

# **SMART AND SECURE EDUCATION**

Project report submitted in partial fulfilment of the requirement for the  
degree of Bachelor of Technology

in

**Computer Science and Engineering**

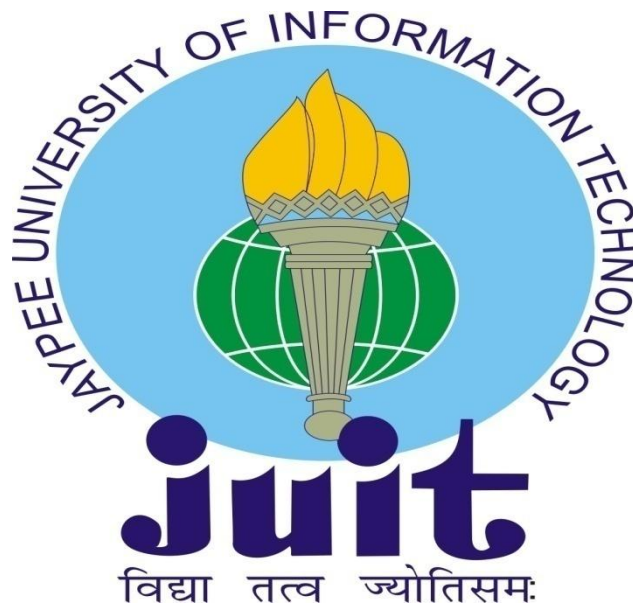
By

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to



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## Certificate

### Candidate's Declaration

I hereby declare that the work presented in this report entitled “ **Smart and secure Education**” in partial fulfillment of the requirements for the award of the degree of **Bachelor of Technology in Computer Science and Engineering/Information Technology** submitted in the department of Computer Science & Engineering and Information Technology, Jaypee University of Information Technology Waknaghat is an authentic record of my own work carried out over a period from August 2018 to December 2018 under the supervision of **Dr.Suman saha** (Assistant Professor (Senior Grade))

The matter embodied in the report has not been submitted for the award of any other degree or diploma.

Pranay Pushp(151386)

This is to certify that the above statement made by the candidate is true to the best of my knowledge.

Dr. Suman Saha  
Assistant Professor  
Computer Science & Engineering  
Dated:

## **ACKNOWLEDGEMENT**

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Thanking you,

Pranay Pushp (15186)

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## **ABSTRACT**

One of the important mission of smart education is to allow people to gain knowledge about the various skills and to also get a professional degree, without physically attending a traditional schools or the university .Smart learning uses the concept of E-learning which can be applied at all level of education from basic schooling to higher study , and have large field to accommodate and fulfil all learning styles. Today's the latest technologies are transferring the students from traditional classroom based learning environment to e-learning environment.

The Smart education main focus is to provide Quality and accessible Education by the use of latest technology.

## Chapter 1: INTRODUCTION

### 1.1 Introduction

SMART and Secure Education is a e-learning platform designed to meet the need of the twenty first century's learners by offering an intelligent and customized learning solutions to the user .E-learning technology had made the learning experience more fluent and flexible among the learner through interactive audio video lectures. Now's a day One of the basic foundation of learning is the transfer of knowledge and sharing of information through technologies. It is now getting much more popular among the students , learner , teacher and different academicians.

Due to rapid advancement in IT technology and WorldWideWeb, the idea of online learning has become quite popular among students and teachers throughout after digital revolution . The Smart education involves multi platform system that focuses to improve Quality Education by using latest technologies with the focus on ensuring daily evaluation and monitoring with the accountability in the system. Our Project aims to provide the multiplatform to the learner to learn basic skills such as primary or secondary school levels with Reasoning and Aptitude skills along with higher software technicalskills like,programming skills and opt different courses as per their needs .

The online platform fulfils the learner's need according to his choice. This digital revolution had bring the significant changes in the way of learning it had changed how the study material is accessed,consumed, and discussed with others, and shared with other learners.

Smart education will Provide Students a richer and diverse learning environment .It will provides cheap and affordable solutions to the higher cost of the academic institutions.The aim of our project is to provide informative and interactive audio-video learning modules, as well as on this learning platform one can access a lot of e-books, journals ,research paper and pdf related to different course material .In our project we are using Cryptography and data mining for the purpose of securing the data and information on the e- learning platform as well as securing the information of the user .The second part of our project comes with using data mining techniques such as Association rules for the recommendation of the course to the learner on the basis of the other student choice.

The E-learning system comes with huge and diverse data such as students/learners record, faculty records, study material in the form of e-book, journals, research paper. Course materials are stored in the form of pdf, audio-video forms. All these data have been stored in the form of encryption using the cryptographic techniques.

#### **Why Smart Education is the need of today's world?**

The Smart education based on online learning method accommodates everyone's need as learner can opt courses of their choice at any time and as per needs. Learner gets freedom to learn the skills which he thinks required for his growth.The IT revolution had led to the



remarkable changes in the traditional education system .learner doesnot have to depend on the school or institution for gaining knowledge. Digital revolution had bring the change in the education system which goes beyond the the traditional blackboard style teaching many working class people can opt courses of their choice and its need for their growth in job.Smart education had moved old traditional classroom based on black board to digital or virtual class room which offer more opportunity like lectures can be viewed or taken many times as per the learners need.The e-learning provides facility to update their content as per their needs and the changing technology easily .theseupdate can beviewed by the learner at any time . E learning provides a scope of quick delivery of the lectures and content through audio visual lectures or e book.elearning provides the facility to the learner to study the material as per their understanding level.elearning also saves times of the learner as they donot have to go institution to gain knowledge.On the onlinelearning platform they can quickly learn lesson through interactive audio-video lectures and these courses donot take much time as old traditional system takes.e learning provides platform to learn specific content without studying each and every content they can skip those contents or lectures which they already knows or are less relevant.elearning is a very fast way of learning new things which cannot be possible through old systematic ways.elearning is cost effective as compared to the traditional way of attending the school .e learning provides the opportunity to the educator to interact with the best mind of the world .it provides a platform to teach aswell as learn on the same platform itself.e learning ensures consistency as the same type of training and material is provided to the large audience.With the helps of data minning the faculty can know the learning behaviour of the student and can design the course module as per the need of the learner.Machine learning system will automatically analyze the performance of learner in the variouse quizzes or test and recommend the learner to opt particular course or material to strengthen that areas.

The learning among the learners can be improved by

- a. Adaptive learning Methods.
- b. use of informative and interactive audio- video lectures and e-books in the form of pdf .
- c. Daily assessment and evaluation and provide facility for discussions with teachers on the learning platform .

## **1.2 Problem Statement**

The problem statement represents the need to plan a system which provide informative and interactive learning modules,with the help audio-video lectures and different study material daily practice and comprehensive evaluation of students performance Also User can discuss his doubts and Problems with the faculty or the expert on the learning Platform .learner can also give feedback to the admin about the course and faculty. courses can be taken up by any user, at the time that suits them. This system will recommend course the learner can apply using data mining such as association rules and collaborative filtering.

### **1.3Scope and Objective**

Now a day's Education system is rapidly changing with the digital learning techniques. E-learning platform has evolved as one of the most widely used method for gaining education. E-learning gives its user/learner to learn from any place and at any time . It provides flexibility to the user to learn as per as his time and requirements.

In our project, we have developed the E-learning platform which is divided into two parts:--

- 1) The first part involves securing the learning material and the learners details using file encryption and decryption using cryptography techniques we have used triple des algorithm to secure file.
  
- 2) The Second parts comes with storing the huge study material data on the server and using data mining techniques for recommendation to the learner to apply for the courses.

## **1.4 Modules and their Description**

The e-learning platform system consist of 3 modules with their sub-modules:--

### **1. Admin:**

- a. **Login:** Admin need to login with the valid login credentials to access the system.
- b. **Approve Learners Registration:** Once a student is registered by himself or herself whereas Admin will approve their registration details. After approval, students can login with their login credentials. Admin generates and sends login id and password to the register student by sending email so, that user account gets more confidential.
- c. **Add/View Faculty:** Admin will add a new faculty with his/her details and create a login id and password.
- d. **Upload E-Book:** System allows admin to upload tutorials, e books, learning documents as study material of a chapter for student reference.

