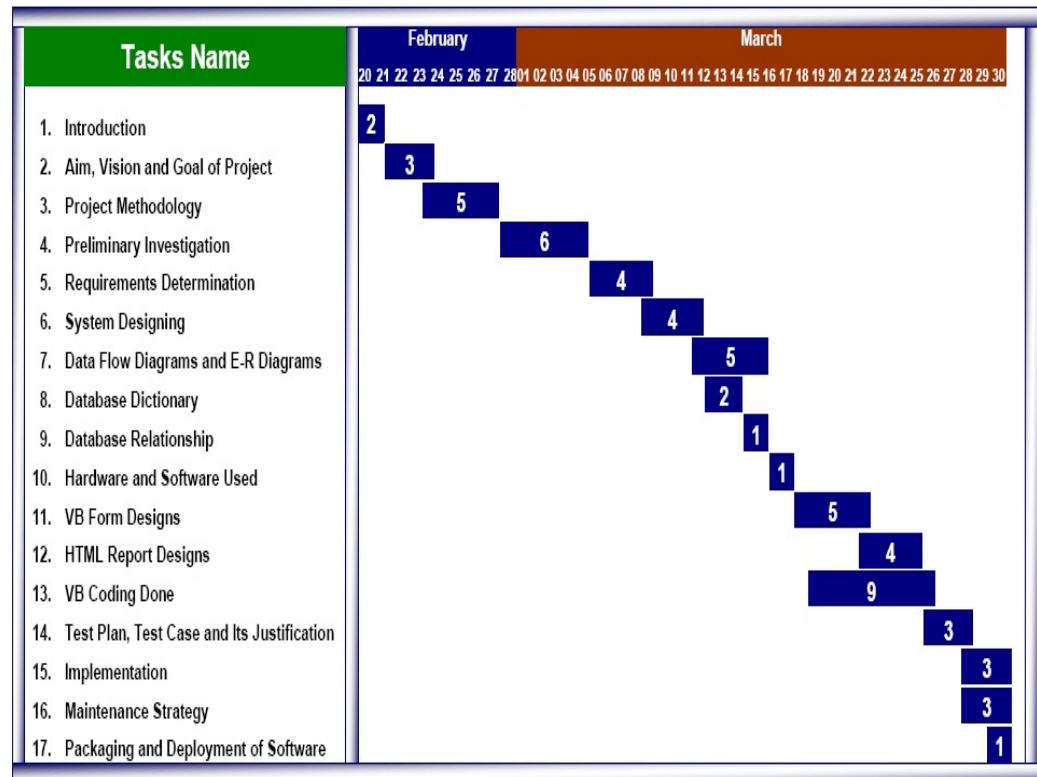


Figure 2: Gantt Chart of Project

2.3.2 Aim of the Software Development Project

Whenever a Project is made its Scope is determined – whether it will last for a long period of time or short. So, in this section we are going to explain the aim of our project keeping in mind that our software will have adequate life.

The aim of our project can be categorised by the computerization of the following tasks:

- **Record Maintenance of Study Centre Details:** Maintenance of Study Centre Details means that we are going to keep the details of the Study Centre in which our project is currently implemented.
- **Record Maintenance of Teacher Details, Study Centre Resources:** In this section we are going to keep the teacher's complete bio-data which will enable students to find out about their teacher's capabilities, mastery, experiences and knowledge.
- **Record Maintenance of Students Affiliated:** In this we are going to keep complete details of the students of the Study Centre. Using these details students will be frequently asked for suggestions.
- **Programme and its Course Structure:** Complete details about programme structure, its fees, eligibility, duration and many other details which would enable students to select the programme of their choice.
- **Maintenance of Fees, Marks and Attendance details of Students:** Although the fee at present is not being deposited at the study centre, in the long term it may be the case, if every data transfer is sound and secure.

- **Schedule Creation for Classes**
- **FAQ (Frequently Asked Questions) Facility:** This section will enable students to find out answers to their queries. It would contain Frequently Asked Questions with their answers. Using this facility, students can find out the solution of their most common problems during admission and study phase.
- **Report Generation of all the Resources available in Study Centre and Student Support Services like marks, fees, attendance report.**

Some of the standard features of this software project are as follows:

- *Backup/Recovery System.*
- *Automatic creation of Database on a new System.*
- *Multi-user Environment Facility: Support for concurrent transactions.*
- *Password Facility for Administrator and Teachers: Support for security.*

2.3.3 Present working system

At present our system has lots of manual work which needs to be computerized. So, lots of paper work is required. In order to minimize this we need to computerize all those departments which require record maintenance. The different points which illustrate the present working of the System are:

- All the different administrative department works require paper work which includes the record maintenance of current Study Centre, Students Affiliated, Teacher Details or Faculty Details.
- Fees of the students include submission of the form which is duly filled by the student (This feature is not there in IGNOU system but we are assuming it from the long-term plan point of view).
- Records of Marks of Assignment, Theory and Practical are maintained on the paper.
- No FAQ facility, so students who have some confusions and problems regarding courses structure and fees need to talk to specific functionaries who are normally not available on weekdays at study centres as most of the Study Centres operate on Saturdays and Sundays only.
- They are not able to find out their teacher qualifications and experiences.

2.3.4 Proposed working

After the implementation of this project, there would be lots of benefits as there would be less manual work, more computerized working, resulting in faster resolution of students' queries.

It would provide all the goals and aims which we have discussed in the earlier sections. So, making the present system faster, quicker, more active and user friendly to the students, teachers and study centre staff members. The system will become more responsive and fast.

2.4 Software life cycle

In this sub-section, we are going to list the procedure we are going to use in order to build our project. The details of this methodology are defined in the System Analysis Courses and Software Engineering Courses. The term Project Methodology suggests the processes, structures, method or style for building our Project.

Software Life Cycle consists of the set of activities which the analysts, designers and users carry on to develop an information system. Let us have a brief overview of the stages. It consists of following stages:

Preliminary investigation: It consists of request clarification, feasibility study

(software being technical, economical and operational) and approval of request.

Determination of requirements: It consists of the following questions which are needed to be answered:

- What is being done?
- How is it being done?
- How frequently does it occur?
- How great is the volume of transactions?
- How well is the task being performed?
- Does a problem exist?
- If problems exist, the level of seriousness of the problem.
- If problems exist, the underlying cause.

In order to answer these questions the System Analyst will do detailed investigation by study and observation of data collected using fact finding techniques like interviews, questionnaires, etc.

Development of Prototype System: It consists of developing models of the requested task, object oriented methods for easier programming and 4th Generation Language Technologies.

Design of System: It consists of elements of the task to be designed, the design of the report to be printed, the design of input to be provided and design of files.

Development of Software: It consists of the language used, the file description and the user friendliness of the software.

System Testing: It consists of different types of testing of the software including unit testing, system testing and validation testing and user acceptance.

System Implementation: It consists of the training needed by the user, conversion methods, system review and maintenance.

System Maintenance: It requires trained, skilled persons who have good knowledge of system working and of handling the system in case of any failures or adaptations.

But what process Model do we follow to develop this Project? Before answering this question let us recapitulate the different process Models, their advantages and disadvantages and then select one of the most suitable models for our domain.

2.4.1 Different models

Waterfall Model

It consists of a linear set of distinct phases including requirement analysis, specification, design, coding, testing and implementation. It can be represented as in *Figure 3*. Please note the use of two terms, verification and validation, in the figure. Verification is defined as the question “Are we building the product right?” Validation is defined as the question “Are we building the right product?”

Features of the waterfall model:

- Systematic and linear approach towards software development.
- Each phase is distinct.
- Design and implementation phase only after analysis is over.
- Proper feedback, to minimize the rework.

Drawbacks of the waterfall model:

- Difficult for the customer to state all the requirements in advance.
- Difficult to estimate the resources, with limited information.
- Actual feedback is always after the system is delivered. Thus, it is expensive to make changes during the later stages of software development.
- Changes are not anticipated.

Introduction to Software, Analysis and Design

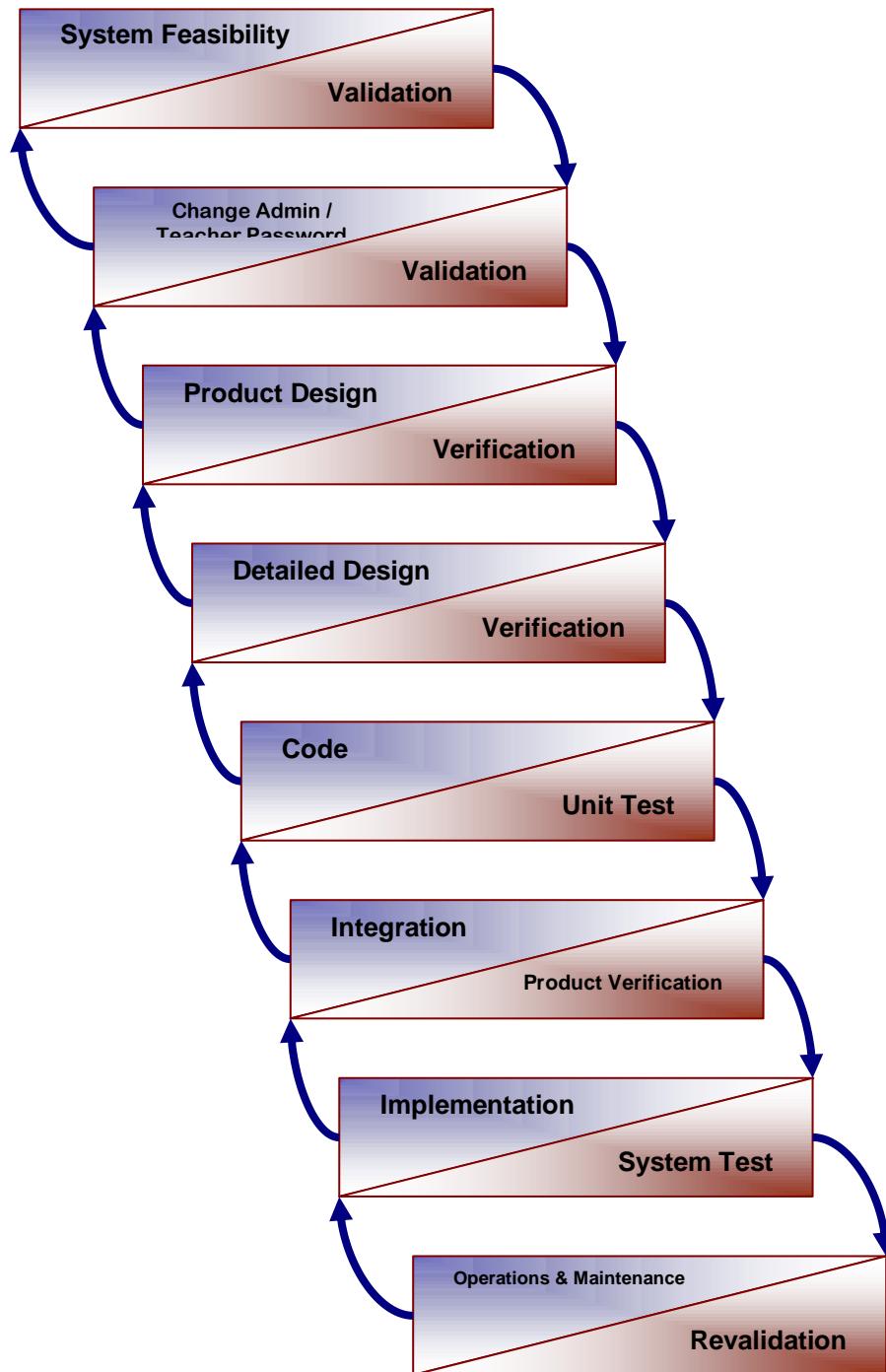


Figure 3: The Waterfall Model

Rapid Application Development Model

RAD is more like a set of parallel waterfalls where the system can be decomposed into largely independent subsystems. It includes a broad array of software tools that automatically generate source code as per the developer's specification.

Prototype Model

It consists of distinct phases including its prototype, for example, demonstration that enables the customer to get a feel of the system. It can be represented as in *Figure 4*.

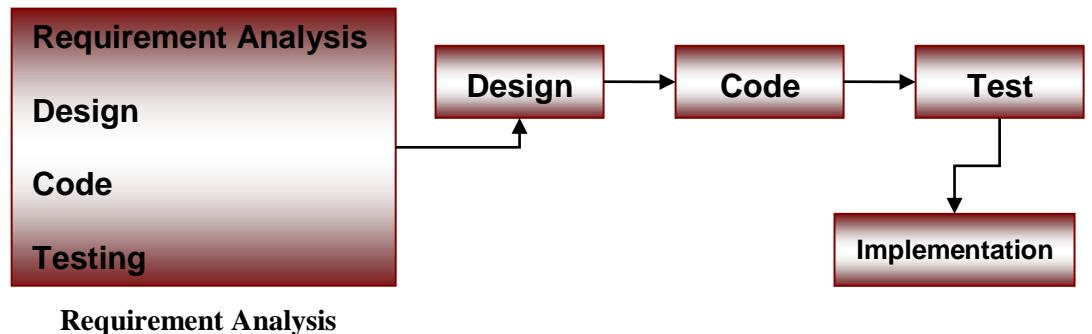


Figure 4: The Prototype Model

Features of the prototype model:

- Reduced functionality.
- Begins with requirements gathering.
- Used in large systems.
- Makes use of existing programs.
- Reduces the risk of project failure.

Drawbacks of the prototype model:

- Customers feel that the cost incurred or provided is too high for the model.
- Developer might use inefficient algorithm during prototype development, which may not ultimately be changed due to customer's non-cooperation.

Iterative Enhancement Model

It consists of distinct phases in which the steps after the designing steps are repeated if the customer is not satisfied. The demerit of this model is that the iteration may never end thus the user can never get the "final" product. It can be represented as *Figure 5*.

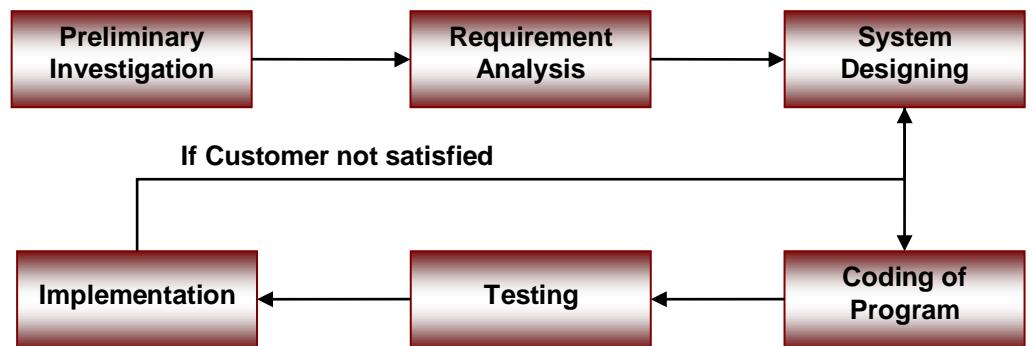


Figure 5: Iterative Enhancement Model

Spiral Model

It consists of distinct phases including both the prototype model and the classic life cycle model. It includes six major phases which are customer communication activities named planning, construction risk analysis, engineering and release customer evaluation. This model can be represented as *Figure 6*.