### **2. Student:**

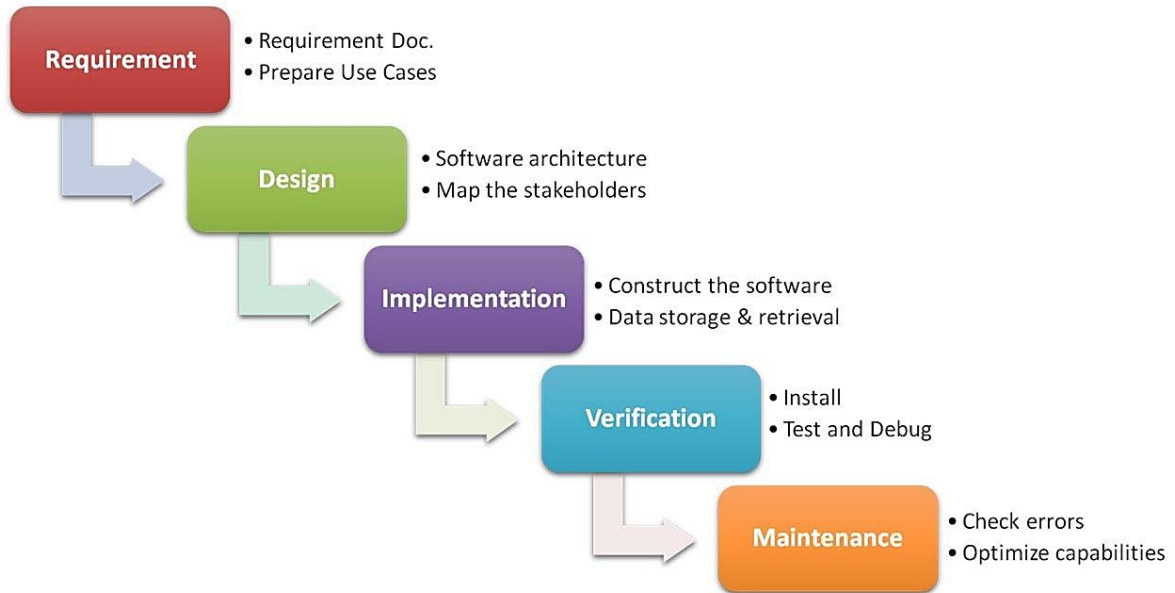
- a. **Registration:** Student need to register with their basic registration details in order to create their account.
- b. **Login:** Student need to login with the valid login credentials to access the system.
- c. **Study/Learn:** Students can download an E Book from the portal and starting learning.
- d. **Ask Query:** System allows student to ask queries to their faculty members and get the answer from them.
- e. **Receive Solution:** Students can view for their resolved queries by the faculty.

### **3. Faculty:**

- a. **Login:** Faculty need to login with the valid login credentials to access the system.
- b. **View Queries:** Faculty can view all the queries received from the registered students.
- c. **Answer Queries:** Can answer the query with a proper resolution.

## 1.5 Methodology

We are implementing our Project on the basis of water fall model also known as linear–sequential life cycle model. It is one of the simplest model to understand and use. In this model, each phase must be completed before moving to the next phase .there is no overlapping in this model.



**figure01:Waterfall model**

## **1.6 Report Overview**

The Project report follows the detailed analysis how the project work is completed. The Project report starts with introduction of the topic – “Smart and secure Education” which includes the following details such as an abstract, objectives of our project and the methodology followed in the development of the project which is followed by the Literature Survey on the topic.

The Literature survey of our project report includes the following:

- 1)Introduction to the data mining and data mining techniques.
- 2)Recommender system and its types.
- 3)Association rules studied.
- 4)Recommendation using KNN collaborative filtering studied for the project.
- 5)Securing data through Data encryption using Triple Des algorithm studied.

The report then follows up on the System Development and the system design of the project which includes ER diagram, use case diagram, dfd and activity diagram, algorithm and computational, Model development. The report ends with a conclusion which includes Future Scope, its advantage ,limitation and Applications.

## Chapter 02 Literature Survey

### 2.1 Introduction to Data Mining

Data Mining is used in educational field to enhance the efficiency of learning experience of the learner. it is most useful tools to track the performance of the learner on the online platform and predict the learning pattern and learning behaviour .it helps in recommending the learner according to the need of the user on basis of past data or records.It is the process of extracting the useful information by applying statistical and computational and mathematical modelling using AI and machine learning techniques.

These are the following Data Mining application are:

- Analysing and visualization of data
- Providing feedback to the learner and guide.
- Recommendation based on performance students
- Predicting student performance
- Detecting undesirable student behaviours
- Social network analysis
- Constructing courseware
- Planning and scheduling

#### **Effectiveness of Data Mining Approaches to E-Learning System**

##### **A. Predictive Apriori Association Rule**

**Apriori** is an efficient algorithm for frequent instructionor and object set mining and association rule learning over transactionala databases. It proceeds by finding the most occurred unique items in the database and extendingg them to larger and largerritem sets as long as those item sets sappear sufficiently often in the ddatabase. The frequent item sets determined by Apriori can be used toedetermine aassociationn rules whichhhighlight general trends in the databasee.

##### **B.Fuzzy Logic and Artificial Neural Network**

Fuzzy logic is an important tools used widely in the e learning system it uses fuzzy logic methods for the learner evaluation.It can be used to determine the interaction level between the learner and the whole system. It provides very efficient solution to the complex problem .It reuire less data for predicting the output.

##### **C. Clustering**

clustering technique is used to find the common groups or the objects from the huge volume of the data sets This technique will be helpful in gathering the common contents,students understanding level as well as to track the student behaviour that's why it ia an important technique to use in the educational sysem. The clustering algorithms are as following:

1)K-means Clustering

- 2) Hierarchical Based Clustering
- 3) Centroid Clustering
- 4) Distributed Clustering
- 5) Density Based Clustering

### **Data Mining Techniques are as follows-**

1. Classification: the classification method of data mining technique is used to predict the different class of the data. It is an important tool to know the important and relevant information.
2. Clustering: clustering method is used to identify the similar group of data. It helps in grouping similar data together in such a way that data showing similar properties are grouped together against the data showing different
3. Regression: It is the data mining method for identifying and estimating the relationship among the variables. It is used to identify the function which will show the minimum error for estimating the likelihood of a specific variable.
4. Outlier detection: It is also known as Anomaly detection. This method is used to detect the unusual data record and unexpected pattern or behaviour which require further analysis and study.
5. Sequential Patterns: Sequential Pattern technique helps to identify or find similar or expected data/variables trends for given period.
6. Prediction: Prediction technique is used to predict the pattern and result on the basis of studying and analysing past behaviour or data
7. Association Rules: Association techniques of data mining help to search for the association between two or more variables. It helps to find the unknown pattern in the data or the variables.



## 2.2 Association Rules For course Prediction

It involves the study of the customer transactions database in order to discover any relation between his different purchases till now. This rule shows attribute value that are more likely to occur together in a given data set. It provides information in the form of “IF-THEN” statements. Association techniques of data mining helps to search for the association between two or more variables. It helps to find the unknown pattern in the data or the variables.

**For example**, if you want to find out which products customers in Delhi are likely to purchase course together; Within Customer-state(“Delhi”):  
 Product-ProductName (“java”) => Product-ProductName (“python”)  
 i.e. Customers in Delhi, who buy java course, are also likely to buy Python course.

### Association Rules for Recommendations

User_id	Item_set
1.	{ C , C++ }
2.	{ C , PYTHON , PHP , ML }
3.	{ C++ , PYTHON , PHP , JAVA }
4.	{ C , C ++ , PYTHON , PHP }
5.	{ PYTHON , C , C++ , JAVA }

**Table 1:-Course database**

Here we apply Association rule to check that the learner who opt c++ , and python opt PHP or not.

An implication expression of the form  $X \rightarrow Y$ , where X and Y are item-sets

**Example:**

{C++, Python}  $\rightarrow$  {Php}

## Rule Evaluation Metrics

### 1.Support (s)

Supports calculate what Fraction of transactions that occurred contains both the item sets X and Y item.

### 2.Confidence (c)

Confidence calculates how frequently an items in Y appear in the transactions that contain the item sets X.

### From Table 1:-----

{C++, Python} → {Php}

$$S = (C++, Python, Php) / |T| = 2/5 = 0.4$$

$$C = (C++, Python, Php) / (C++, Python) = 2/3 = 0.67$$

1) A **support** of 40% for Association rule means that 40% of the customer are frequently choosing {**C++,Python & php** } together (support indicates how frequently item appears in the database).