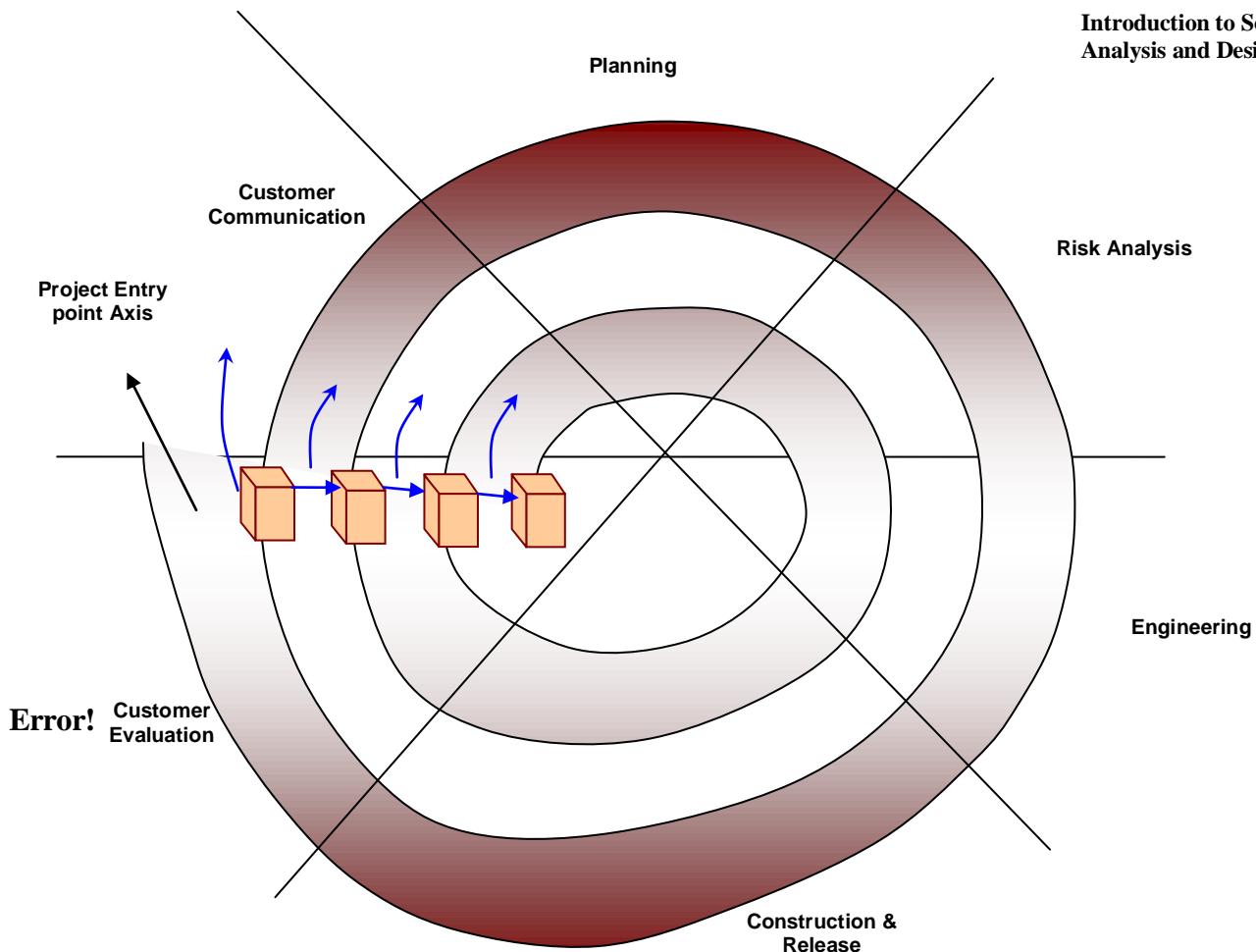


Figure 6: The Spiral Model

Features of the Spiral model:

- Risk assessment is involved at every activity.
- Most realistic approach to development for large systems.

Drawbacks of the Spiral model:

- Risk assessment involves great expertise.
- Comparatively a new approach.

Fourth Generation Techniques

It covers a broad array of software tools that have one thing in common. They are considered to be the high level languages, as they serve the users in a very friendly way. Based upon the specifications given by the customer, the tools available automatically generate the source code. 4GT's include Non-procedural languages for database query, report generators, menu generation, screen generation, code generation, graphics ability, and spreadsheet capability and even more. These tools exist but for very specific application domains.

Features of the 4GT's model:

- Non-procedural language.
- Build application fourth generation language (4GL's).
- Tools for making report and menu and screen generation of the required program.

- Faster query handling.
- Graphics ability and spreadsheet ability in the required program.
- Conversion of requirements gathering to implementation using fourth generation language (4GL's).
- Good for business information system.

Drawbacks of the 4GT's model:

- Customer is not assured of what is required in advance.
- Customer might not be able to specify the facts properly.
- Not good for big systems.
- Poor maintainability, quality, customer acceptance.

2.4.2 Used model and its justification

Spiral Model

As we know, in the **waterfall model** we cannot perform the next step without doing the previous steps because each step of the waterfall model is **dependent on each other**. However, the spiral model allows use of the features of prototype and incremental model which allow us to divide the project into increments. So we can increment the on-going project after some time, i.e., we can add some new features to the project or we can add some new division or some new functionality in our project. So the chances of failure of the project by using this model is minimal because some result is obtained after the completion of the 1st increment which is generally not possible in the waterfall model. If we want to change some feature or functionality or add some functionality, it can be done by this model. In the waterfall model we cannot do this because repetitive changing may cause the process to restart again and again.

The next best feature of this model is that it is an ongoing process for the lifetime of the project. This means that the project cannot die till the user is satisfied.

3.0 SOFTWARE DEVELOPMENT PROCESS : ANALYSIS

Building an information system or software system is not merely putting the computer instructions together but it involves uses of software engineering process methods and tools. Until software system is implemented and delivered to a customer, and even after that, the system undergoes gradual development and evolution.

We have already discussed the stages related to our project in the previous sections. Let us first discuss the type of this system. The system which is being developed by us involves transaction processing and Management decision system. The system includes processing data. **Transaction Processing System** aims at improving the day to day business activities operations on which the organisation depends. Some of the transactions for the proposed system may involve online updating of fee records, marks, attendance, etc. The sole objective behind the system is to increase the efficiency, speed and accuracy of processing on the voluminous data. So, all these facilities result in greater efficiency and quicker response time of the system.

The users of the system can be categorized into administrator, teachers and students. The following *Figure7* shows the type of users and their rights. The classifications of users of a system are best explained by the Neumann Haddass Model which illustrates the various levels of management which looks after the planning and controls of the system. Let us have a brief overview first of the Neumann Haddass model and then of its application to this system. *Figure 7* shows various users of the system.

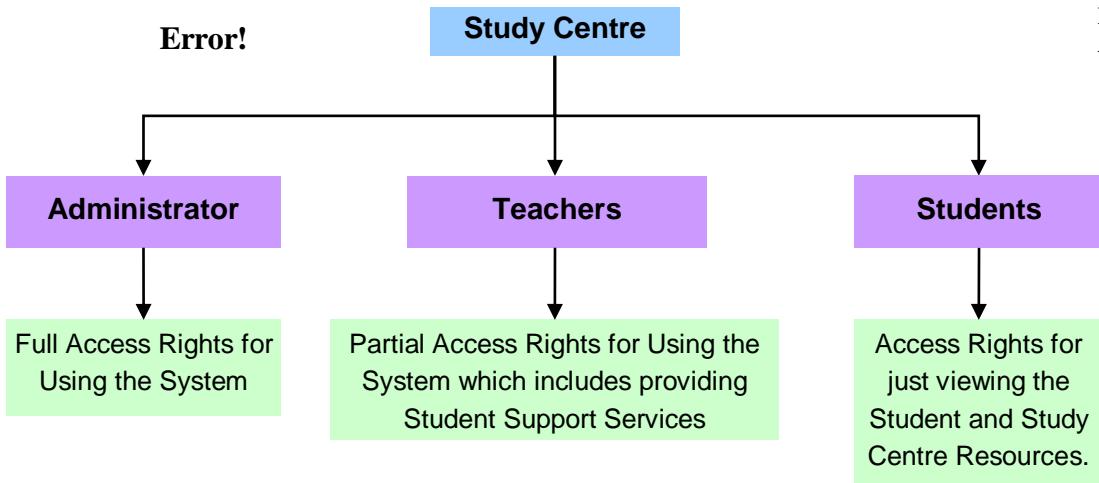


Figure 7: Users of the Proposed System

Neumann Haddass Model

It states that the organisational chart can be divided into three levels of management who look after three different types of planning and control. It is represented by the tree or triangular interdependent systems at different levels. Refer to Figure 8.

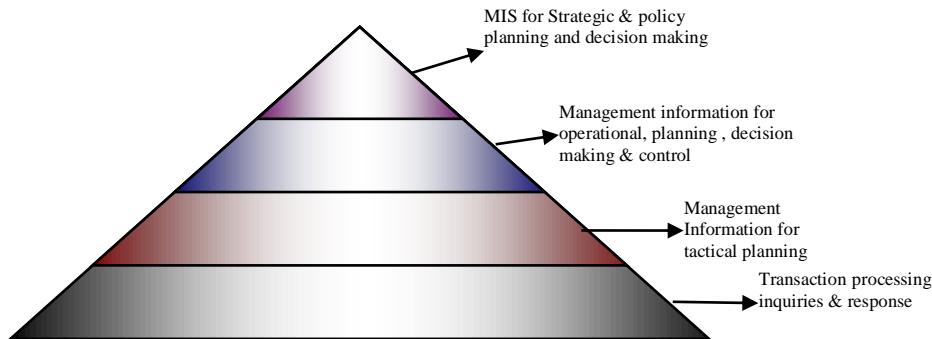


Figure 8: Neumann Haddass Model

The top-level management looks after strategic planning which determines long-term goals and the purpose of the organisation. It also identifies the resource needed to achieve the goal, the government rules, etc.

The second one is the middle level management which monitors the use of resources identified by the top level management. They look after the people, money, equipments, etc. to achieve the goal. They are very important and the progress and speed of working depends on them, not completely but substantially.

The third one is the lower level management. Its working is similar to that of middle level but at a lower level. They look after the day-to-day working and progress of the individual.

In our case, the Top level Management is under the administrator who is either the Study Centre Coordinator or Principal. Next, in the middle are the teachers, or faculty members. However, they sometimes work at lower levels also. The students come at the bottom level or lower level. They can avail of the facilities provided by the system.

Now, what is the use of this analysis phase? It allows you to examine the eight basic characteristics of the system which are:

1. **Goal:** Each system is developed for a reason. It has some purpose for its existence.

2. **Inputs:** The inputs to the system are the resources like manpower, capital, materials, equipment, etc.
3. **Output:** These follow from the system. They are usually goods (may be furniture from a factory or leather handbags from a workshop) or services (legal consultation from a lawyer's office or a project feasibility report from a management consultancy firm).
4. **Boundaries:** Each system has boundaries. In other words, each system has a definite scope. We may wish to include everything in one system but that is practically impossible. Each system has some definable limits. Remember the user's wish list? Some items in the wish list may be outside the scope of the system.
5. **Environment:** Each system exists in an environment that can influence the system in a number of ways, such as making it more or less difficult to perform.
6. **Components:** The components of a system transform the inputs into outputs and the linking together of the components is accomplished by interrelations.
7. **Interrelations:** These describe how resources pass from one system component to another.
8. **Constraints:** These represent the environmental, social, technical or behavioral factors that typically limit system performance.

You need to find out all about the system's environment, boundaries, inputs, outputs, goals, components, resources and interrelations.

Let us now list the important characteristics of the system being developed by us:

Goal	– Printing of Schedules, Fees, Marks, Attendance and all Miscellaneous reports that will help better planning at study centre for student support.
Inputs	– Attendance, Fees, Marks, Schedules details and all Miscellaneous details
Outputs	– Schedule Creation, Student Support Services
Boundaries	– Study Centre Data which includes its Resources and Students Record.
Environment	– IGNOU Terms and Conditions as well as Study Centre Rules and Regulations.
Components	– Various modules that we will develop.
Interrelations	– Computer programs
Constraints	– Data available to administrator and teachers.

3.1 Preliminary Investigation

After having a brief idea of the project, let us undertake the preliminary investigation to ascertain the feasibility of the project. Ideally this stage of analysis should be performed prior to project approval. The three most important stages of preliminary investigation are:

1. Request Clarification
2. Feasibility Study
3. Approval of Request.

3.1.1 Request Clarification

This step is a one of the component of preliminary investigation stages. Many requests from employees and users in the organisation are not clearly stated. So, it should be clear in advance what the originator wants. Problem clarification is a difficult task

because requester is making a request but how to state it or where actually the problem is or what is the problem is not clearly stated. For instance in this project the Coordinator has made the request for adding web-site facility for the study centre but what would be the contents was not stated. Thus, the cost estimation for website could not be done.

3.1.2 Feasibility study

It is an important part of the **Preliminary Investigation** because only feasible projects go to development stages. Let us do a very basic feasibility study for the current project.

1. **Technical feasibility:** Technical feasibility raises questions like, is it possible that the work can be done with the current equipment, software technology and available personnel? And if new technology is required what is the possibility that it can be developed?

In case of our project, the software which we have built up fully supports current Windows OS but it lacks the support for other OS environment like Apple Mac, Unix and Linux. Next, it is not dependent on the number of users so it can handle a very large number of user environments (in principle, but does not happen in practice). Next, the Support for Hardware, it has full support for new hardware, so no hardware compatibilities issues arise as it requires minimum configuration but only non-Mac environment.

Minimum Hardware Support Required

Computer	Intel® or compatible Pentium 166 MHz or higher.
Memory (RAM) ⁱ	64 MB minimum on Windows 2000, 32 MB minimum on all other operating systems 128 MB or more recommended
Hard disk space ⁱⁱ	Minimum Space for Software 10 MB
Monitor	VGA or higher resolution 800x600 or higher resolution required for the Software Project
Pointing device	Microsoft Mouse or compatible
CD-ROM drive	Required for Installation

- (i) Additional memory may be required, depending on operating system requirements.
- (ii) Actual requirements will vary based on your system configuration and the applications and features you choose to install as well as SQL Server Space Allocation.

2. **Economic Feasibility:** It deals with economical impacts of the system on the environment it is used, i.e., benefits in creating the system.

In case of our project we are assuming an economically feasible solution.

3. **Operational Feasibility:** It deals with the user friendliness of the system, i.e., will the system be used if it is developed and implemented? or will there be resistance from the users?

In case of our Project we have done the Operational Feasibility Study with Centre Coordination and Incharge about the usage of the project, and regarding user friendliness we have tried our best to make the software highly user friendly so that a person having only a little knowledge of English can handle it. By the way we have also built on-line as well as special help programs which help in training the user. Also one of the interesting parts of the Project is **Tips of the Day** which

gives some special Tips to the user for proper functioning.

4. **Time Feasibility:** In this type of feasibility study, we examine whether our proposed project can be completed in the specified time frame or not. In our case, our project is finished in the targeted time-frame. So, it is feasible regarding time scope.
5. **Legal Feasibility:** This type of feasibility evaluates whether our project breaks any law or not. According to our analysis, our project doesn't break any laws. So, it is legally feasible too.

3.1.3 Request approval

Not all the requested projects are desirable or feasible. And only those which are desirable or feasible should be put into the schedule. In some of the cases the development can start immediately but in some of the other cases, the staff members are busy on their ongoing projects. Many business organisations develop information systems as carefully as they plan for new products, or new manufacturing programs. After a request is approved its cost, priority, completion time and personnel requirements are estimated.

For example, in our case the management who will be investing the money might feel that there is no requirement of such a system, so unless they approve it work cannot start. However, this project does not have such constraints, as it is just a sample project.

3.2 Requirements Determination

Any software project can succeed only if it has been fully analysed in this stage of Requirements Determination, since Requirement Determination is the heart of the systems analysis, aimed at acquiring a detailed description of all important areas of business that is under investigation. Analysts working closely with employees and managers must study the complete business process for the designers of the system.

In this stage, the system analyst will talk to a variety of people in detail and will take their ideas and opinions. We use fact-finding techniques like Questionnaires to collect the information from people who cannot be interviewed individually and interviews with special appointments for discussion on the project. The detailed investigation includes:

1. Study of manuals and reports.
2. Actual observations of work activities.
3. Collection of sample forms and documents.

In our case we have several interviews with Mr. Goel, centre incharge, about the project discussions. He helped us regarding this project on what to build in it, what are user requirements, etc. We also got ideas from the students who may be users of the system.

Now let us have a brief overview of the fact-finding techniques of the project which we used.

The most commonly used techniques of fact finding by us are as follows:

- Existing documentation, forms, file and records
- Research and site visits
- Observation of the work environment
- Questionnaires
- Interviews and group work sessions.

All these techniques helped us a very great deal in finding out the information related to the project. Let us first have a glance at all these techniques.

3.3 Study of Existing Documentation

You may feel that getting existing information may not be right since you are there to create a new computerized system. So why bother about what happens at present? Think back to the earlier session. What did we say? To build a computer-based system, it is essential to first clearly understand what happens right now. You will be able to build a system only after a correct understanding of the current system. You may even improve it.

So, existing information is absolutely essential. It will give you a clear picture of what actually happens in the department or organisation being studied.

For each document, it is important to know its use in the system. To understand this, it is useful to prepare the document-department routing grid.

So talking about getting existing information, what are the advantages of this technique?

- You don't have to disturb any person while they are working. You can take the files to an empty room and study them at your leisure.
- There is no time constraint. This does not mean that you take 3 months just to study the existing documentation. What it means is that there is no time deadline like an interview. If your interview carries on for 2-3 hours, you are going to have a very unhappy user. Whereas if you spend 2-3 hours studying the document, you will have bothered no one.
- You will know exactly what happens and not what the user wants you to know. You will be able to study the processes free from the bias and personal viewpoint of the user. You will be unaffected by the users' feelings or personal office politics and get an impartial view of the system.

We are talking about getting existing documentation but what are the documents that you should seek? Some of the documents looked into by us were:

After this you can collect documents like:

- Class schedules, faculty schedules.
- Minutes of important meetings.
- Accounting records of the students
- Assignments submission of return records
- Making system and results communication
- Attendance record, student batches record, infrastructure etc.