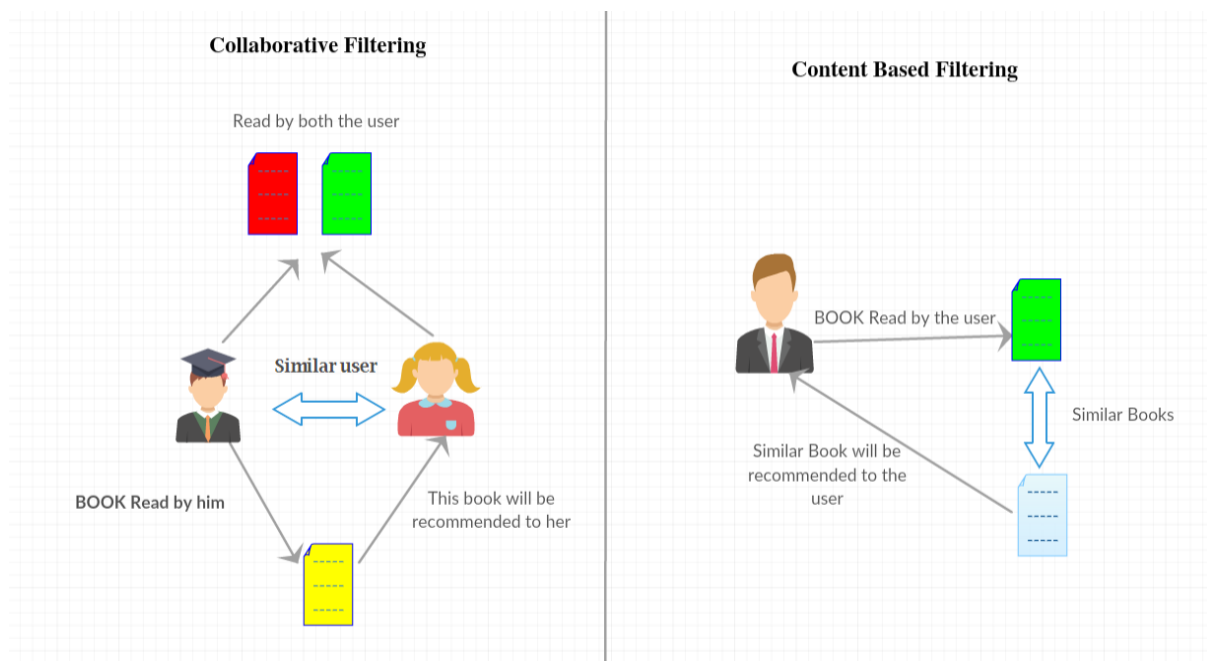
2) And 67% of **confidence** means 67% of all the learner who opt {**c++ ,python**} also opt { **php** } .

## 2.3 Course Recommendation System :

Recommenders system are one of the important application of the machine learning which is widely successful and popular among the users, businesses and academicians. Recommendation system have become an important part of the our lives and affects our browsing and searches on the internet. Recommenders system helps the user /customer to find the right product on the basis of his previous search and transaction history..Most of the e-commerce searches and products are supported by the recommender system. It is used in various field such as YouTube, Netflix for music and movie recommender, flipkart, Amazon for product recommendation and in the field of social media for content recommender such as facebook, quora and twitter etc.

In recent year recommender system have been widely used in the field of education. It has developed rapidly and became popular among the academicians and students. Few examples of recommender system in the field of education are as follows:

- 1) Offering students and learner course suggestion about what the courses they should apply for on the basis of user profiles database and similar users interest using collaborative filtering.
- 2) Recommending News articles for online news paper reader on the basis of reader interest and the news articles they reads in the past using content based filtering.
- 3) Suggesting books and articles to the learner and students base on student purchase and search history of the learner.



Recommendation system Can be broadly classified into two groups which are as :

- 1) Content based filtering: Analyse the important characteristics of an items for recommending other items with similar characteristics and contents. for example- If a user reads many sports articles and news, the recommender system will recommends other news and articles similar to the learners interest i.e news related to sports will be recommended.
- 2) Collaborative Filtering approach: recommends items using the preference given by the other users of the same system. it recommends items to a user from users past behaviour and similar decision made by other similar user. For example If User A and User B are similar i.e their interest is same and they both opt python course on online platform and if user B apply for java course on the same system then the recommender system will recommend user A to apply for java course.

## 2.4 Recommendation Based on K-NN Collaborative Filtering Algorithm

### 2.4.1 K-NN Algorithm

KNN algorithm is also known as K-Nearest Neighbour classification algorithm. The main aim of the KNN algorithm is to find: the majority of the K-most similar object belong to the same category . In pattern recognition, the k-nearest neighbors algorithm (k-NN) is a non-parametric method used for classification and regression. In both cases, the input consists of the k closest training examples in the feature space. The output depends on whether k-NN is used for classification or regression: In k-NN classification, the output is a class membership. An object is classified by a plurality vote of its neighbors, with the object being assigned to the class most common among its k nearest neighbors (k is a positive integer, typically small). If  $k = 1$ , then the object is simply assigned to the class of that single nearest neighbor. In k-NN regression, the output is the property value for the object. This value is the average of the values of k nearest neighbors. k-NN is a type of instance-based learning, or lazy learning, where the function is only approximated locally and all computation is deferred until classification. The k-NN algorithm is among the simplest of all machine learning algorithms. Both for classification and regression, a useful technique can be used to assign weight to the contributions of the neighbors, so that the nearer neighbors contribute more to the average than the more distant ones. For example, a common weighting scheme consists in giving each neighbor a weight of  $1/d$ , where d is the distance to the neighbour. The neighbors are taken from a set of objects for which the class (for k-NN classification) or the object property value (for k-NN regression) is known. This can be thought of as the training set for the algorithm, though no explicit training step is required.

As explained in the given figure the majority of the w's nearest belong to the category x, this explain that w belong to the x category.

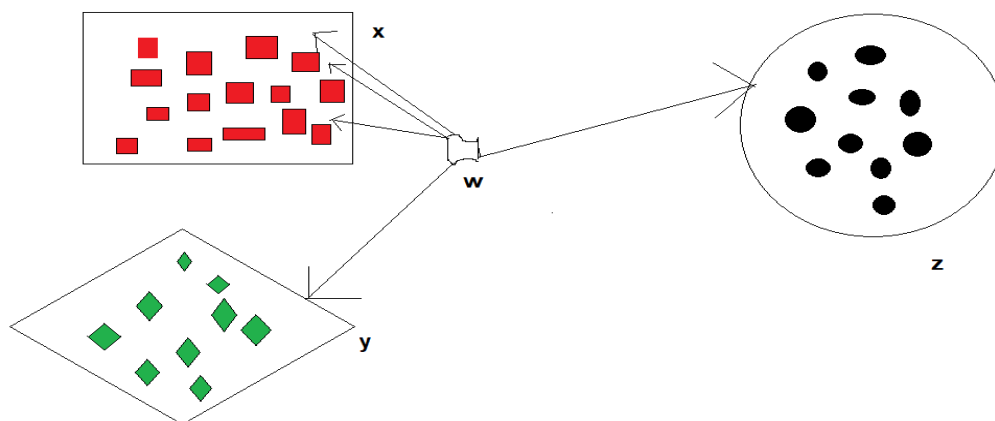


Fig2.KNN Algorithm example

### 2.4.2 Collaborative filtering algorithm:-

Collaborative filtering is one of the important approach which is widely used for designing the recommendation system. Collaborative filtering is based on our assumption that for similar user/customer the recommender system will recommend item chosen by similar groups. The framework creates proposals utilizing just data about rating profiles for various clients or things. By finding peer clients/things with a rating history like the present client or thing, they create suggestions utilizing this area. The client and thing based closest neighbor calculations can be joined to manage the virus begin issue and improve proposal results utilizing this information. Collective separating techniques are named memory-based and model-based. A notable case of memory-based methodologies is the client based calculation, while that of model-based methodologies is the Kernel-Mapping Recommender. A key favorable position of the collective sifting approach is that it doesn't depend on machine analyzable substance and consequently it is able to do precisely suggesting complex things, for example, motion pictures without requiring an "understanding" of the thing itself. Numerous calculations have been utilized in estimating client comparability or thing similitude in recommender frameworks.

For example, the k-nearest neighbor (k-NN) approach and the other approach is Pearson Correlation i.e user similarity approach.

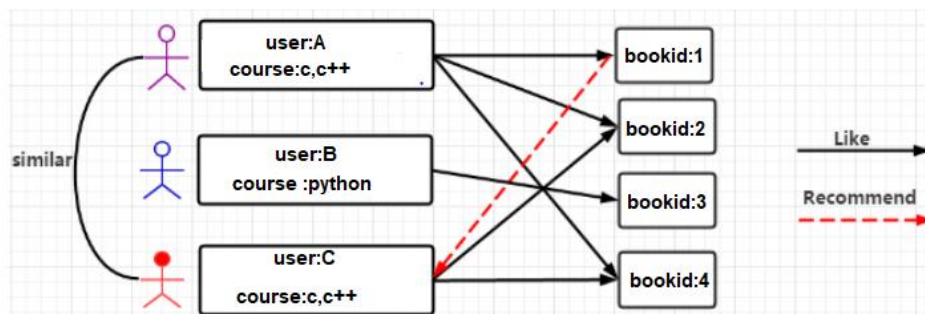


figure 3:collaborative user filtering

This diagram explains that user A read the book\_id1, book\_id2, book\_id4, and user C read the book\_id2, and book\_id4. So we can conclude that that the preference of books of user A and user C are very much Similar. Since user A read the book\_id1,so we can say that user C may also read the book\_id1. Hence the system will recommend book\_id1 to the User C.

The main focus of this algorithm is based on computing the previous records of the use . we calculate neighbour user as U' who have the similar interest with the given target user U, and then it will recommend the items which the neighbour user U' liked to the target user U.

This algorithm includes the following 3 basic steps which are as follows:-

- 1) User's similarity calculation.
- 2) Selection of Nearest Neighbor
- 3) Prediction Calculation

### 1) Calculating the user's similarity:-

The similarity between different users is calculated by calculating the value of the different items which are evaluated by the user. Each of the user uses N-dimension vector to present the item score. Let us take an example for calculating the similarity score of user U1 and the user U3, first we have to find out the set of books that they all scored as {B1,B2,B4,B5} and the relative score of these books. The score vector of the user U1 will be {2,3,4,1} and the score vector of the user U3 will be {3,4,5,2}.

U\B	B1	B2	B3	B4	B5
U1	2	3	3	4	1
U2	3	2	4		
U3	3	4		5	2
U4	2		2		

Table2: Calculating users similarity

The similarity of the user U1 and the user U3 is calculated using the similarity formula. The similarity between the user U and U' is represented by  $\text{sim}(U,U')$ , the most common methods which are used for calculating the similarity are cosine similarity and person correlation similarity.

### a) Cosine similarity calculation method:-

$$\text{sim}(x, y') = \cos(\vec{X}, \vec{Y}) = \frac{\vec{X} \cdot \vec{Y}}{|\vec{X}| * |\vec{Y}|} = \frac{\sum_{s \in s_{xy}} r_{x,s} r_{y,s}}{\sqrt{\sum_{s \in s_{xy}} (r_{x,s})^2} \sqrt{\sum_{s \in s_{xy}} (r_{y,s})^2}} \quad (1)$$

Among them,  $r_{x,s}$  and  $r_{y,s}$  are the score of goods  $s$  scored by user  $X$  and  $Y$  respectively.  $s_{xy}$  is the set of movies that user  $x$  and user  $y$  both scored on. In other words,  $s_{xy} = \{s \in \text{Items} | r_{x,s} \neq \varepsilon \cap r_{y,s} \neq \varepsilon\}$

This method computes the similarity between the two users by computing the cosine of angles between the two given vectors.

### b) Person Correlation similarity method:-

It is a measurement of the linear relationship between the given variables.

$$sim(x, y') = \frac{\sum_{s \in S_{xy}} (r_{x,s} - \bar{r}_x)(r_{y,s} - \bar{r}_y)}{\sqrt{\sum_{s \in S_{xy}} (r_{x,s} - \bar{r}_x)^2} \sqrt{\sum_{s \in S_{xy}} (r_{y,s} - \bar{r}_y)^2}} \quad (2)$$

Among them,  $\bar{r}_x$  is the average score is x[3], the rest of the symbolic meaning is the same as formula(1).

## **2) Selection of KNN nearest neighbour:--**

After the calculation of the similarity score using the above formula as  $sim(U, U')$  between the given set of users ,then the algorithm will select the number of users having the highest similarity as U's neighbour represented by U'.

## **3) Prediction Score Calculation:--**

After finding the user's neighbour ,the score of each item will be predicted according to the score of the neighbour to the item.

The formula for Calculating the Prediction score is as follows:-

$$r_{u,i} = \bar{r}_u + k \sum_{u' \in U} sim(u, u') * (r_{u',i} - \bar{r}_{u'}) \quad (3)$$

$$(k = 1 / \sum |sim(u, u')|)$$



## Mathematical computation--

user	Similarity score	C course(score)	Similarity*C	Python course (score)	Similarity*Python
A	0.99	3	2.97	2.5	2.48
B	0.89	4.5	4.02	-	-
C	0.92	3	2.77	3.0	2.77
D	0.62	3	1.99	3.0	1.99

Total score=	11.75	7.24
Similarity sum=	3.46	2.57
Total/sim*sum=	3.39	2.81

Table:03 Mathematical computation

The above process can be summed up for calculating the prediction score of user  $u$  from the course  $i$  as follows:-

Step1:-First we will generate the user item a two dimensional matrix where we will assign each score as  $r(u, i)$ .

Step 2:-Using the person correlation similarity and cosine similarity between every two users as  $\text{sim}(u, u')$  and we will create the user similarity matrix

Step 3:- After computing the step 2 , we will find  $K$  number of score which has the maximum weight ,that  $K$  user will be the neighbour of  $U$ .

Step4:-Using the formula in eqn 3, we will calculate the predictive value.

In this way, KNN collaborative filtering algorithm based on user is used to compute the recommendation of the course to the user.

## 2.5 Securing data and learners information using cryptography:

Cryptography is one of the important characteristics handling the network security. Crypto stands for hidden or secrets. Cryptography is the practice or study of secure communication to hide information and data from the third party. Cryptography is mainly classified into 3 types these are asymmetric cryptography, symmetric cryptography and hasing.

- 1) Symmetric cryptography:--In symmetric cryptography we use one secret key with the encryption and decryption algorithms to secure the information/data of the communication from the third party. It is faster than asymmetric cryptography but there is distribution problems of the key as you have to transfer the key from the senders to the target receiver through the secure channel.

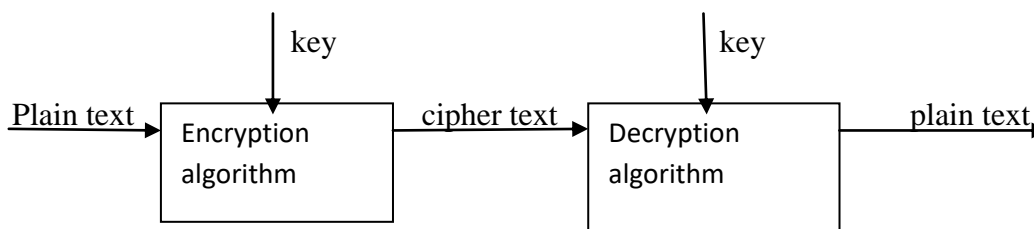


Figure4:symmetric cryptography

- 2)Asymmetric Key cryptography:-- Asymmetric key cryptography is also known as public key cryptography because it also involves the use of the public key and private key along with it. There is no problem of key distribution between the both stakeholder involves in the communication. It is very slow when we compare it with the symmetric key cryptography.

a) Public key- Public key can be known by anybody and it can also be used to encrypt the given lain text or message.

b) Private key- Private key is known to the targeted receiver who can use it to decrypt the cipher text.

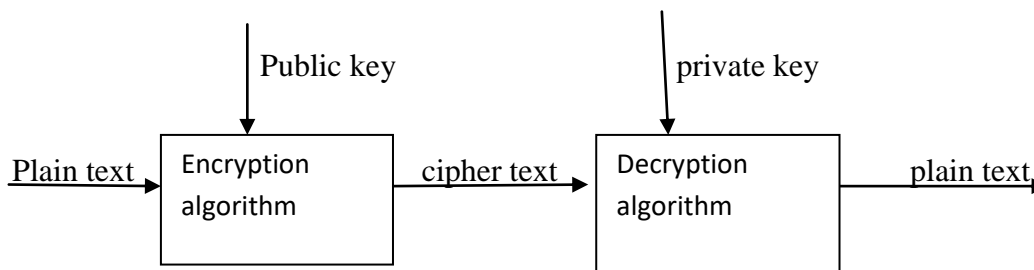


Figure5:asymmetric cryptography

3) Hashing-In hashing the plain text is converted into a hash value of the fixed size by using the hash function . Hashing process ensures integrity of the data and information as both the sender's and receiver's side hash Value is matched and if the value is same then the message is unaltered.