Let us look at some of the above documents more closely and see how they can help an analyst.

3.4 Completed Forms

The most important documents are the **completed forms** representing actual transactions. Remember that blank forms should not be accepted. This is emphasized because commonly, users prefer to tear out a blank sheet from their file or register when they are asked for a form. A blank form will tell you nothing about the kind of information that is actually filled in the columns. The form design may be obsolete and the users may have devised their own forms within the framework of the old one. The heading to the column may be totally misleading and the user may actually be entering something different out there.

We have said that we should study only completed forms. All right, but how many should we study? Just 1 or 10 or 100 or 1000? What is the correct sample to study?

There exists an empirical formula by which you can find the sample size to be certain

of the quality of data. In our case a sample size of 25-50 forms is ok.

Then comes the question – how do we choose the sample?

There are 2 ways.

The first is **randomization**, i.e., you pick up any 50 documents and use them as a sample.

The other approach is **stratification**, that is, a systematic method for choosing the sample. Let us take an example. Suppose the total number of student documents we have is 5,000. We have to choose 50 documents in our sample. So we choose every 100th document which is 5000/50.

3.5 Reports (Manual and Computerized)

All **manual and computerized reports** must be collected. This may sound easier than it actually is because many users devise their own reports for follow-up or for statistical analysis. These reports are normally prepared by hand or word-processed from information available in the system. These are considered by the users as ‘their’ property and normally not shown to the analyst. Remember in our last section we talked about some notebook or register maintained by the user privately? Well, these are reports. Therefore, when you ask for all reports, make sure that you really get all the reports. The reports prepared manually by the user are actually the most important because they are the ones being used regularly. You may wish to modify the existing computer reports to absorb the manual report.

If the organisation has **standard operating procedures (SOPs)** in place, it makes life easier for the analyst. The analyst will know how things ought to be done and then, when the procedure is being reviewed with user, the gaps or inaccuracies will be easily identified. In case of missing SOPs, the analyst will have to write the procedures himself after identifying all responsible parties and determining the tasks appropriate to each.

It is very important to review the SOPs very carefully to verify that they are complete and accurate. Any mismatch between the actual procedures carried out and the SOPs should be identified and resolved. You may find a number of duplicate information flowing from one department to the other or a particular procedure being eliminated in actual practice or different information recorded on the same form.

Let us now see how it helped us in our project.

“You may find that a different type of form was used to record the details of Students Marks, Fees and Attendance Schedules, etc. We questioned about the formats, the conclusion may well be that no one really knew why those formats were used but they were doing it because it was always done that way.”

Therefore, the point to be made is that collection of existing documentation is important because it clarifies your understanding of the current system. It also throws up gaps, missing parts and other questions about the current system which you may need to clarify with the users.

3.6 Research and Site Visits

Let us consider the next fact-finding technique, that is, research and site visits. This particular technique is not used very often because it is not relevant in many projects. Here research means **studying the application and the problem areas**. You could do this by studying the trade journals or you can visit reference rooms in libraries to find out more about the application and the problems. You can discover how others have solved similar problems and whether any tools (whether mechanical or manual) exist for solving the problems. You can visit other companies or departments in other organisations who have already gone through the analysis exercise and get some tips from them. This technique of fact finding was not employed in this project.

3.7 Observation of Work Area

This technique involves observation of place of work and work procedure. In this technique, the analyst watches a person perform certain tasks and tries to understand the system. This technique is not very commonly used.

Can you think of the reasons?

- To create a ‘good impression’ on the analyst, very simple or routine work may be shown to the analyst. In which case the analyst will not be able to observe the special or irregular cases.
- The tasks may be carried out at odd times, e.g., there may be a graveyard shift (night shift) which may be difficult for the analyst to observe or there may be too many interruptions.
- In case persons have been performing a task contrary to the standard operating procedures, s/he may perform it correctly temporarily while under observation.

Hawthorne Effect

People perform differently on stage as compared to real life, i.e., if someone knows that s/he is being observed, s/he becomes aware of it and subconsciously performs better. The Hawthorne Effect may prove this point.

What is the Hawthorne effect?

It has been described as the rewards you reap when you pay attention to people. The mere act of showing people that you are concerned about them usually spurs them to better job performance. That is the Hawthorne Effect.

Suppose you have taken a management trainee and given her specialised training in management skills she doesn’t now possess. Without saying a word, you have given the trainee the feeling that she is so valuable to the organisation that you will spend time and money to develop her skills. She feels she is on track to the top, and that motivates her to work harder and better. The motivation is independent of any particular skills or knowledge s/he may have gained from the training session. That is the Hawthorne Effect at work.

When people spend a large portion of their time at work, they must have a sense of belonging, of being part of a team. When they do, they produce better. That is the Hawthorne Effect.

Occasionally, managers object saying that observation is not a valid test. Of course they will do a good job if you are watching them. Isn’t that the Hawthorne Effect? Which is why some people do not count observation as a useful fact-finding technique.

On the other hand, there are many points in favour of observation

The main point in its favour is that the analyst is able to see exactly what is being done. Sometimes, users may find it difficult to explain complex procedures. In such cases, the analyst may get a clear idea if s/he observes the person at work.

- Observation also reveals the physical conditions (like excessive noise, poor lighting, physical layout and place of movement) which may have a bearing on the work being done and which may have been missed or inaccurately described during discussions.

To obtain maximum benefits from observation, you should be fully prepared. Ideally, the analyst should observe the work during normal hours and during peak times. The analyst should prepare proper data collection forms in which he can record the data

observed. Your findings should be documented during or immediately following the observation.

In this project the efforts were made to watch various activities of the students/teacher etc. to determine the environment of working.

3.8 Questionnaires

All of you would have received and even responded to some questionnaire.

So what is a questionnaire?

It is a document prepared for a special purpose that allows the analysts to collect information and opinions from a number of respondents.

It contains a list of questions. The questionnaire is distributed to the selected respondents; the respondents answer the questions in their own time and return the questionnaire with the answers to the analyst. The analyst can then analyze the responses and reach conclusions.

Sample Questionnaires Used by Us:

- What are the services provided by the Study Centre?
- What are the specific data of Student?
- How Schedule is created for a Teacher?
- How are Marks, Fees and Attendance recorded?
- Some of the Sample Layouts of Reports
- What are the various outputs of Systems?

3.9 Personal Interview

There are always 2 roles in the personal interview.

The analyst is the *interviewer* who is responsible for organising and conducting the interview. The other role is that of the *interviewee* who is the end-user or the manager or the decision-maker. The interviewee is asked a number of questions by the interviewer.

In this project we have done interviews of centre incharge, co-ordinator and other main functionaries to ascertain their expectations of the system.

4.0 SYSTEM DESIGNING

It is the process which starts after the completion of Analysis Phase. In this phase the planning of activity starts whereas in the Analysis phase the important data are gathered.

System Designing consists of various activities. The main activities that are being conducted here:

- Modeling Data Flow Diagram of System
- Creating Entity Relationship Diagram of System
- Creation of Database Dictionary Designing
- Database Design
- Input Form Design
- Output Forms or Reports Design.

Finally, after the completion of this phase, the development phase is performed where these designs are used to achieve the proper look and feel of the software.

4.1 Data Flow Diagram for System

It is one of the important tools of System Designing which enables software engineer to develop models of the information domain and functional domain at the same time. It serves two purposes:

1. Provides an indication of how data are transformed as they move through the system
2. Depicts the Functions (and sub-functions) that transform the data flow.

The DFD provides additional information that is used during the analysis of the information domain and serves as a basis for the modelling of function. A description of each function presented in the DFD is contained in a **Process Specification**. As the DFD is refined into greater levels of details, the analyst performs an implicit functional decomposition of the system.

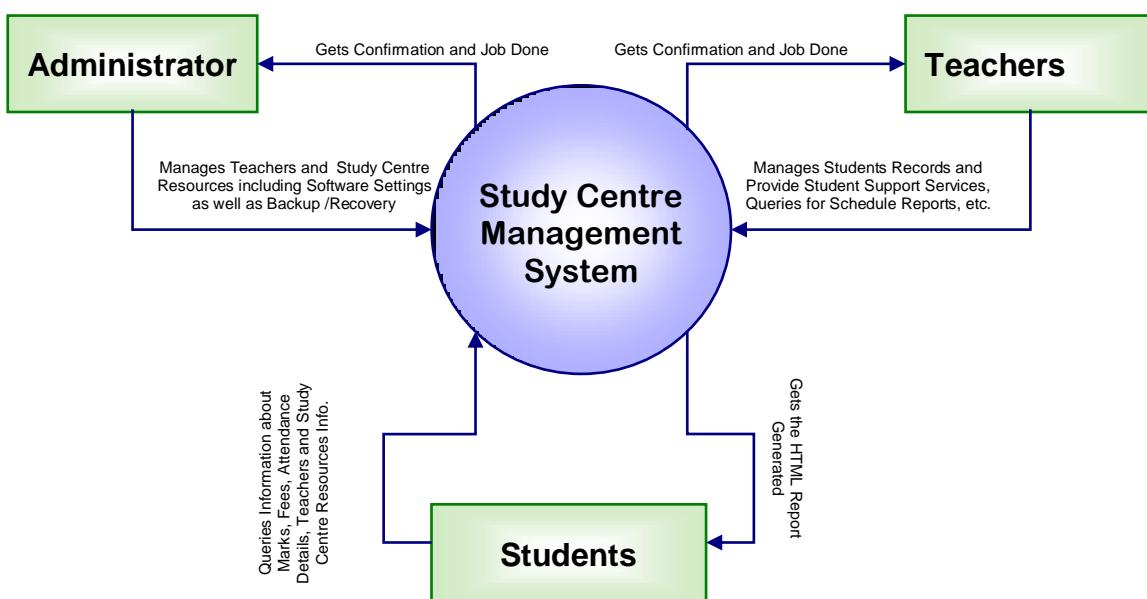
One of the faults in our process while developing the system was that the system was analysed, designed and implemented but the DFDs were developed as an afterthought. Thus, you will find the following problems in the DFDs:

- The dataflow have not been labeled in many cases.
- The processes are shown as linear processes especially in the second level DFDs
- The verification activities are being performed in sequence, although they are not practically done that way in the actual situation.

Exercise

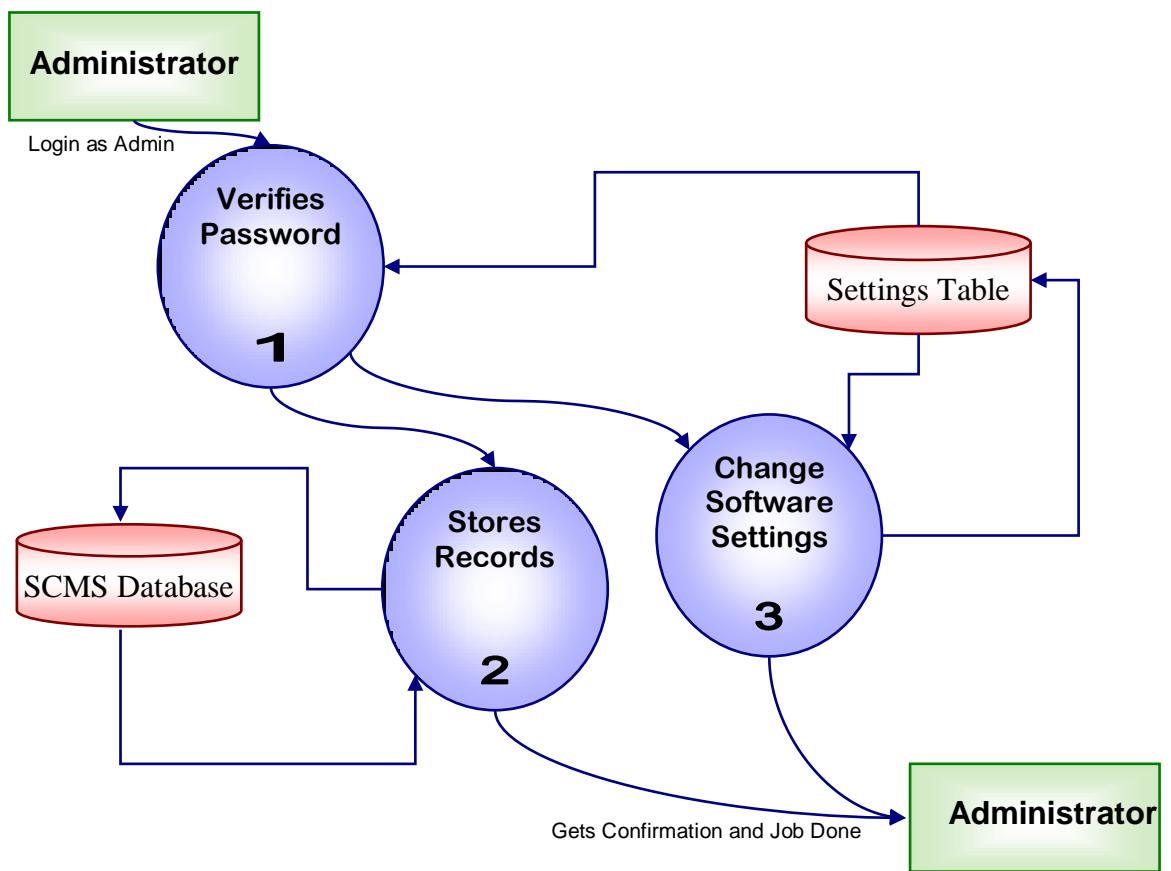
You must discuss the DFDs thoroughly in your sessions and come up with the most optimum DFDs.

0th Level (Context Flow Diagram)