### **2.5.1Data Encryption Standard (DES):**

General structure of the DES algorithm are given as follows:-

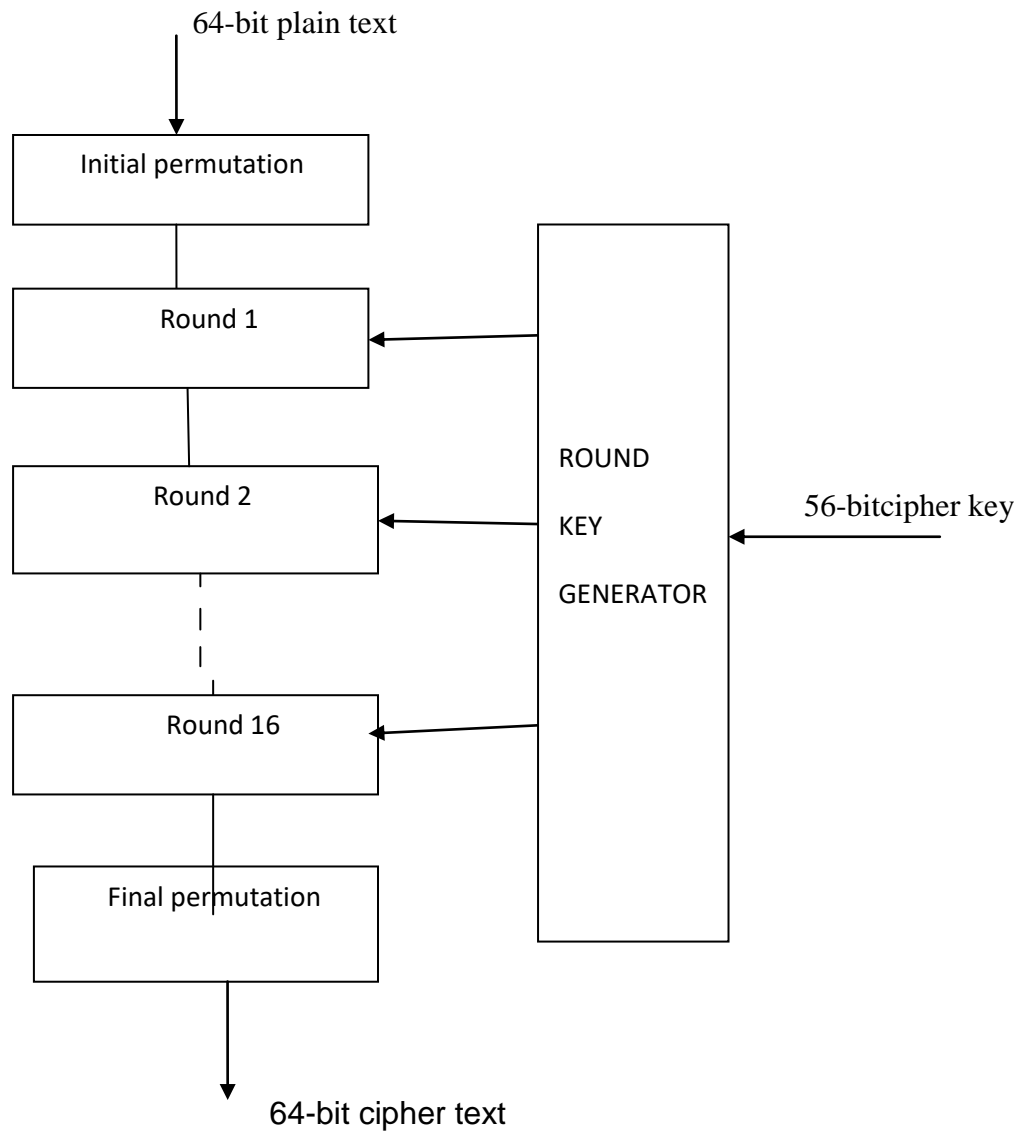


figure 6: DES Structure

The main problem of this DES technique is that if any third person knows the key then the full data and information is compromised. The 3DES (Data encrypted structure ) is 64 bits of the block size and it uses particular key to protect the content and the decryption process can be only performed on those content with the help of those keys only. It cannot be decrypted by other means but only by those keys which were used to encrypt the content.

The key is 64bits of block sizes but only 56 bits of those are used for the purpose of algorithm. In DES 8<sup>th</sup> bits of the particular key is discarded and all those bits at the position of 8<sup>th</sup> multiples such as 8,16,24,32,48,56,64 are removed .It was developed by the IBM in the early 1970s .this algorithm is supposed to be secure using the technique of triple DES.



figure 7:DES

### 2.5.2 Triple DES :

Triple DES or 3-DES is referred as the triple data encryption algorithm(TDEA) is a symmetric key block cipher which uses the cipher algorithm 3 times first it encrypt the data block using the key K1, then decrypt the data block using key k2, and again encrypt it using key k3. The previous des cipher key which was of 56 bits size was sufficient but to brute force attack feasibility increasing of computational power now , it was not secure anymore. Triple DES algorithm simply increases the key size to protect it against any such attack without designing a new block cipher algorithm. Triple DES algorithm uses three keys such as K1, K2, K3.

Encryption algorithm of triple DES is:  $C = Ek_3(Dk_2(Ek_1(\text{plain message/text})))$  ;  
where c= cipher text

The Decryption algorithm is the reverse of the encryption algorithm:  
 $P = Dk_1(Ek_2(Dk_3(C)))$  ; where P= plain text, C=cipher text

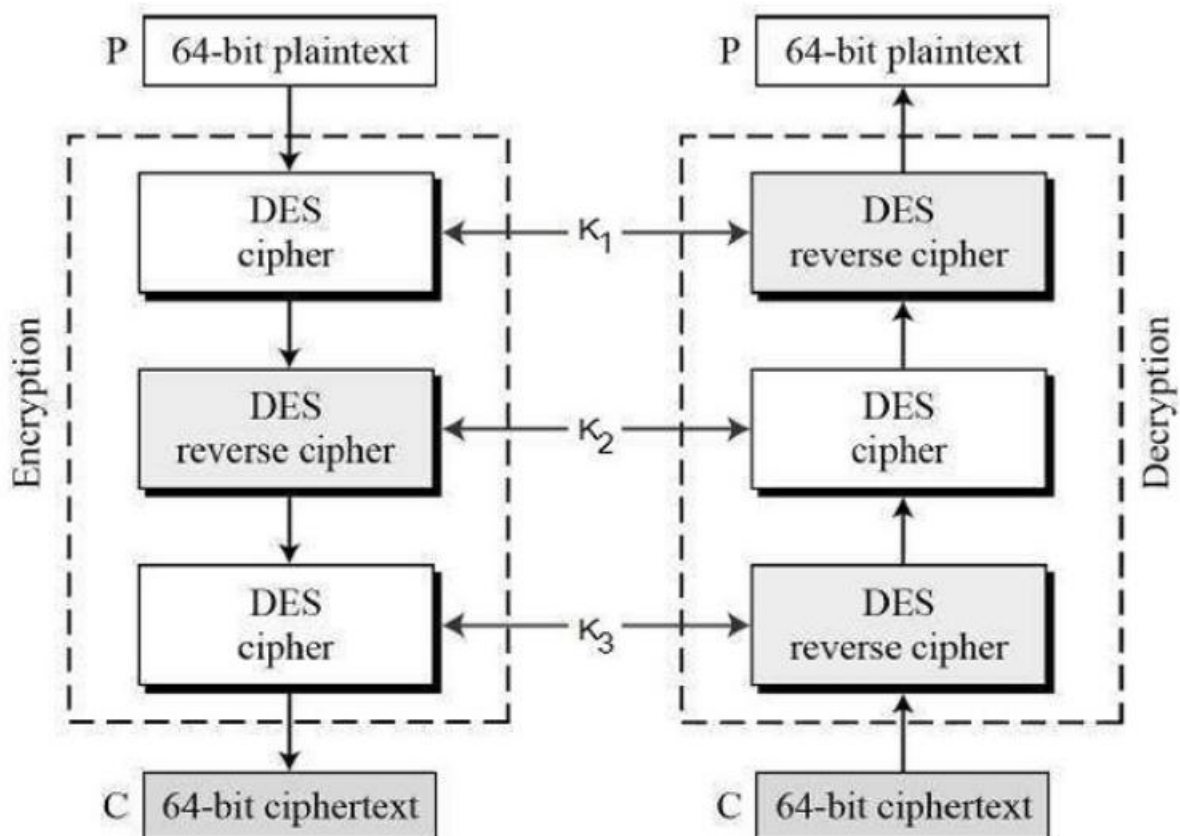


Figure 8:Triple DES

In triple data encryption algorithm , senders have to first generate the keys and distribute three DES keys such as K1,K2,K3.This implies that the actual length of 3 TDES keys will be of the length  $3*56=168$  bits which makes it more secure than the single DES and hard to be attacked by brute force method.

### Triple DES (3 DES) Implementation:

- i) block cipher with the use of the symmetric key.
- ii) Block length is 64bits.
- iii) key length is 56bits and 112 or 168bits.

3DES is created using the DES algorithm it was invented in the period of 1970's using the 56 bits. Triple DES runs algorithm slower than the DES because it runs three times, But triple DES algorithm is much secure and effective in case of the brute force attack than the DES algorithm if it is used properly. The decryption process is same as the encryption process only difference between them is that decryption process is reverse of encryption. The key size in the triple des provides extra security features through the encryption algorithm .Each of the block contains 64 bits of data/information.

There are three option for Keys in the data encryption algorithm are as follows:-

- i) All keys can be independent.
- ii) Only 2 keys i.e Key1 and key2 can be independent.
- iii) All the three keys may be identical.

### Key Generation Procedure

1. Select any two different large random prime number P, Q such that  $P \neq Q$ .
2. Compute  $n = P * Q$
3. Calculate:  $\phi(n) = (p-1)(q-1)$
4. Select an integer e such that  $1 < e < \phi(n)$
5. Calculate D to satisfy the congruence relation  $d * e = 1 \pmod{\phi(n)}$ ; d is kept as private key exponent.
6. The Public Key are (n, e) and the private key is (n, d)

### ENCRYPTION

Plain text: P < n.

Cipher text :  $C = P^e \pmod n$ .

### DECRYPTION

Cipher text : C

Plain text :  $P = C^d \pmod n$

## Chapter 3: System Development

### **3.1 Existing System of E-learning:**

#### **Problem with current scenario**

- ii. Traditionally, student have to visit college library to receive a book of their choice to study.
- iii. Student may also buy the book by visiting a local bookstore, which may also cost them.
- iv. It may consume more time and efforts to get a desired book for learning.
- v. Current system is not user friendly.
- vi. Data is not stored in encryption form so that this system is not secure.

#### **Drawbacks of the existing system**

- i. Maintenance of the system is very difficult.
- ii. There is a possibility for getting inaccurate results.
- iii. User friendliness is very less.
- iv. It consumes more time for processing the task.

### **3.2 PROPOSED SYSTEM of E-learning**

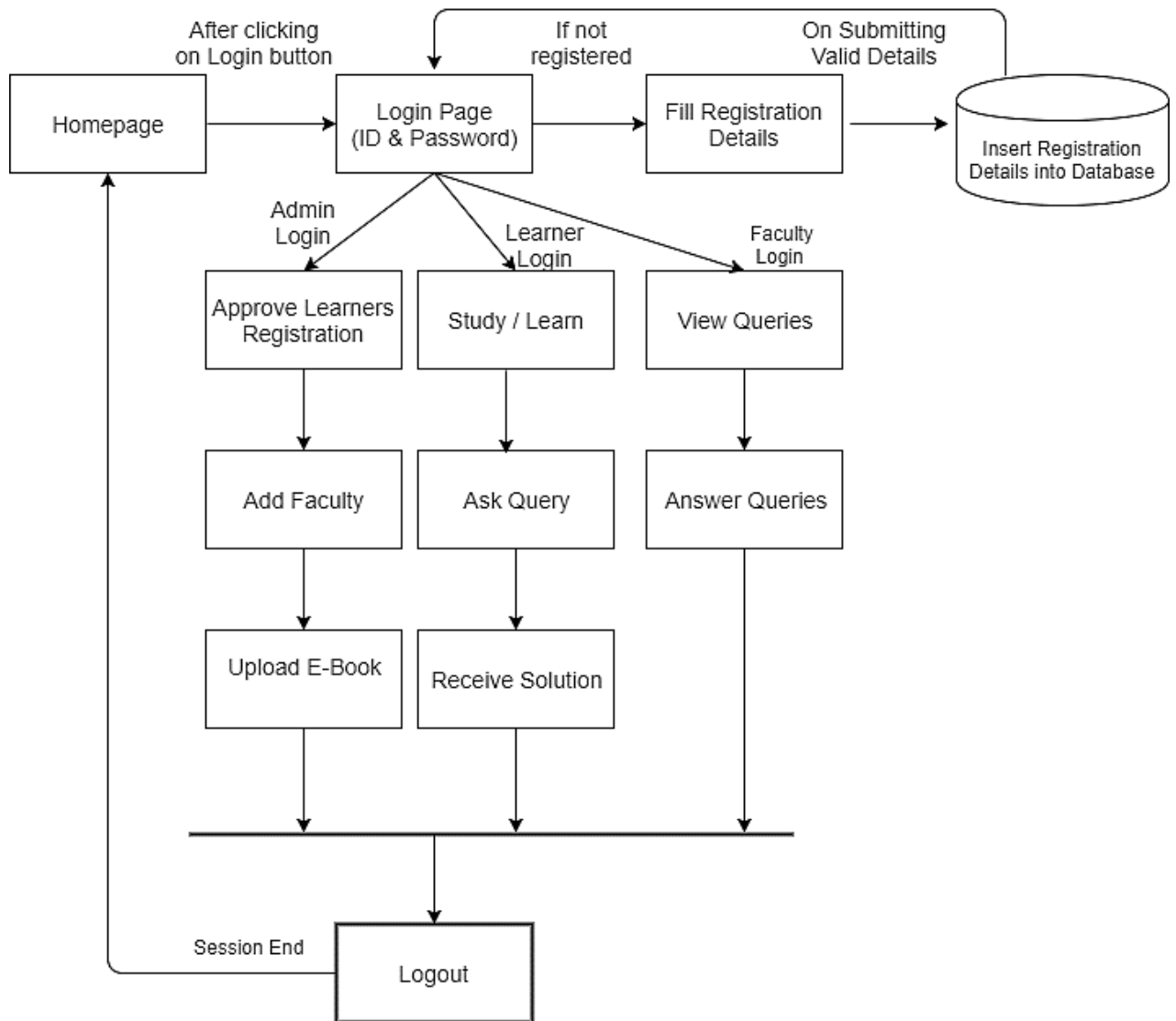
Digital revolution had bring the change in the education system which goes beyond the the traditional blackboard style teaching many working class people can opt courses of their choice and its need for their growth in job. Smart education had moved old traditional classroom based on black board to digital or virtual class room which offer more opportunity like lectures can be viewed or taken many times as per the learners need. The e-learning provides facility to update their content as per their needs and the changing technology easily .these update can be viewed by the learner at any time . E learning provides a scope of quick delivery of the lectures and content through audio visual lectures or e book. elearning provides the facility to the learner to study the material as per their understanding level.

The Smart education based on online learning method accommodates everyone's need as learner can opt courses of their choice at any time and as per needs. E-learning gives its user/learner to learn from any place and at any time .It provides flexibility to the user to learn as per as his time and requirements. In our project, we have developed the E-learning platform which is divided into two parts; The first part involves securing the learning material and the learners details using file encryption and decryption using cryptography techniques we have used triple des algorithm to secure file. The Second parts comes with storing the huge study material data on the server and using data mining techniques for recommendation to the learner to apply for the courses.

- i. The web application is developed using Notepad++ with Php as a programming language.
- ii. This system is accessed by three entities namely, Admin, Student and Faculty.
- iii. Admin can perform task such as add faculty, approve learners registration and upload learning documents as study material.
- iv. Student can access the system to download the study material from the learning portal and start learning.
- v. Student can raise their doubts or query using this system and get the query resolved from the managing faculty.
- vi. Faculty can login into their portal using valid login id and password and view queries from the registered students.
- vii. Faculty can answer students query by providing a proper resolution.
- viii. Proposed system is very simple and user-friendly.



### 3.3 System Architecture of online learning platform:



**Fig9: System Architecture**

### **3.4 Project Implementation Tools and Technology used:**

#### **1. Hardware Requirement :**

- I. i3Processor Based Computer/laptop or higher
- II. Memory Requirement: 1 GB RAM
- III. Hard Drive: 50GB
- IV. Monitor
- V. Internet Connection

#### **2. Software Requirement :**

- I. Windows7 or higher is required
- II. xampp or wampp Server is used
- III. Notepad++
- IV. MySQL 5.6
- V. Google Chrome/Mozilla firefox or other browser

### **3.4.1 OVERVIEW OF Tools and TECHNOLOGIES USED**

#### **1.PHP**

PHP was started as a very small open source project in 1994 by Rasmus Lerdof which evolved and became popular as many people find it very useful with the passage of the time; it became one of the popular programming language for the web development purpose.

1. PHP stands for “Hyper Text Preprocessor”.
2. It is Server side Scripting language which is embedded in the HTML. It is very useful in managing the dynamic contents of the system, databases, it can also be used to build a complete e-commerce sites.
3. It can be integrated/connected with many popular databases available in the market such as MYSQL, Oracle, and Microsoft SQL server.
4. PHP also supports a very huge number of different protocols.
5. The syntax of PHP is similar to C.