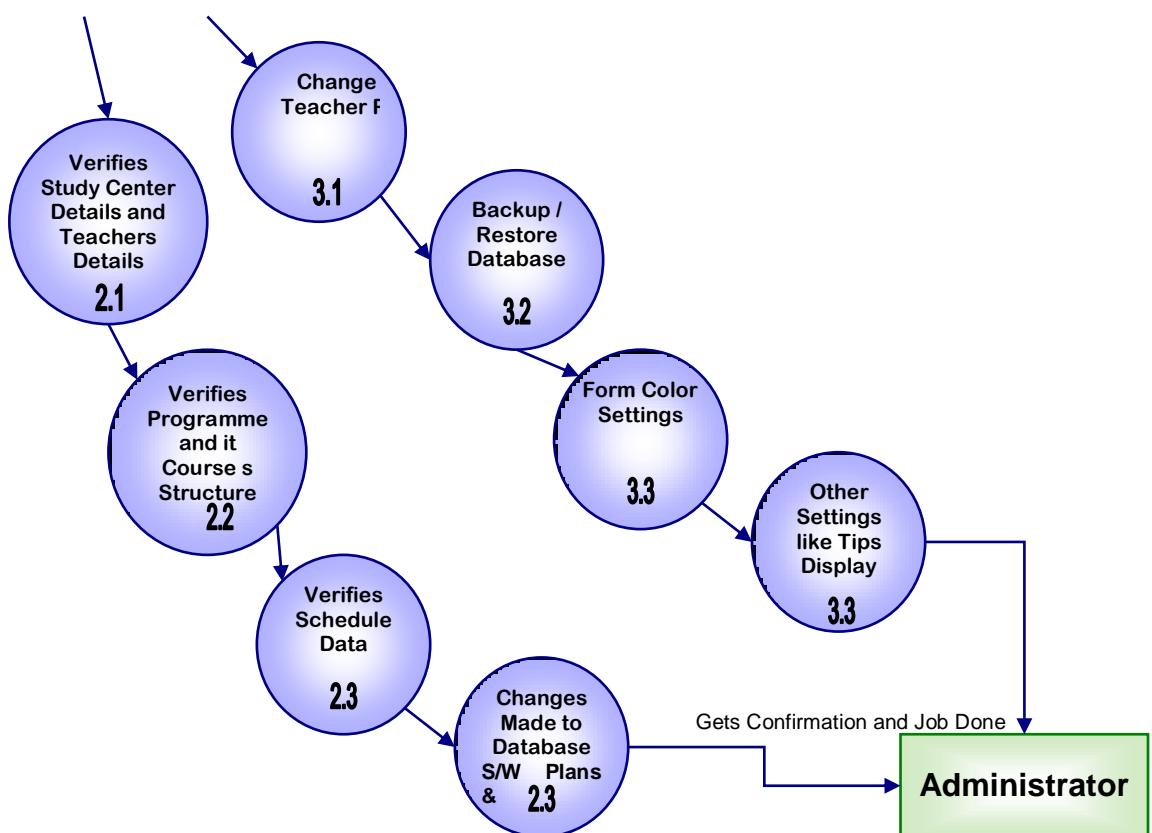


DFD For Administrator

1st Level

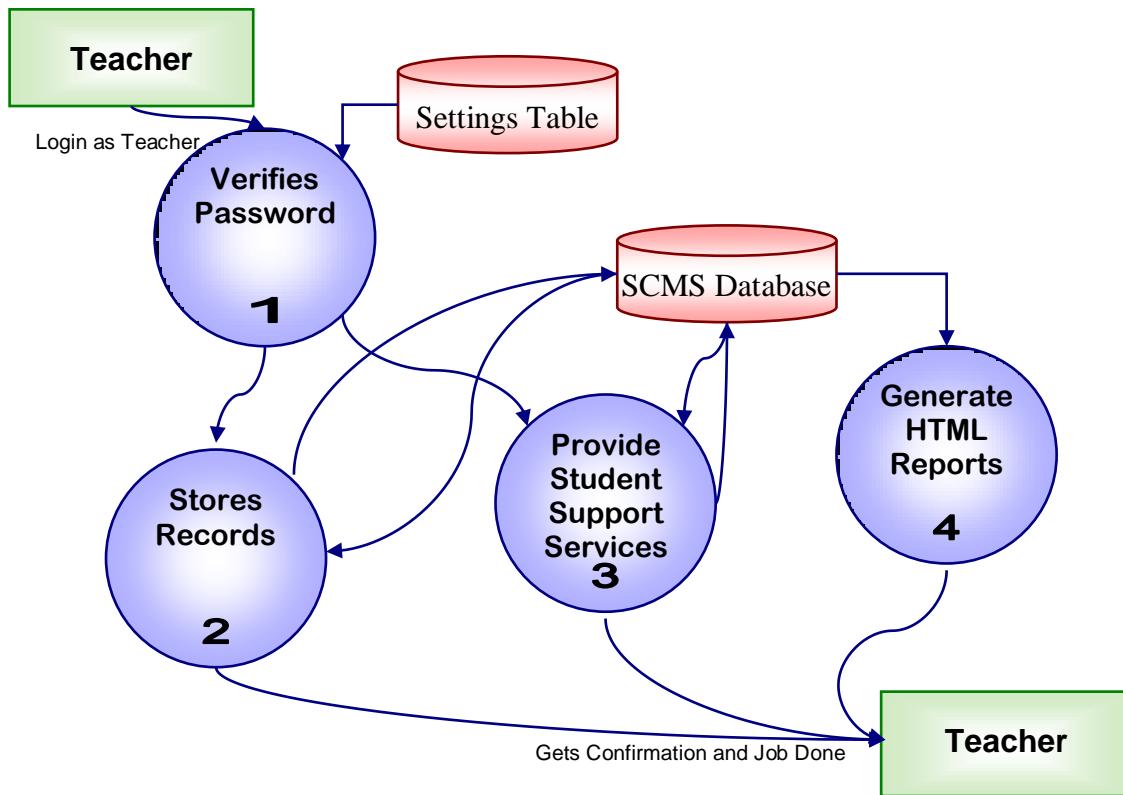


2nd Level

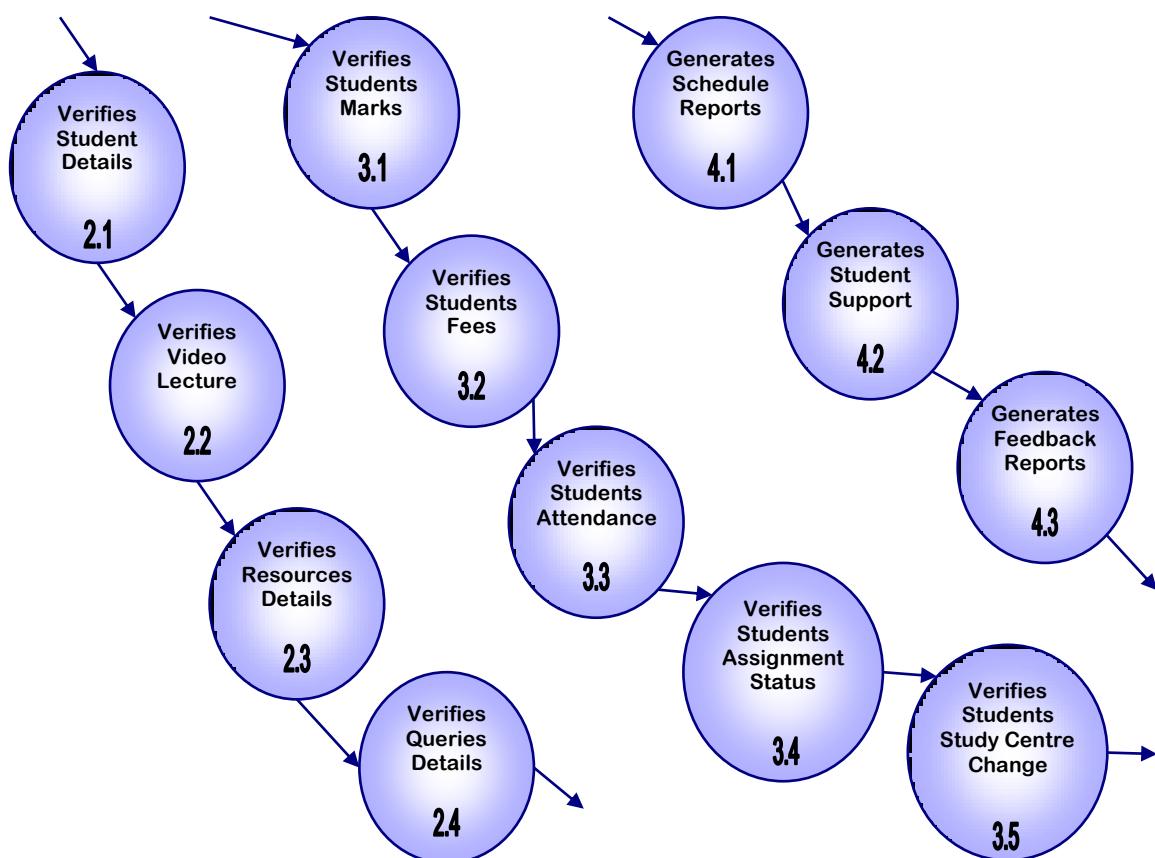


DFD for the Teacher

1st Level

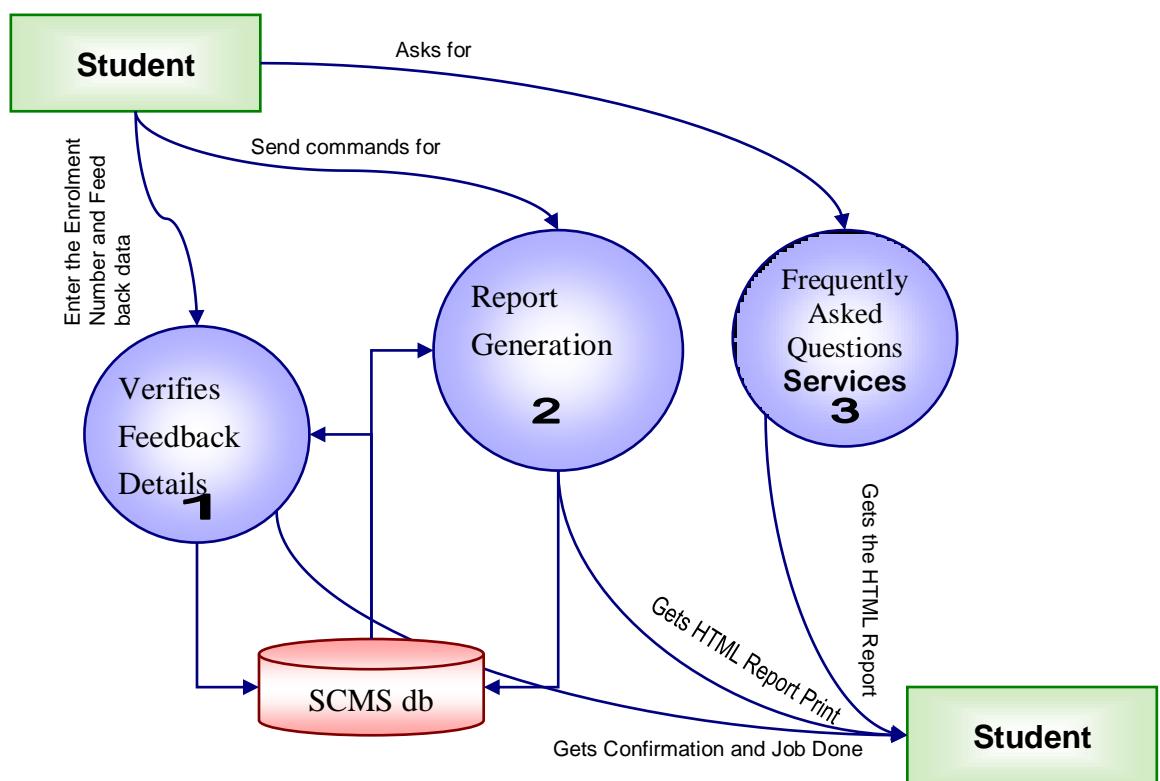


2nd Level



DFD for the Students

1st Level



2nd Level

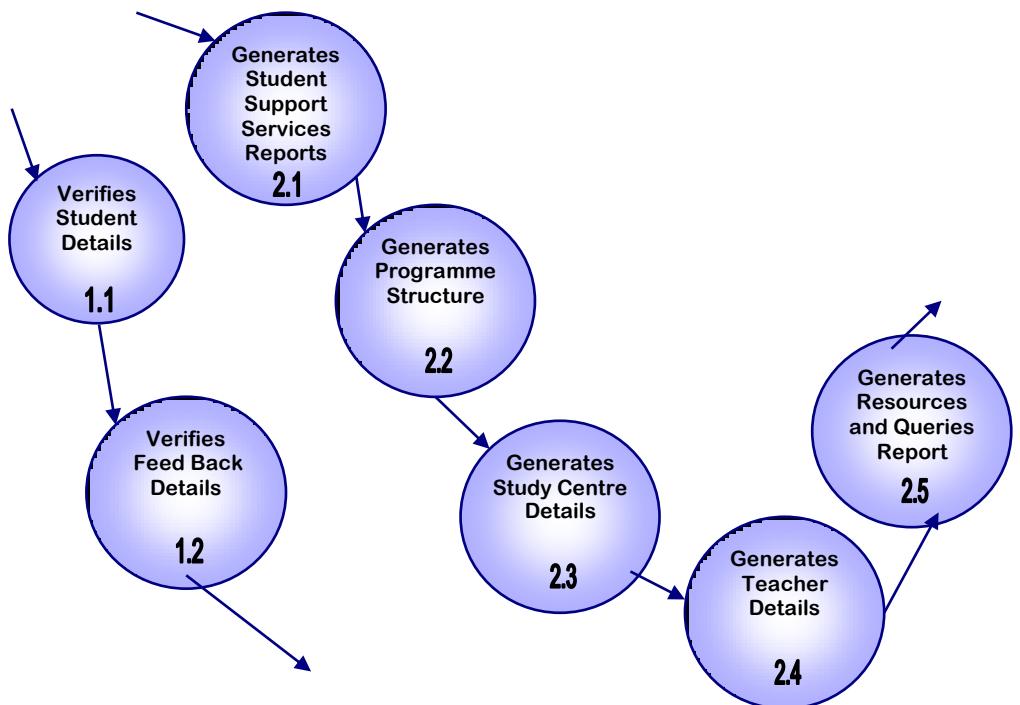


Figure 9: All the DFDs for the System

The **Data Flow Diagrams** as above give a brief idea on how our system is working. It also suggests to us the type of users who are using this system and the processes involved in the system.

After having a brief idea we would like to now explain the relationships among the users and data records available in the system in the next section.

4.2 Entity-Relationship Diagram for the system

The ER Diagram of the system is shown in *Figure 10*.

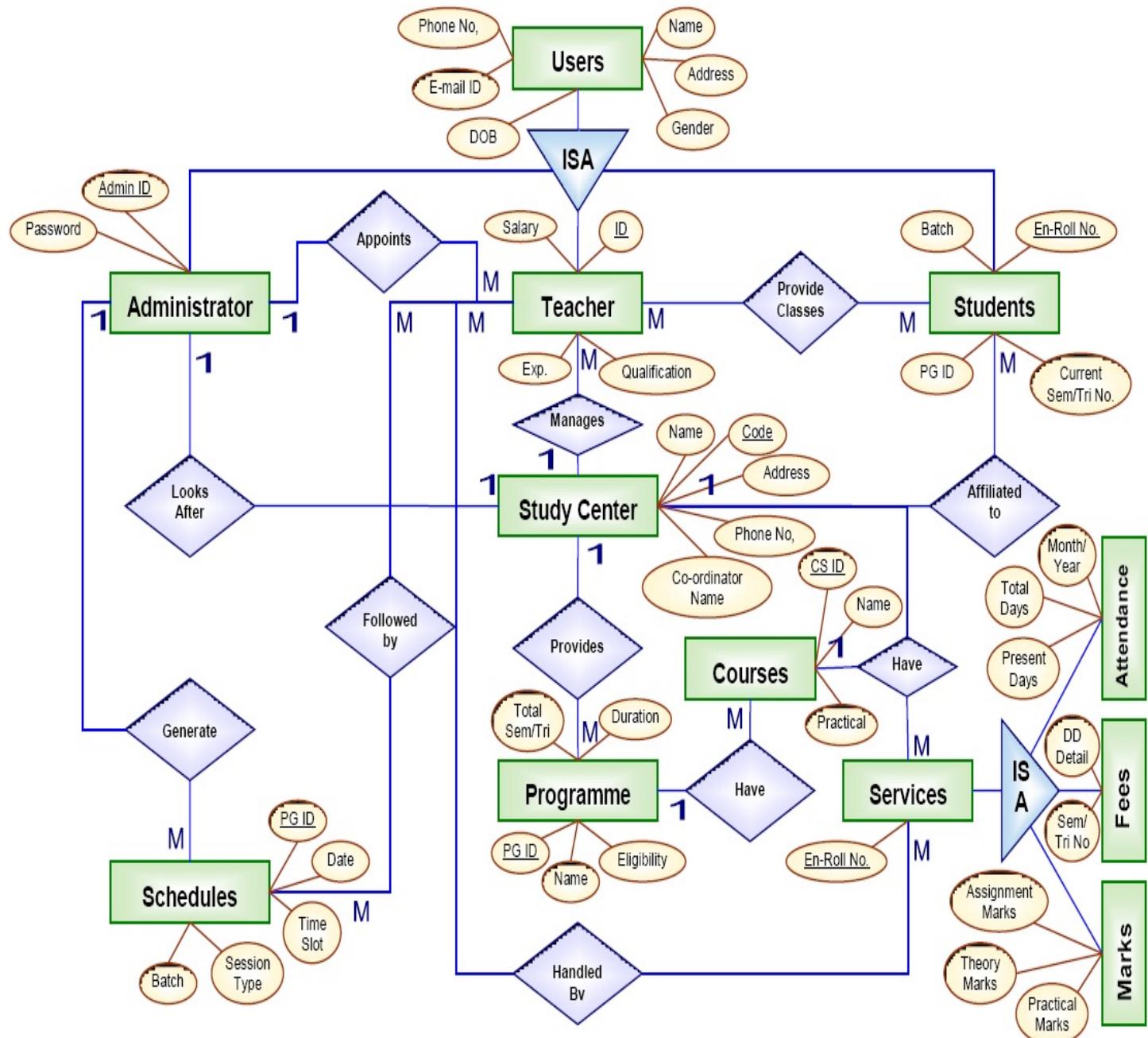


Figure 10: Entity Relationship Diagram for System

4.3 Data Dictionary

	Field Name	Data Type	Length	Description
Form Color Settings Table (frmColorSets)				
PK	Theme	VarChar	50	Stores the Unique Name of Color Theme
	frmColorSets	Memo or Text	NA	Stores Color Settings of Theme
Settings Table (Settings)				
	Ad_pass	VarChar	20	Stores the Administrator Password
	Fy_pass	VarChar	20	Stores the Faculty or Teachers Password
	Theo_hrs	Number	Integer	Stores Total Theory Sessions Hours
	Prac_hrs	Number	Integer	Stores Total Practical Sessions Hour
	Vido_hrs	Number	Integer	Stores Total Video Lecture Sessions Hour
	showtips	Number	Integer	Show tips of Day or not at Startup
	showtree	Number	Integer	Show tree View with each form or not
	Mainbktp	VarChar	1	Main Background Type (Image or Color or None)
	Mainback	VarChar	255	Path of Image or Color Code of Main Form
FK	theme	VarChar	50	Theme to be used for Forms
Study Center Record Table (sc_details)				
PK	Sc_id	VarChar	5	Stores the Unique Study Center ID
	Sc_name	VarChar	70	Stores the Unique Study Center Name
	Sc_codname	VarChar	70	Stores the Study Center coordinator Name
	Sc_add	Memo or Text	NA	Stores the Study Center Address
	Sc_phone	VarChar	15	Stores the Study Center Phone Number
	Sc_faxno	VarChar	15	Stores the Study Center Fax Number
	Sc_email	VarChar	100	Stores the Study Center E-mail Address

Comments

- Varchar specifies variable length character fields
- The password stored here is plaintext but in actual application development you can store it in encrypted form.