**Common uses of PHP:**

1. PHP helps to handles different forms for example – it helps in gathering data from the files ,save data to the files , as well as through email you can send data ,return the data to the user .
2. PHP allows you to add, modify, update or delete elements within your database.
3. PHP allows you to access cookies variables and you can also set cookies.
4. With the help of PHP, you can deny user to access some of the content of your website.
5. PHP can help you to encrypt the data.

Five important characteristics of the PHP that makes its popular among the people are-

1. Simplicity
2. Efficiency
3. Security
4. Flexibility
5. Familiarity

**2.HTML**

HTML is the standard markup language for creating Web pages.

- i. HTML stands for Hyper Text Markup Language
- ii. HTML describes the structure of Web pages using markup
- iii. HTML elements are the building blocks of HTML pages
- iv. HTML elements are represented by tags
- v. HTML tags label pieces of content such as "heading", "paragraph", "table", and so on
- vi. Browsers do not display the HTML tags, but use them to render the content of the page

**3.SQL**

SQL language stands for the structured query language.SQL is one of the standard language used to extract important information from the database as well as altering and modifying the information in the datbase.SQL language was discovered way back in 70's period by the giant company known as IBM(International Business machine) and originally it was known as SEQUEL which stands for structured English query language. It is one of the popular and widely used query language for the purpose of the database management. It runs on all the computers such as personal computer, minicomputer, mainframe computer etc.

SQL supports the database which are spread over a large number of computers network. It helps in carrying out the transaction between the server and the client .SQL have the capacity to handle a large number of request of the different user simultaneously.

Users are allowed to perform activities on the website such as registering information into the database as well as to update the details on the database.

SQL perform its works in the background and it handles large and numerous data/information which the user is not able to see on the webpage.

SQL commands are categorized basically into 4 main categories on the basis of their functionality:-

- 1) Data definition language(DDL) :- This command is used for the purpose of creating new table in the database and altering the table as well as dropping the structure of the object in the database.

Examples of the commands are as follows:- CREATE, RENAME, TRUNCATE, ALTER, DROP etc.

```
--
-- Table structure for table `admin`
--
CREATE TABLE `admin` (
  `username` varchar(100) NOT NULL,
  `password` varchar(100) NOT NULL
) ENGINE=MyISAM DEFAULT CHARSET=latin1;
```

- 2) Data Manipulation Language(DML):- Data manipulation language consist of all those SQL commands which can be used for storing the data, modifying the data in the database, and deleting the data in the database

Examples of DML type SQL commands are as follows:-- SELECT, DELETE, UPDATE, INSERT,

```
INSERT INTO `admin` (`username`, `password`) VALUES
('admin', 'admin');
```

- 3) Transaction control Language(TCL):--Transaction control language consist of all those SQL commands which are used for the handling of the changes that will affect the data in the given database

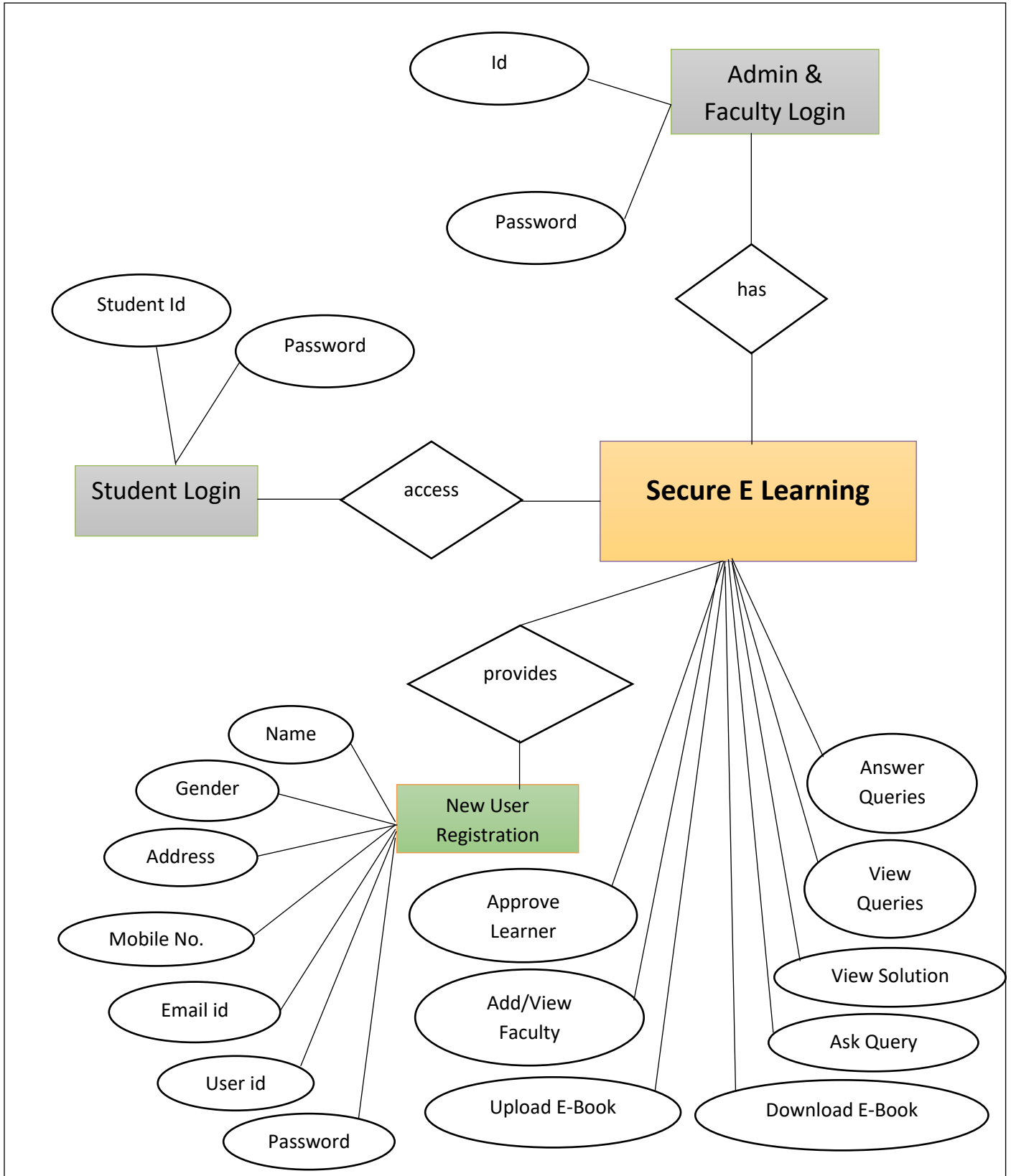
Examples of the TCL commands are as follows:-- COMMIT, SAVEPOINT, ROLLBACK , etc

- 4) Data Control Language(DCL):-- Data control transaction language consist of all those SQL commands which helps to provide security purpose for the data or objects in the database.

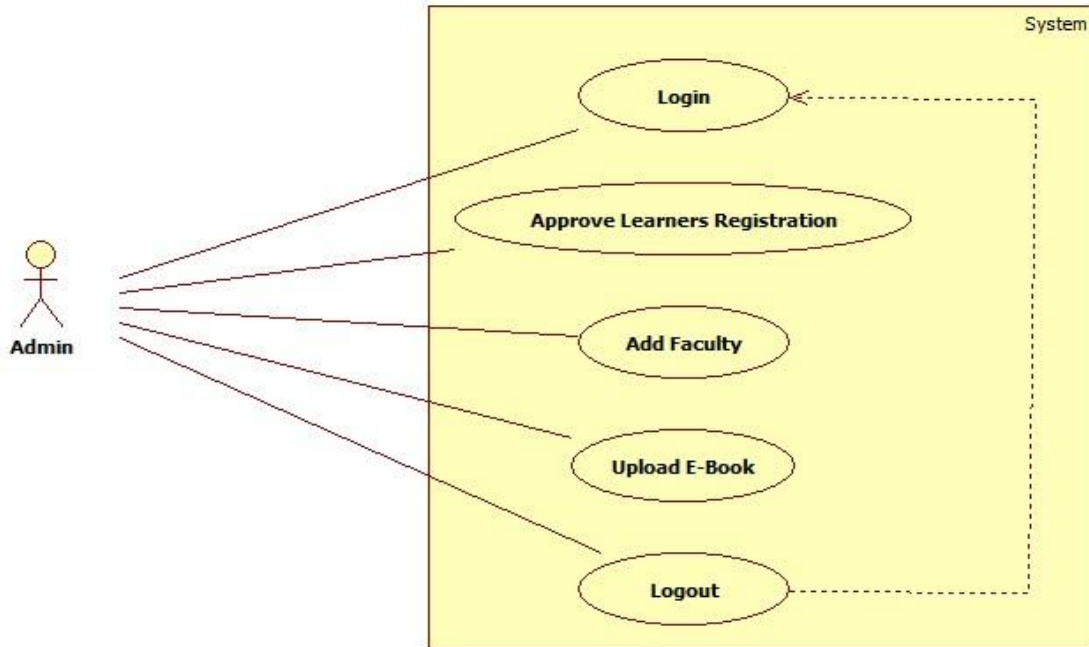
Examples of DCL commands are as follows:-- GRANT, REVOKE etc