	Field Name	DataType	Length	Description
Programme Records (sc_prog)				
PK	Pg_id	VarChar	7	Stores the Unique Alphanumeric ID of Programme
	Pg_name	VarChar	70	Stores the Unique Programme Name
	Pg_eligible	Memo or Text	NA	Stores the Programme Eligibility
	Pg_fees	Number	Integer	Stores the Programme Fees
	Pg_obj	Memo or Text	NA	Stores the Programme Objectives
	Pg_duration	Number	Integer	Stores the Programme Duration in Months
	Pg_duratype	VarChar	2	Stores the Programmer Duration Type (Sem/Tri/Other)
Courses Table (pg_courses)				
PK	Cs_id	VarChar	7	Stores the Unique Alphanumeric ID of Course
FK	Pg_id	VarChar	7	Stores the Alphanumeric ID of Programme
	Cs_name	VarChar	70	Stores the Unique Course Name
	Cs_practical	Char	1	Stores the Practical is available or not
	Cs_slide	Char	1	Stores the Slide is available or not
	Cs_trisem	VarChar	3	Stores the Number of Tri/Sem/Other the course exists
Resources Record Table (sc_resources)				
PK	Rs_id	VarChar	5	Stores the Unique Resource ID
	Rs_details	Memo or Text	NA	Stores the Resource Details
	Rs_quantity	Number	Integer	Stores the Resource Quantity
	Rs_type	Char	1	Stores the Resource Type

	Field Name	DataType	Length	Description
Teachers Table (sc_teachers)				
PK	Ts_id	VarChar	5	Stores the Unique Teacher ID
FK	Sc_id	VarChar	5	Stores the Study Center ID
	Ts_name	VarChar	70	Stores the Unique Teacher Name
	Ts_add	Memo or Text	NA	Stores the Teacher Address
	Ts_dob	Date/Time	NA	Stores the Teacher Name Date of Birth
	Ts_phone	VarChar	15	Stores the Teacher Phone Number
	Ts_faxno	VarChar	15	Stores the Teacher Fax Number
	Ts_email	VarChar	100	Stores the Teacher E-Mail Address
	Ts_qual	VarChar	70	Stores the Teacher Qualification
	Ts_field	VarChar	70	Stores the Teacher Field of Expertise
	Ts_exp	VarChar	70	Stores the Teacher Experiences
	Ts_salary	Number	Integer	Stores the Teacher Salary in Rs.
	Ts_jobtype	Char	1	Stores the Teacher Job Type (Counselor/Lab Asst.)
	Ts_wload	Char	1	Stores the Teacher Work Load (Half Time/Full Time)
	Ts_sal_bas	Char	1	Stores the Teacher Salary Basis (Monthly/Hourly)
	Ts_gender	Char	1	Stores the Teacher Gender (Male/Female)
Query Record Table (sc_query)				
PK	Qy_id	VarChar	5	Stores the Unique Query ID
	Qy_details	Memo or Text	NA	Stores the Query Details
	Qy_solved	Varchar	1	Stores the Whether Query Solved or Not
	Qy_remarks	Memo or Text	NA	Stores the Query Remarks, if any.

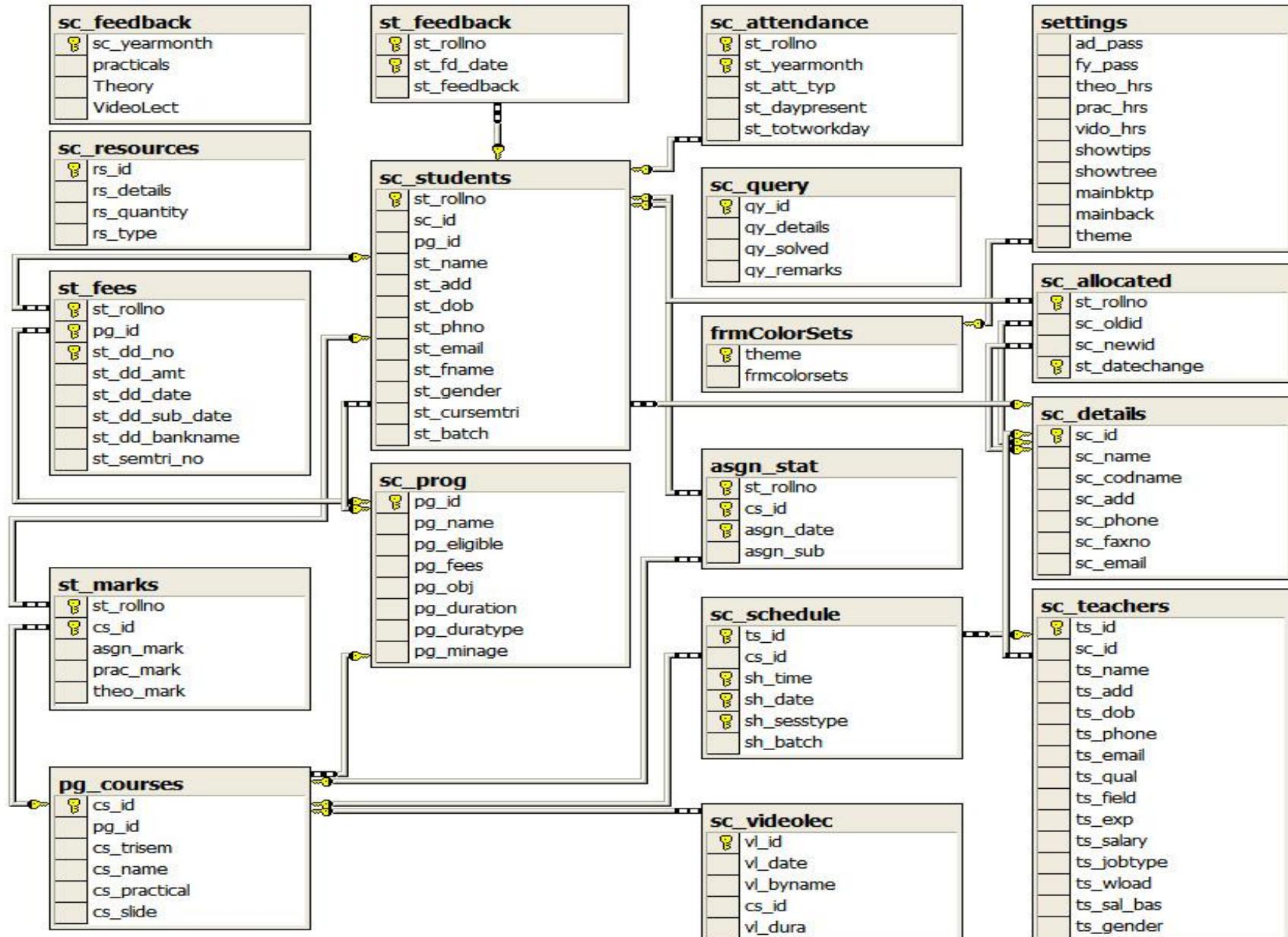
	Field Name	DataType	Length	Description
Schedule Table (sc_query)				
	Ts_id	VarChar	5	Stores the Teacher ID
	Sh_time	Number	Integer	Stores the Schedule Time Slot
	Sh_date	Date/Time	NA	Stores the Schedule Date
	Sh_sesstype	Char	1	Stores the Schedule Session Type (Theo/Prac/Video Lec.)
	Sh_batch	VarChar	3	Stores the Schedule Batch (1 st -20 th)
FK	cs_id	VarChar	5	Stores the Course ID
Students Table (sc_students)				
	st_rollno	VarChar	12	Stores the Unique Student Enrollment Number
FK	Sc_id	VarChar	5	Stores the Study Center ID
FK	Pg_id	VarChar	5	Stores the Programme ID
	St_name	VarChar	70	Stores the Student Name
	St_add	Memo or Text	NA	Stores the Student Address
	St_dob	Date/Time	NA	Stores the Student Date of Birth
	St_phone	VarChar	15	Stores the Student Phone Number
	st_email	VarChar	100	Stores the Student E-mail Address
	St_fname	VarChar	70	Stores the Student Father's Name
	st_gender	Char	1	Stores the Student Gender (Male/Female)
	St_cursemtri	VarChar	3	Stores the Student Current Sem/Tri/Other Number
	St_batch	Number	Integer	Stores the Student Batch in YYYY

	Field Name	DataType	Length	Description
Student Fees Table (st_fees)				
PK	St_rollno	VarChar	12	Stores the Enrollment Number
	Pg_id	VarChar	7	Stores the Programme ID
	St_dd_no	Number	Integer	Stores the DD Number
	St_dd_amt	Number	Float	Stores the DD Amount
	St_dd_sub_date	Date/Time	NA	Stores the DD Submission Date
	St_dd_bankname	VarChar	70	Stores the DD Bank's Name
	St_semtri_no	VarChar	3	Stores the Sem/Tri/Other No. of which DD is submitted
Students Marks Table (st_marks)				
PK	st_rollno	VarChar	12	Stores the Enrollment Number
	Cs_id	VarChar	7	Stores the Course ID
	Asgn_marks	Number	Integer	Stores the Assignment Marks
	Prac_marks	Number	Integer	Stores the Practical Marks
	Theo_marks	Number	Integer	Stores the Theory Marks
Students Attendance Table (sc_attendance)				
PK	st_rollno	VarChar	12	Stores the Enrollment Number
	St_yearmonth	VarChar	7	Stores the Year and Month of Attendance (yyyy-mm)
	St_att_typ	VarChar	1	Stores the Attendance Type (Theo./Prac./Video Lec.)
	St_daypresent	VarChar	93	Stores the Total Present Days of Student
	St_totworkday	VarChar	2	Stores the Total Working Days

*Students DD Number can be a character field. But in this application we have just assumed it to be an Integer.

	Field Name	DataType	Length	Description
Student Study Center Allocated Table (sc_allocated)				
PK	St_rollno	VarChar	12	Stores the Enrollment Number
	St_datechange	Date/Time	NA	Stores the Date of Change of Study Center
	Sc_oldid	VarChar	7	Stores the Old Study Center ID
	Sc_newid	VarChar	7	Stores the New Study Center ID
Students Assignment Status Table (asgn_stat)				
PK	st_rollno	VarChar	12	Stores the Enrollment Number
	Cs_id	VarChar	7	Stores the Course ID
	Asg_date	Date/Time	NA	Stores the Assignment Date
	Asgn_sub	VarChar	1	Stores the Submission Date
Students Feedback Table (st_feedback)				
PK	st_rollno	VarChar	12	Stores the Enrollment Number
	St_fd_date	Date/Time	NA	Stores the Feedback Date and Time
	St_feedback	Text or Memo	NA	Stores the Feedback Details
Video Lecture Table (st_feedback)				
PK	Vl_id	VarChar	12	Stores the Video Lecture ID
	Vl_date	Date/Time	NA	Stores the Video Lecture Date
	Vl_byname	VarChar	70	Stores the Name of the Lecturer
FK	Cs_id	VarChar	7	Stores the Course ID
	Vl_dura	Number	Integer	Stores the Duration of Video Lecture in Minutes

Database Relationships



4.4 A Few Input Designs (Rough Layout)

We have presented a very rough layout here. It might be good idea to have a description of the type of each field, its length in the layout. You can also specify more useful information about the kind of input such as – Drop down list, free text entry etc. You can also describe possible validation checks required for each field. This of course applies to all the forms here. You can also think of more user friendly input screens that use the facilities available in the programming language and programmable features.

Teacher Entry Form

Teacher ID	<input type="text"/>
Teacher Name	<input type="text"/>
Teacher Address	<input type="text"/>
Teacher Date of Birth	<input type="text"/>
Teacher Experiences	<input type="text"/>
Teacher Qualification	<input type="text"/>
Teacher Field of Expertise	<input type="text"/>
<input type="button" value="ADD"/> <input type="button" value="DEL"/> <input type="button" value="EDIT"/> <input type="button" value="EXIT"/>	

Student Entry Form

Student Enrolment Number	<input type="text"/>
Student Name	<input type="text"/>
Student Address	<input type="text"/>
Student Date of Birth	<input type="text"/>
Programme Selected	<input type="text"/>
Student Father's Name	<input type="text"/>
Study Centre Affiliated to	<input type="text"/>
<input type="button" value="ADD"/> <input type="button" value="DEL"/> <input type="button" value="EDIT"/> <input type="button" value="EXIT"/>	

Marks Entry Form

Student Enrolment Number	<input type="text"/>
Course ID	<input type="text"/>
Assignment Marks	<input type="text"/>
Maximum Marks	<input type="text"/>

Fees Entry Form

Student Enrolment Number	<input type="text"/>
Programme ID	<input type="text"/>
DD Amount	<input type="text"/>
Semester	<input type="text"/>
DD Number	<input type="text"/>
DD Bank Name	<input type="text"/>
DD Date	<input type="text"/>
DD Submission Date	<input type="text"/>

4.5 A Few Output Designs (Rough Layout)

Although we have presented a very simple layout, in practice, you can consider a columnar format for such a report. One key question which you must ask is: Are these formats in tune with what the users have asked for? This will help you in validating your report formats. A special mention here can be made of the Marks report. It will be better if a complete list of inputs and outputs is given.

Teacher Detail Report

Software Development,
Testing and Maintenance

Teacher ID	12345
Teacher Name	Mr. Ram
Teacher Address	New Delhi - 92
Teacher Date of Birth	29/02/1980
Teacher Experiences	3 years in Teaching
Teacher Qualification	MCA from IGNOU
Teacher Field of Expertise	Java Programming

Teacher ID	12346
Teacher Name	Mr. Shayam
Teacher Address	New Delhi - 92
Teacher Date of Birth	29/02/1975
Teacher Experiences	5 years in Teaching
Teacher Qualification	MCA from DU
Teacher Field of Expertise	Network Administration

Student Details Report

Marks Detail Report

Student Enrolment Number	123456789
Student Enrolment Number	987654321
Student Name	NABC
Student Address	INew Delhi - 92
Student Date of Birth	23/08/1982
Programme Selected	MBIT
Student Father's Name	Mr. J.K.Singh
Study Centre Affiliated to	UICT

Student Enrolment Number	123456789
Course ID	CSI-15
Assignment Marks	23
Theory Marks	60
Practical Marks	NA
Total Marks	83

Student Enrolment Number	123456789
Course ID	CSI-16
Assignment Marks	23
Theory Marks	50
Practical Marks	NA
Total Marks	73
Student Enrolment Number	987654321
Course ID	CSI-15
Assignment Marks	23
Theory Marks	30
Practical Marks	NA
Total Marks	53
Student Enrolment Number	987654321
Course ID	CSI-16
Assignment Marks	23
Theory Marks	40
Practical Marks	NA
Total Marks	63
Student Enrolment Number	987654321
Course ID	CSI-20
Assignment Marks	23
Theory Marks	60
Practical Marks	NA
Total Marks	83

5.0 SOFTWARE DEVELOPMENT, TESTING AND MAINTENANCE

After completing analysis and design, let us discuss various issues relating to development, validation, testing and maintenance in this section.

5.1 Software Development

After the completion of Analysis **and** Designing Phases now, the facts collected and the design of the System Project is used to start the final development of the software in this phase. This phase requires skilled programmers and designers who work together to develop a quality software.

It also suggests how programmer writes the codes which are easily understandable by another programmer i.e. including comments in the places required, using naming conventions with the controls and variables names. Several other rules are followed

during this phase by the programmer. A programmer finally implements the detailed design which includes software architects, data design, user interface design. In this section we have presented for you some of the Basic screen shots. On the implementation front you can implement the database using any for the DDMS. You can also include indexes on many fields and develop database triggers.

Hardware Required to run the system

The hardware listed below is the lowest but acceptable configuration for the software which we are going to build.

- ⊕ Processor : **Celeron 1.6 GHz**
- ⊕ Motherboard : **ASUS i845 Chipset M/B**
- ⊕ RAM : **256 MB DDR RAM**
- ⊕ HDD : **40 GB IDE HDD with UDMA 4 mode**
- ⊕ CD-ROM : **52x CD-ROM**
- ⊕ Video Card : **Onboard Intel Extreme Graphics**
- ⊕ Audio Card : **Onboard AC'97**
- ⊕ FDD : **1.44 MB**
- ⊕ Monitor : **15" Color Monitor**
- ⊕ Printer : **HP 3550 Color Printer or Dot-Matrix**
- ⊕ **104 Keys Keyboard, 3-button Logitech Mouse**

Software Required to run the system

The software listed below are the minimum requirement in order to develop the proposed project.

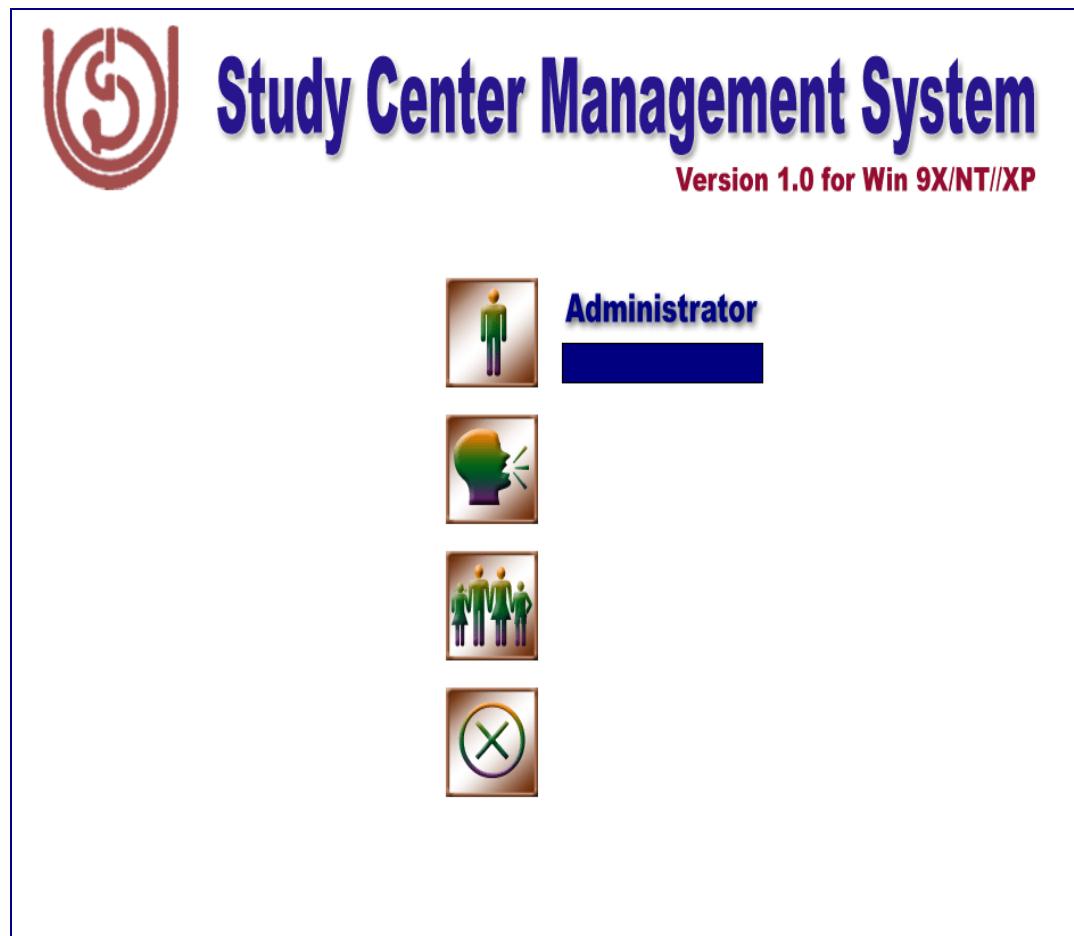
- ⊕ OS : **Windows 98 with IE installed**
- ⊕ Programming S/W : **Visual Studio 6.0 Professional**
- ⊕ Database Server : **Microsoft SQL Server 7.0**
- ⊕ Zipping Utility : **PKZIP and PKUNZIP**

All these interfaces are produced using VB and a sample code is presented here.
At present we are not providing details on coding standards. This is a self-generated code.

For your reference we have included a sample code of VB. You may create your own screens for the system.

A Sample Form with VB Coding

Login Form



VB Coding

```
Dim varapas, varspas As String
Dim vis As Byte
Option Compare Binary
Dim no As Byte
Private Sub Form_Load()
Show
If no > 10 Then
    picSplash.Visible = False
Else
    picSplash.Visible = True
    dbopen
End If
rs.Open "Select ad_pass,fy_pass from settings", db, adOpenStatic, adLockReadOnly
If IsNull(rs(0)) Or IsEmpty(rs(0)) Then varapas = "" Else varapas = rs(0)
If IsNull(rs(1)) Or IsEmpty(rs(1)) Then varspas = "" Else varspas = rs(1)
rs.Close
varcmd = 0
End Sub
Private Sub Form_Resize()
imgback.Move 0, 0, ScaleWidth, ScaleHeight
picSplash.Move (ScaleWidth - picSplash.Width) / 2, (ScaleHeight - picSplash.Height) / 2
lblTime.Move ScaleWidth - 30, ScaleHeight - lblTime.Height - 10
End Sub
'Subroutine for Mousemove on the Image Controls
Private Sub imgback_MouseMove(Button As Integer, Shift As Integer, X As Single, Y As Single)
```

```
For a = 0 To 3
    If vis - 1 = a Then imgTxt(a).Visible = True Else imgTxt(a).Visible = False
    lblMouseMove(a).Visible = False
Next
End Sub
```

```
Private Sub imgUsrTyp_Click(Index As Integer)
lblMouseMove(Index).Visible = False
If vis > 0 Then imgTxt(vis - 1).Visible = False
If vis > 0 And vis < 3 Then txtPass(vis - 1).Visible = False
vis = Index + 1
Select Case Index
    Case 0:
        txtPass(0).Visible = True
        txtPass(0).SetFocus
    Case 1:
        txtPass(1).Visible = True
        txtPass(1).SetFocus
    Case 2:
        varcmd = 3
        mdiMain.Show
        Unload Me
    Case 3:
        Shutdown
End Select
End Sub
```

```
Private Sub imgUsrTyp_MouseMove(Index As Integer, Button As Integer, Shift As
Integer, X As Single, Y As Single)
imgTxt(Index).Visible = True
If vis - 1 = Index Then lblMouseMove(Index).Visible = False Else
lblMouseMove(Index).Visible = True
End Sub
```

```
Private Sub controlsPos()
cordY = (ScaleHeight - (imgUsrTyp(3).Top + imgUsrTyp(3).Height -
imgUsrTyp(0).Top)) / 2
cordX = (ScaleWidth - (imgUsrTyp(3).Left + imgUsrTyp(3).Width -
imgUsrTyp(0).Left)) / 2
imgUsrTyp(0).Move cordX, cordY
lblMouseMove(0).Move cordX + imgUsrTyp(a).Width + 20, imgUsrTyp(a).Top +
imgUsrTyp(a).Height - 25
imgTxt(0).Move cordX + imgUsrTyp(a).Width + 20, imgUsrTyp(a).Top + 5
For a = 1 To 3
    imgUsrTyp(a).Move cordX, imgUsrTyp(a - 1).Top + imgUsrTyp(a - 1).Height + 20
    lblMouseMove(a).Move cordX + imgUsrTyp(a).Width + 20, imgUsrTyp(a).Top +
    imgUsrTyp(a).Height - 25
    imgTxt(a).Move cordX + imgUsrTyp(a).Width + 20, imgUsrTyp(a).Top + 5
Next
txtPass(0).Move lblMouseMove(0).Left, lblMouseMove(0).Top - 8
txtPass(1).Move lblMouseMove(1).Left, lblMouseMove(1).Top - 8
End Sub
```

```
Private Sub tmrLoad_Timer()
no = no + 1
lblProgress.Caption = String(no, "<")
If no > 10 Then
    tmrLoad.Enabled = False
```

```
picSplash.Visible = False
controlsPos
For a = 0 To 3
    imgUsrTyp(a).Visible = True
Next
End If
End Sub

Private Sub tmrTime_Timer()
    lblTime.Caption = Format(Now, "dddd, mmmm dd, yyyy | hh:mm:ss AM/PM")
End Sub

Private Sub txtPass_KeyPress(Index As Integer, KeyAscii As Integer)
If KeyAscii = vbKeyReturn Then
    Select Case Index
        Case 0:
            If txtPass(0) = varapas Then
                varcmd = 1
                mdiMain.Show
                Unload Me
                Exit Sub
            Else
                MsgBox "Invalid Password For Administrator!" & vbCrLf & "Access Denied!", vbCritical, "Error!"
            End If
        Case 1:
            If txtPass(1) = varsapas Then
                varcmd = 2
                mdiMain.Show
                Unload Me
                Exit Sub
            Else
                MsgBox "Invalid Password For Faculty!" & vbCrLf & "Access Denied!", vbCritical, "Error!"
            End If
    End Select
    SendKeys "{Home}+{End}"
End If
End Sub
```

The Menu Bar of the System

(The Menu will be activated depending on the options available for a given form/
report/ query)



The Main Form

STUDY CENTER MANAGEMENT SYSTEM



Software Settings Form

Software Settings

Passwords | Backup/Recovery | Form Colors | Settings |

Show Tips at Startup
 Show Tree View with Each Form
 Show Color or Wallpaper

Change Background Picture...
Pics\JPG\Back1 copy.jpg

Enter Theory Hours

Enter Practical Hours

Enter Video Lecture Hours

Study Centre Registration Form

**Study Centre
Management System: A
Case Study**

Study Center Registration

Study Center Code	21312
Study Center Name	asdasdasd asd as
Co-ordinator Name	asd asdasd as
Address	asda sadasdasdasd as
Phone Number	32323123123
Fax Number	123123123123
E-Mail ID	asdasd@asdas.sdf

Record 1 of 3

Add Del Edit Search Show All Close

Disable Tree View

Programme Registration Form

Programme Registration

Programme Code	ASDASDA
Name	asdasdasdasda
Eligibility	dasdasdasdasd
Fees in Rs.	1231231
Objective	sadasdasdasd
Duration Type	Trimester - 4 Months
Total Duration in Months	12
Minimum Age in Years	12

Record 1 of 3

Add Del Edit Search Show All Close

Disable Tree View

Course Registration Form

Course Registration

Course Code	A423423
Select Programme	asdasdasdasd
Practical Available	15 Marks
Name	asdasdasdasdasdasd as dasd
Slide Available	Yes
Semester / Trimester	2nd

Record 1 of 1

Add Del Edit Search Show All Close

Disable Tree View

Teacher Registration Form

Teachers Registration

Record 1 of 1

Code	21312
Name	asdasdas dasd a
Address	dasdasa sdasd asdasasaddasd asdasdasdas
Date of Birth	May 05, 2004
Phone Number	342342342341
Select Study Center	Counsellor
Job Type	Work Load
Highest Qualification	Half Time
Experience	asdasdasd asd
Field	sadasdasdasdasdas asdasd
Salary in Rs.	123213
Salary Basis	Monthly

Add Del Edit Search Show All Close

Schedule Data Form

Study Center Schedule

Record 1 of 2

Teacher ID	asdasdas dasd a
Select Teacher's Name	Practical
Select Session Type	01:00 PM - 03:00 PM
Date	May 05, 2004
Select Course	assadasdasdasdas as dasd
Select Batch	Batch - 2nd

Add Del Edit Search Show All Close

Student Registration Form

Student Registration

Record 1 of 1

Roll Number	123123123123
Enrollment Number	asfasdfsd fsd fsdf sdfsdf
Name	sd fsd fsdfsdfsd fsd
Father's Name	asdasdasdasd
Select Programme	asdasdasd asd as
Select Study Center	May 05, 2004
Date of Birth	Gender
Address	Male
Email ID	fsdfsfdsfsdfsfds
Phone Number	sdfsdfs@sadasds.sad
Batch Year	43242342342342
	Current Semester / Trimester
	2nd

Add Del Edit Search Show All Close

Video Lecture Entry Form

**Study Centre
Management System: A
Case Study**

The screenshot shows a software window titled "Video Lectures". On the left is a vertical tree view with items 0 through 9. The main area contains fields for "Video Lecture ID" (with a magnifying glass icon), "Select Course" (dropdown menu), "Date" (May 10, 2004), "Time" (10:38 AM), "Duration in Minutes" (dropdown menu), and "Video Lecture By" (dropdown menu). At the bottom are buttons for "Add", "Del", "Edit", "Search", "Show All", and "Close". A status bar at the bottom left says "Zero Records".

Resource Data Entry Form

The screenshot shows a software window titled "Resource Entry". On the left is a vertical tree view with items 0 through 9. The main area contains fields for "Resource ID" (with a magnifying glass icon), "Resource Details" (text area), "Quantity" (text area), and "Resource Type" (dropdown menu). At the bottom are buttons for "Add", "Del", "Edit", "Search", "Show All", and "Close". A status bar at the bottom left says "Zero Records".

Query Entry Form

The screenshot shows a software window titled "Study Center Query". On the left is a vertical tree view with items 0 through 9. The main area contains fields for "Query Code" (with a magnifying glass icon), "Query" (text area), "Solved" (dropdown menu), and "Remarks" (text area). At the bottom are buttons for "Add", "Del", "Edit", "Search", "Show All", and "Close". A status bar at the bottom left says "Zero Records".

Student Fees Entry Form

Student Fees Entry

Enrollment Number: [Text Box]

Select Programme: [Text Box]

Demand Draft Number: [Text Box]

Amount in Rs.: [Text Box]

DD Bank's Name: [Text Box]

Demand Draft Date: [Date Picker] May 10, 2004

Submission Date: [Date Picker] May 10, 2004

Selected Semester or Trimester Number: [Text Box]

Zero Records

[Add] [Del] [Edit] [Search] [Show All] [Close]

Disable Tree View

Student Attendance Entry Form

Student Attendance

Enrollment Number: 123123123123

Select Month: May

Enter Year: 2004

Attendance Type: Theory

Enter Total Working Day: 23

Check the Box to Mark Student Present

Sun	Mon	Tue	Wed	Thu	Fri	Sat
<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input checked="" type="checkbox"/> 4	<input checked="" type="checkbox"/> 5	<input checked="" type="checkbox"/> 6	<input type="checkbox"/> 7	<input type="checkbox"/> 8
<input type="checkbox"/> 9	<input type="checkbox"/> 10	<input checked="" type="checkbox"/> 11	<input checked="" type="checkbox"/> 12	<input checked="" type="checkbox"/> 13	<input type="checkbox"/> 14	<input type="checkbox"/> 15
<input type="checkbox"/> 16	<input type="checkbox"/> 17	<input checked="" type="checkbox"/> 18	<input checked="" type="checkbox"/> 19	<input type="checkbox"/> 20	<input type="checkbox"/> 21	<input type="checkbox"/> 22
<input type="checkbox"/> 23	<input type="checkbox"/> 24	<input checked="" type="checkbox"/> 25	<input checked="" type="checkbox"/> 26	<input checked="" type="checkbox"/> 27	<input type="checkbox"/> 28	<input type="checkbox"/> 29
<input type="checkbox"/> 30	<input type="checkbox"/> 31					

Record 1 of 1

[Add] [Del] [Edit] [Search] [Show All] [Close]

Disable Tree View

Student Marks Entry Form

Student Marks Entry

Enrollment Number: 123123123123

Select Course: asdasdasdasdasd as dasd

Enter Assignment Marks: 23

Enter Practical Marks: 12

Enter Theory Marks: 23

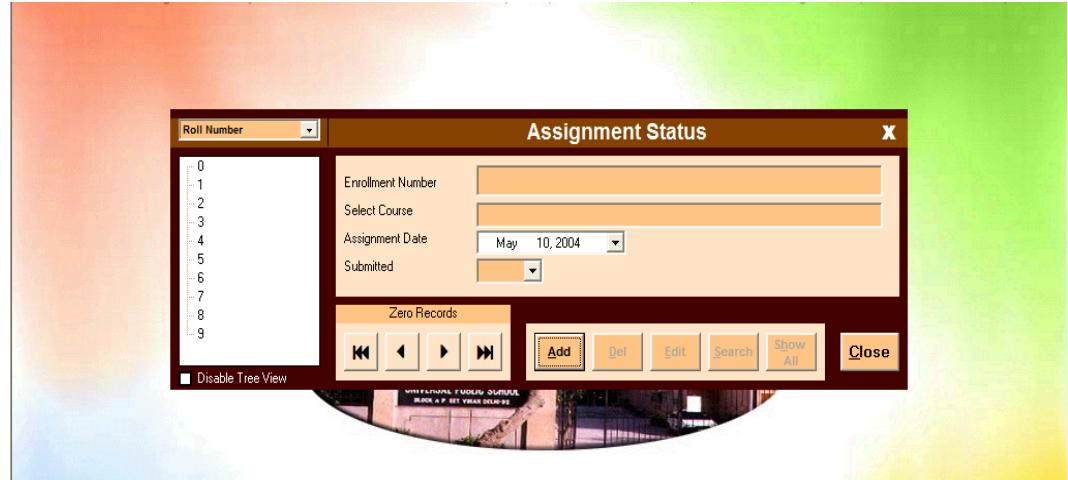
Record 1 of 1

[Add] [Del] [Edit] [Search] [Show All] [Close]

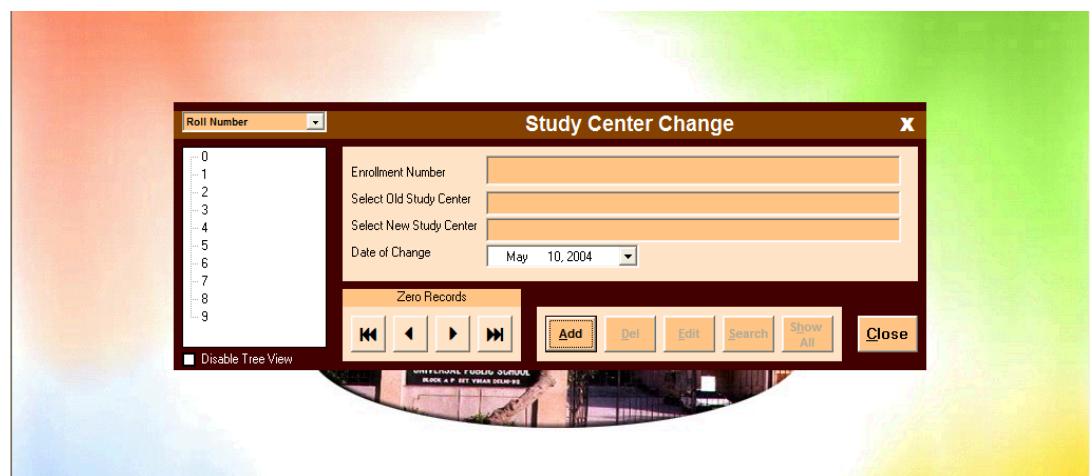
Disable Tree View

Assignment Status Form

**Study Centre
Management System: A
Case Study**



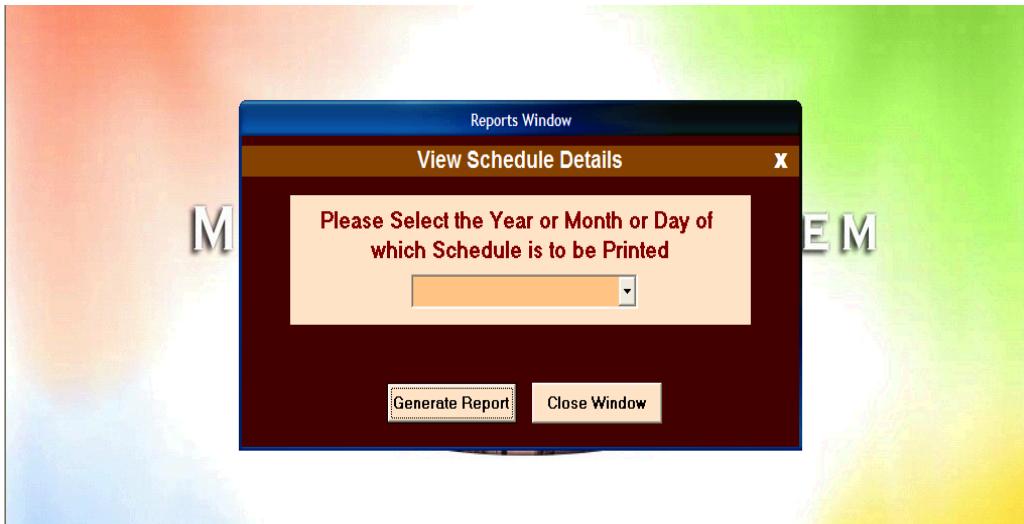
Student Centre Changes Form



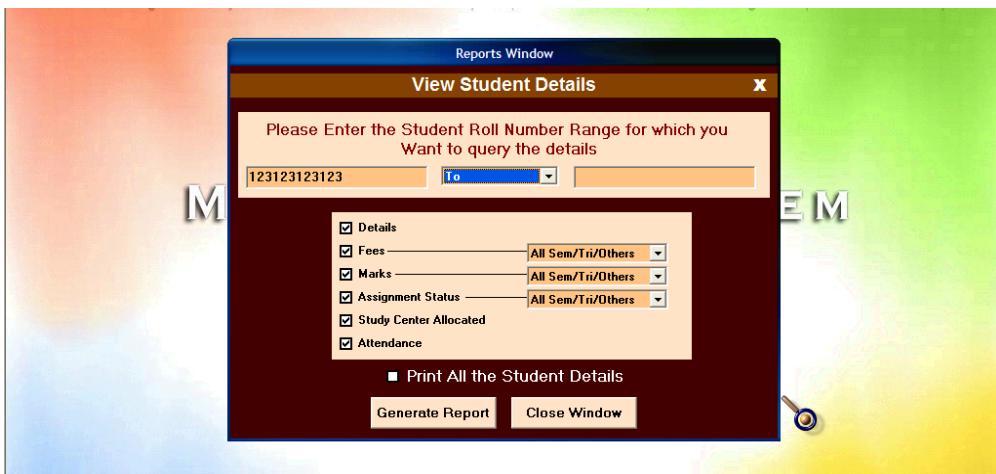
Feedback Entry Form



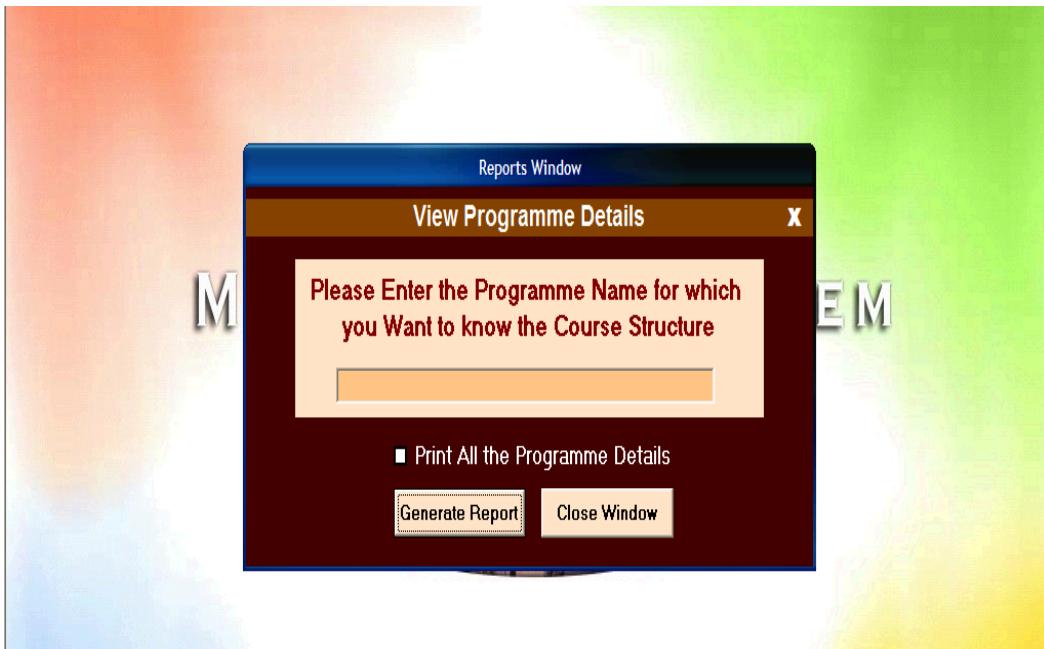
Schedule Printing Form



Student Details Prining Form



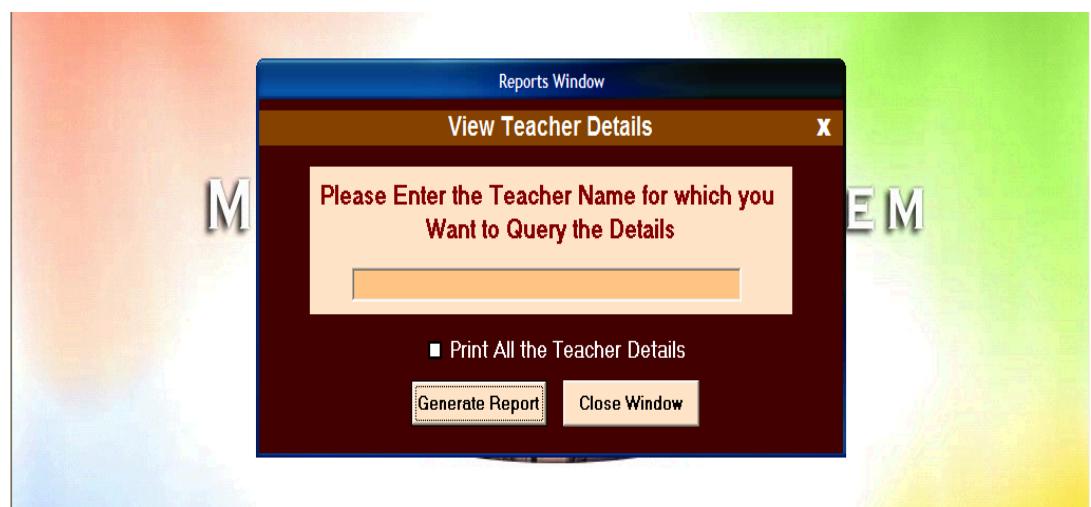
Programme Details Printing form



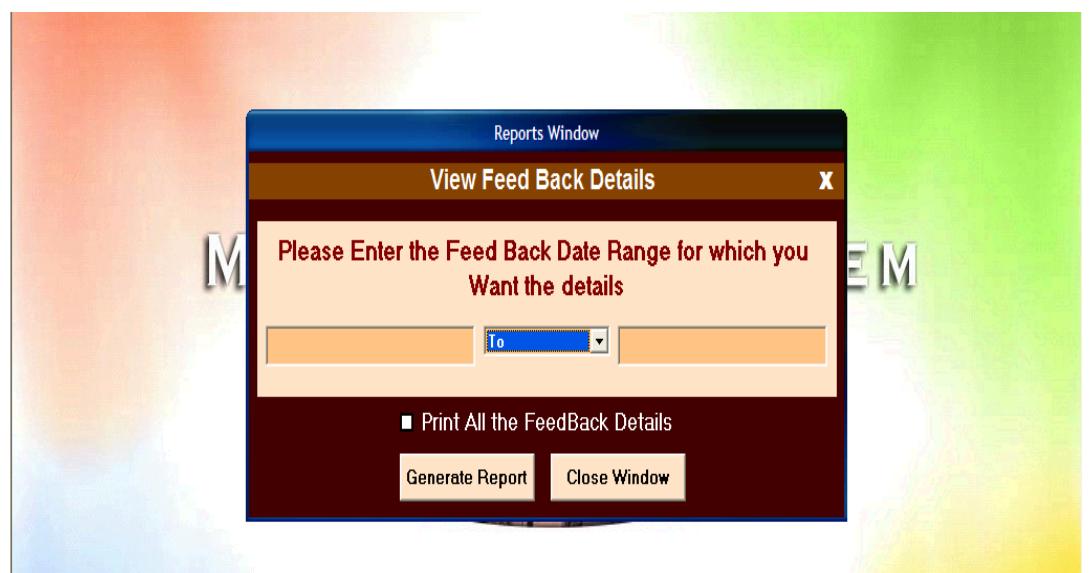
Study Centre Prining Form



Teacher Details Prining Form



Feedback Printing Form



Queries Printing Form

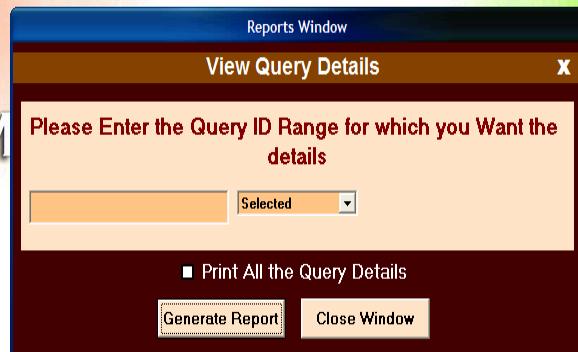
Reports Window

View Query Details X

Please Enter the Query ID Range for which you Want the details

Selected

Print All the Query Details



Resource Printing Form

Reports Window

View Resource Details X

Please Enter the Resource ID Range for which you Want to query the details

Print All the Resource Details



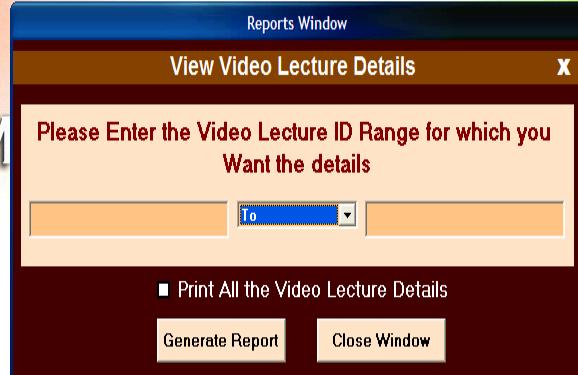
Video Lecture Printing Form

Reports Window

View Video Lecture Details X

Please Enter the Video Lecture ID Range for which you Want the details

Print All the Video Lecture Details



Print Preview Lecture Form

Layout

Resource Details

Roll Number - 123123123123

Study Center Name: asdasdasd asd as
Programme Name : asdasdasdasd
Student Name : asfsdfsd fsd fsdf sdfsd
Father's Name : sd fsd fsdfsdfsd fsd
Date of Birth : Wednesday 05 May,2004
Gender : Male
Address : fsdfsdfsdfs
Phone : 43242342342342
E-Mail : sdfsdfs@asdasds.sad
Batch in YYYY : 2000
Current Sem/Tri/Other : 2nd

Fees Details Given Below:

DD Number	DD Date	DD Submitted Date	Bank Name	Sem/Tri/Oth No.
-----------	---------	-------------------	-----------	-----------------

 None of the Fees Submitted!

Marks Details Given Below:

Course ID	Course Name	Assignment	Theory	Practical	Total	Grade	Sem/Tri/Oth No.
A423423	asdasdasdasdasd as dasd	23	23	12	58	Referred	2

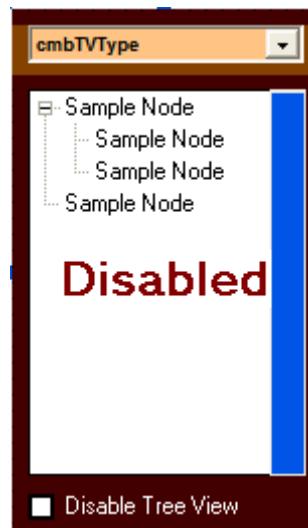
Assignment Status Details Given Below:

Course ID	Course Name	Assignment Date	Submitted	Sem/Tri/Oth No.
-----------	-------------	-----------------	-----------	-----------------

 None of the Assignments Submitted!

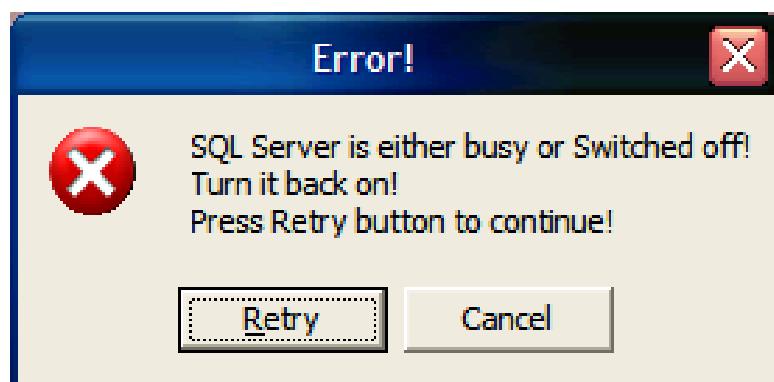
Please Select the Items from the Menu CAPS NUM INS SCRL Mon , 10 May 2004 12:03:15 PM

Tree View Form

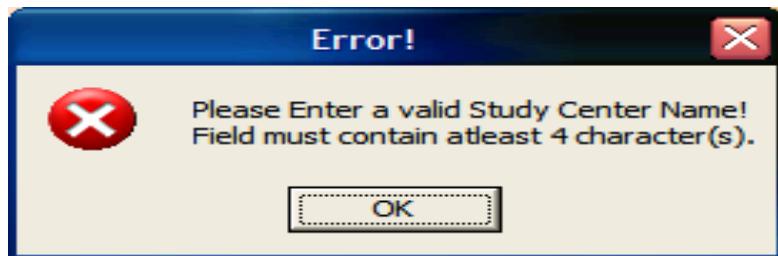


5.2 Some Validation Checks

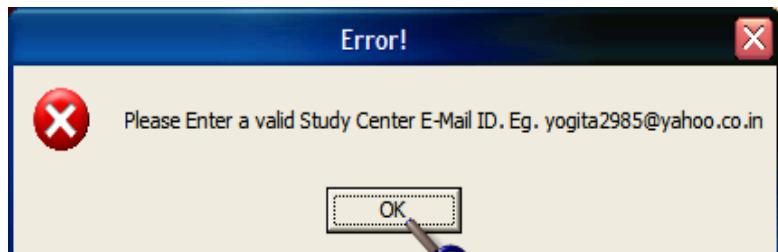
Message Box incase SQL Server is Busy or Turned off :



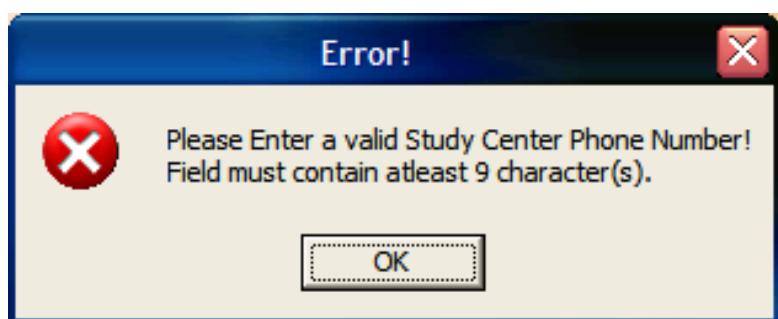
Message Box if Name Fields have Wrong Entries :



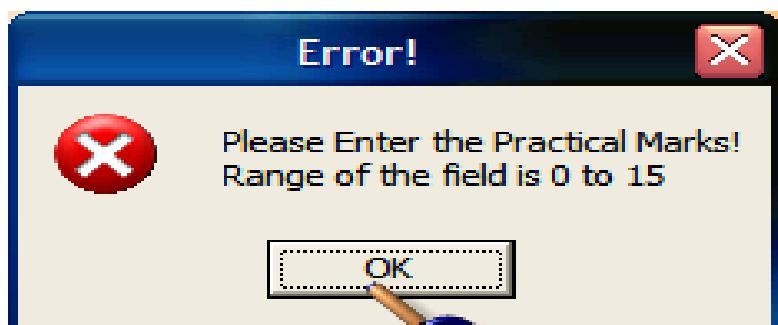
Message Box if E-mail ID is not valid :



Message Box if Phone Number is Invalid :



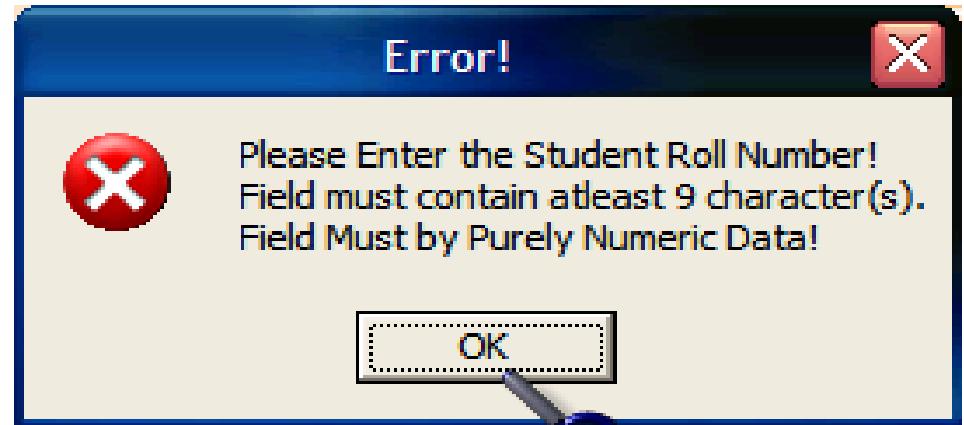
Message Box if Marks fields are invalid :



Message Box if Batch Year is Invalid :



Message Box if Enrollement Number is Invalid :



5.3 Reports Screen Shots

Schedule Report :

Schedule Details				
Date & Time : Monday May 10,2004 12:33 PM				
Practical				
Course Id	Teacher Name	Date	Time Slot	Batch
A423423	asdasdas dasd as	Wed, 05 May,2004	11:00 AM - 01:00 PM	2nd
Video Lecture				
Course Id	Teacher Name	Date	Time Slot	Batch
A423423	asdasdas dasd as	Wed, 05 May,2004	09:00 AM - 10:00 AM	3rd

Student Report :

Student Details							
Date & Time : Monday May 10,2004 12:35 PM							
Roll Number - 123123123123							
Study Center Name: asdasdasd asd as							
Programme Name : asdasdasdasd							
Student Name : asfsdfsd fsd fsdf sdfsd							
Father's Name : sd fsd fsdfsdfsd fsd							
Date of Birth : Wednesday 05 May,2004							
Gender : Male							
Address : fsdfsdfsd fsdfs							
Phone : 43242342342342							
E-Mail : sdfsdfs@asdasds.sad							
Batch in YYYY : 2000							
Current Sem/Tri/Other : 2nd							
Fees Details Given Below:							
DD Number	DD Date	DD Submitted Date	Bank Name	Sem/Tri/Oth No.			
None of the Fees Submitted!							
Marks Details Given Below:							
Course ID	Course Name	Assignment	Theory	Practical	Total	Grade	Sem/Tri/Oth No.
A423423	asdasdasdasdasdas dasd	23	23	12	58	Referred	2
Assignment Status Details Given Below:							
Course ID	Course Name	Assignment Date	Submitted	Sem/Tri/Oth No.			
None of the Assignments Submitted!							

Feedback Report :

Feedback Details

Date & Time : Monday May 10,2004 | 12:37 PM

Roll Number	Feedback Date	Feedback Details
123125123123	Monday May 10,2004	asdasd asd asd asd

Software Development,
Testing and Maintenance

Programme Structure Report :

Programme Details

Date & Time : Monday May 10,2004 | 12:38 PM

asdasd as

Code : SADASDA
 Eligibility : asd asd asdad asda sdas das d asdasda sd
 Objectives : asdad asd asd asda sd asdasd
 Fees : Rs. 23123.00
 Duration : 120 months
 Minimum Age : 12 years
 Duration Type : Semester - 6 Months

Course Structure is given Below :

Course ID	Course Name	Practical	Slides	Trimester/Semester/Other
No Courses Data Available!				

asdasdasdasd

Code : SADFASD
 Eligibility : dasd asd asdas
 Objectives : asdad asd asd
 Fees : Rs. 23213.00
 Duration : 12 months
 Minimum Age : 12 years
 Duration Type : Trimester - 4 Months

Course Structure is given Below :

Course ID	Course Name	Practical	Slides	Trimester/Semester/Other
A423423	asdasdasdasdasd as dasd	No	Yes	2nd

Queries Report :

Queries Details

Date & Time : Monday May 10,2004 | 12:38 PM

Query ID	Query Details	Remarks	Solved
12312	d asdasdad asd	a sdasdasdad	Yes

Resources Report :

**Study Centre
Management System: A
Case Study**

Resource Details		
Date & Time : Monday May 10,2004 12:31 PM		
Resource ID	Resource Name	Quantity Category
23213	asdasdasdasd	123 Software
<hr/>		

Study Centre Details Report :

Study Center Detail		
Date & Time : Monday May 10,2004 12:39 PM		
<u>asdas dasd asd a</u>	Code: 32234	
Co-ordinator Name: asdas dasd a	Address: asdas dasd asd a	
Phone Number: 12313131312	Fax Number: 12313131312	
E-Mail Address: asdasdasd@studysite.org		
<u>asdasdas das</u>	Code: 23432	
Co-ordinator Name: asdas das	Address: asdasdas das	
Phone Number: 12313131313	Fax Number: 12313131313	
E-Mail Address: asdasdasd@studysite.org		
<u>asdasdasd asd as</u>	Code: 21312	
Co-ordinator Name: asdasdasd as	Address: asdasdasd as das das das d	
Phone Number: 12313131313	Fax Number: 12313131313	
E-Mail Address: asdasdasd@studysite.org		
<hr/>		

Teacher Details Report :

Teacher Details	
Date & Time : Monday May 10,2004 12:39 PM	
Study Center Name : asdasdasd asd as	
Name:	asdasdas dasd a
Code:	21312
Address:	dasdas dasd asdasdasdasdasdasdas
Date of Birth:	Wednesday 05 May,2004
Gender:	Male
Phone:	2423423 423423
E-Mail:	asdasda@asdasdasda
Qualification:	asdasdasd asd
Field:	asdasdasd asd asd
Experience:	asdasdasdasdasdasdas asd
Salary:	Rs. 12/213
Job Type:	Counselor
Salary Basis:	Monthly
Work Level:	Half Time

Video Lecture Report :

Video Lecture Details				
Date & Time : Monday May 10,2004 12:39 PM				
Video Lecture ID	Date/Time	Name of the Lecturer	Course III	Duration in Minutes
12312	5/10/2004 10:43:00 AM asdasdasdasd		A423423	123

5.4 System Testing

After the completion of the Development Phase of Software, the testing phase starts. In it, we test out the software by the end-users or self. There are various software testing modes. During this phase the system is used experimentally to ensure that the software does not fail, i.e. it will run according to its specifications and in a way users expect it to. Special data is input for processing and the results are examined to locate unexpected results. Persons other than the one who write original programs perform testing, i.e. using persons who do not know how certain parts were designed or programmed. It ensures more complete and unbiased testing and more reliable software.

This is testing the portions of the software and then before the system is implemented, all the components or processes are tested together to ensure that the entire system operates as required and should run error free.

Some of the major testing types are as follows :

- ❖ **White Box testing** : This type of testing goes inside the program and tests the paths, loops and branches in the code at least once to verify the programmer's intention .
- ❖ **Black Box testing** : This testing is done only by checking the outputs to see whether they are the expected ones. This type of testing verifies that the software generates the expected outputs with a given set of inputs.
- ❖ **Static analysis** : In this type of testing, the code is examined rather than exercised to verify its conformance to a set of criteria. This type of testing is most effective when it can be used to validate the traceability of software to a formal, mathematically rigorous specification. Such kinds of peer reviews are very effective in finding many kinds of errors.

5.4.1 Test Plan

Here let us start with the question who is going to use the program?

The program will be used by the Students, Teachers and administrator. The students would have rights to get the results and can query certain informations and they can submit feedback to Study centres. Teachers would provide students support services and would have the right to see the appointed schedule by the administrator. In the end, the administrator would have all the rights of students and teachers and would have an extra facility for entring details of teacher, alter Study Centre details, making schedules, etc.

Next, what program is used?

The program used is a **Study Centre Management System**. It would have a multi-user enviroment with three users categorized as students, teachers and administrator

When is the program used?

The program is used when students want to query some information or by the teacher to enter the details of student-related information, and by the administrator for data entry of teachers and Study Centres

What are the resources?

The resources are SQL Server database Engine containing tables. These tables are given in **section 4.7.3 Database Dictionary**

On the basis of all the above information a plan for testing is genearated.

5.4.2 Test Cases

Before we define the test cases, let us specifically state that this is not the canonical

way to show test cases. A test case should give the exact input or action performed and the expected output. The tester then tests the system by using the test cases. The actual output is obtained and recorded in the test log. If the expected and actual outputs agree the test case is said to have “passed” else failed. Failed test cases are sent back to the development team for fixing and are then tested in the next round of testing. However, for the present we are giving some basic testing scenarios.

Login Form :

S. No.	Initial	Expected	Output
1.	Login failure when Password is correct	Login when Password Matches	Wrong
2.	Unable to access data from Settings Table	Settings Table data accessed	Wrong
3.	Password Data accessed from Settings Table.	Password Retrieved	Corrected
4.	Login rechecked for Admin and Teacher	Worked Out	Corrected

S. No.	Initial	Expected	Output
1.	Menu bar doesn't deactivate according to login form	Menu bar should have visibility according to login type	Wrong
2.	Image File mishandling if image file doesn't exist	Error! if no Image File exists	Wrong
3.	Menu bar functions according to login type	Worked Out	Corrected
4.	Error! If image not found	Worked out	Corrected

Main Form :

Data Entries Form :

S. No.	Initial	Expected	Output
1.	Form Color Settings not applied	Form Color Settings should be applied	Wrong
2.	Primary Key validation not working	Primary key validation available	Wrong
3.	Foreign Key validation not working	Foreign Key validation available	Wrong
4.	Numeric validation for Numerical fields not functioning	Numeric validation for Numerical fields should be working	Wrong
5.	No E-mail validation facility	Checking of valid e-mail id	Wrong
6.	Grid View of records not working	Grid view of record should be displayed	Wrong
7.	Form Color Settings should be applied	Worked Out	Corrected
8.	Primary key validation available with error if duplicate.	Worked Out	Corrected
9.	Foreign Key validation available with proper error!	Worked Out	Corrected
10.	Numeric validation for Numerical fields.	Worked Out	Corrected
11.	Checking of valid entered e-mail id	Worked Out	Corrected
12.	Grid view of record should be	Worked Out	Corrected

	displayed		
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Settings Form :

S. No.	Initial	Expected	Output
1.	Form Color Settings theme not stored to database	Form Color Settings should be stored to database and should be applied	Wrong
2.	Tree view and Tips of day settings not stored	Tree view and Tips of day settings should be stored to Settings table	Wrong
3.	Backup/Recovery System not working properly and there is failure	Backup/Recovery System should create a backup file	Wrong
4.	System hangs if SQL Server is switched off or Paused during transaction	No System hangs and message box should appear.	Wrong
5.	Password Changing functionality not working	Password should be changed	Wrong
6.	Form Color Settings should be stored to database and should be applied	Worked Out	Corrected
7.	Tree view and Tips of day settings should be stored to Settings table	Worked Out	Corrected
8.	Backup/Recovery System should create a backup file	Worked Out	Corrected
10.	Password should be changed if administrator wants	Worked Out	Corrected

Reports Form:

S. No.	Initial	Expected	Output
1.	Form Color Settings not applied	Form Color Settings should be applied	Wrong
2.	Auto Complete Facility not working if same name record exists	Auto complete functionality should work even if same name record exists	Wrong
3.	No Creation of HTML Reports	Auto Creation of HTML Reports	Wrong
4.	Form Color Settings should be applied	Worked Out	Corrected
5.	Auto complete functionality should work even if same name record exists	Worked Out	Corrected
6.	Auto Creation of HTML Reports	Worked Out	Corrected

5.5 Implementation

Installation Procedure of the Software

First match the minimum requirement for the system. If the condition matches then install Microsoft Windows 98 or above on the system in which program is going to be used. After that, we would require to setup Microsoft SQL Server as a Database server. Now you are ready to install the software.

Then, Insert the Project CD in the CD-ROM Drive. After that a setup screen appears,

there you follow on-screen instructions. Now, after the setup the User would simply click on the shortcut named SCM System placed on the *windows desktop* to access the file or go to the Programs Menu in which select the SCM System in the Start Menu.

Usage of the Software

At first we need the PC and the minimum hardware and software configuration as specified earlier. The system has three access rights for administrator, teachers and students. The administrator and teacher would login with their Password provided by administrator and then he follow on-line help displayed on the status bar. Student would login without any password and they can query any information they require. For further information you can read **readme.txt** file provided with the software or open the Help from **Help Menu** or press **F1**.

5.6 Maintenance Strategy

This stage is optional in Software Life Cycle Model as it may exist or not. This phase is required to keep the software current. It has four types :

- ❖ **Adaptive Maintenance**
- ❖ **Preventive Maintenance**
- ❖ **Corrective Maintenance**
- ❖ **Perfective Maintenance**

Now, in case of our products we need only adaptive and perfective maintenance. Adaptive maintenance makes software exist in the current hardware and software area and Perfective maintenance enables fine tuning and optimizing the system for faster and quicker response in a more efficient and effective way.

Study Centre does not need to install latest Hardware and Software for keeping the initial database but as the database size increases gradually then frequent backups of the data should be taken.

There should be a way of logging the errors in a file. We would try to sort out these errors. After, removing the errors we would create the error free software. So, maintenance strategy helps in keeping the software at top-notch working more effectively and efficiently.

5.7 Future Scope of Project

This project has been designed to work on a large scale. So, according to our analysis the future scope of the project is bright and would have an everlasting effect on the current system.

The future scope of this project is that it would be provided with the functionalities of Bugs Report and submitting facility in case there is any abnormal failure in the software. Similarly like in Windows XP if the Software crashes the bugs reporting screen appears and is logged. We would like to implement our project in the same way.

Next, we would like to make the software work even faster in case the database size is larger by using some optimized algorithms for searching and viewing records.

Next, we would like to include Safe Mode facility in the software so as to recover the system incase the software hangs out or has abnormal crashes or errors.

Currently, our software is fully compatible with all those systems which can run SQL Server correctly and efficiently. So, there is no compatibility issue in our software in

future.

Hard Disk space required is 10 MB which is enough but extra space allocated during Database creation in SQL Server. So, even 4 GB hard disk having windows 98 and SQL Server installed can make the software in good working condition.

SOCIAS-IGNOU/P.O.10.5T/MAY, 2004