### 3.5 System Design

3.5.1 E-R Diagram:- An entity relationship diagram (ERD) shows the different relationship between the different types of the entity sets which are stored in the database.fig.10:

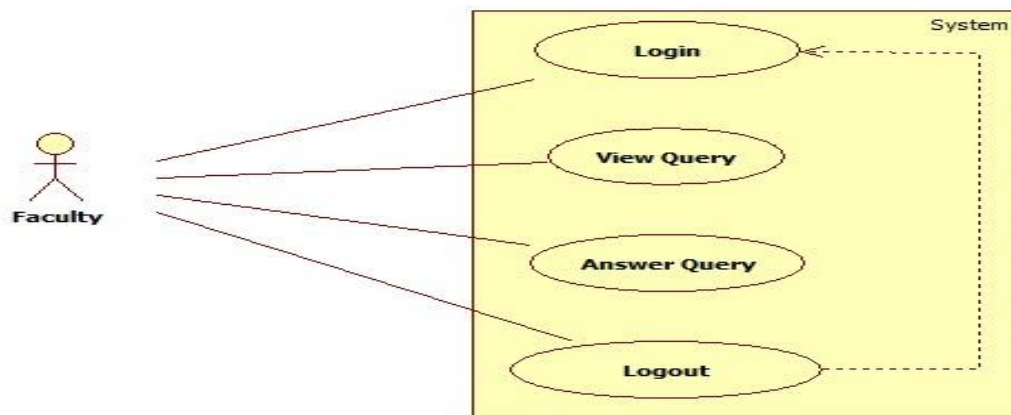


**3.5.2 Use Case Diagram:-** The Use Case Diagrams is the simple representation of the user's interaction the the given system. ( for example how the student will interact with the e-learning platform and its relation with the different use case which are involved in the e-learning platform . )

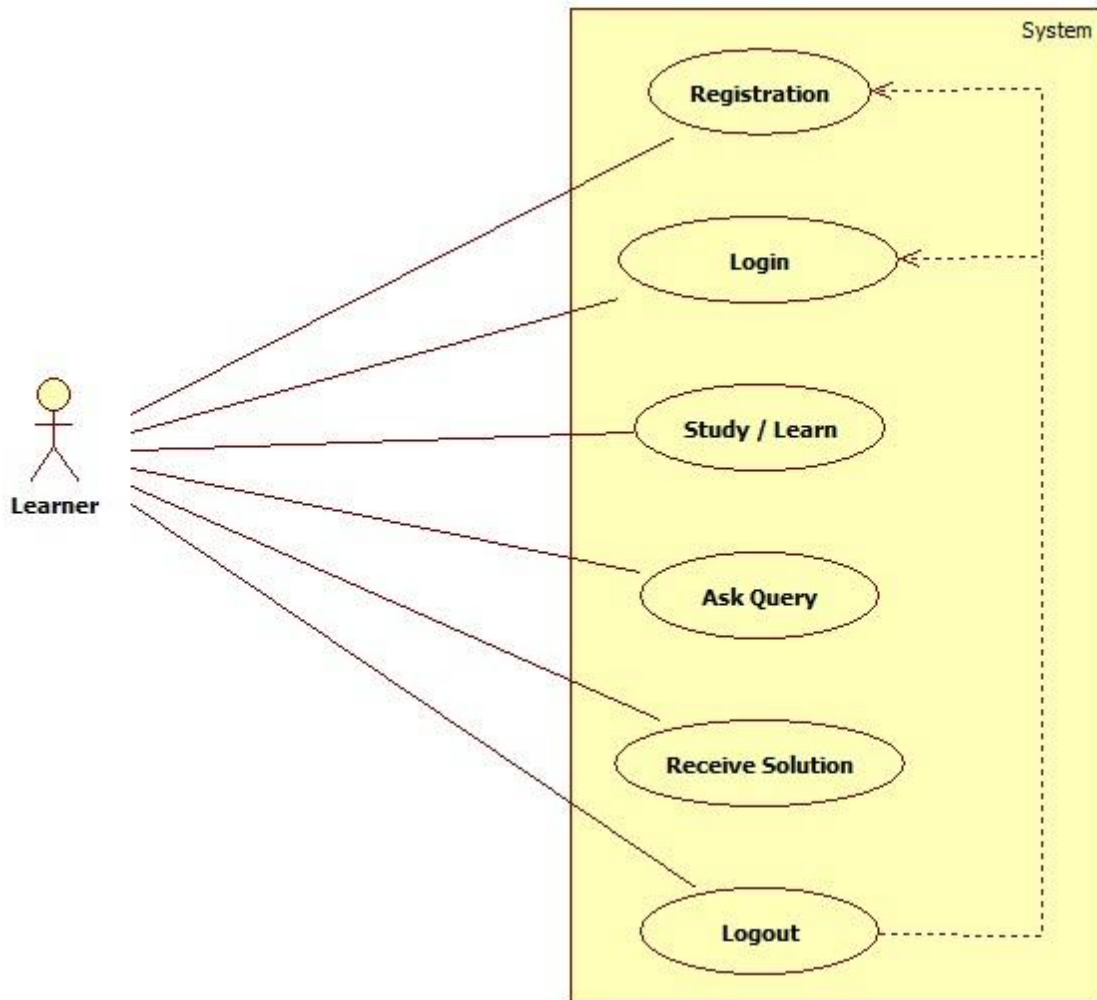


**Fig11. UseCase Diagram of the Admin**

This use case diagram of the admin shows the relationship between the admin and the different use case involved also it shows the interaction of the admin with the system .Here admin can login ,upload study material , add faculty and also upload study material on the system.



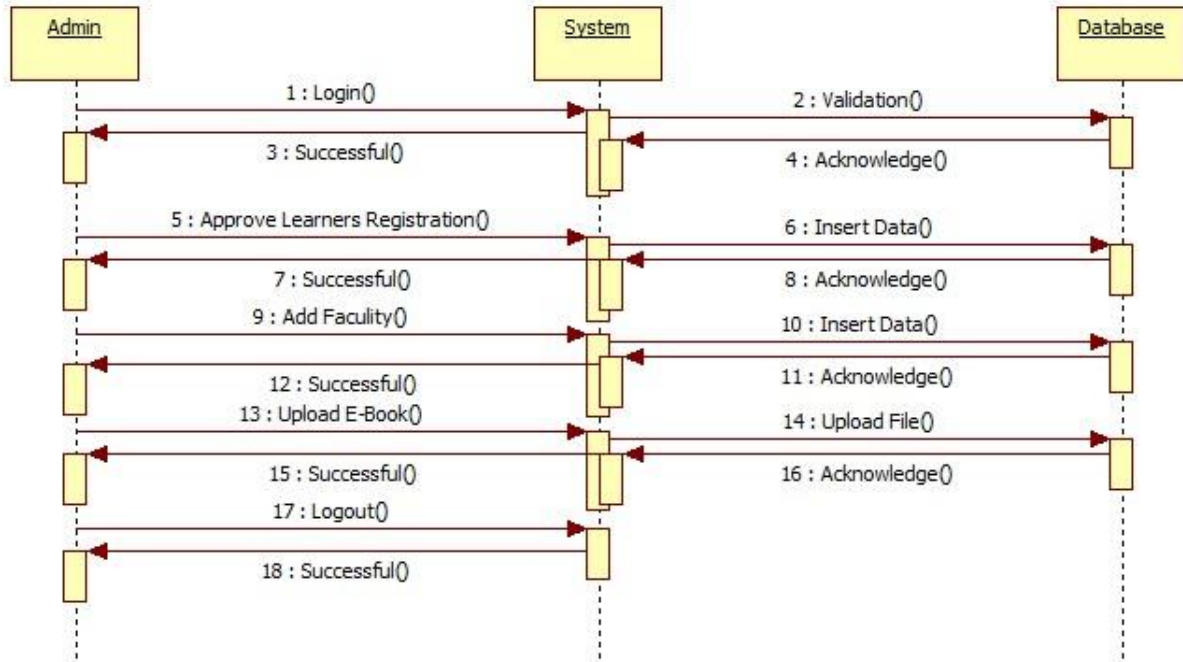
**Fig11.1. UseCase Diagram of the Faculty**



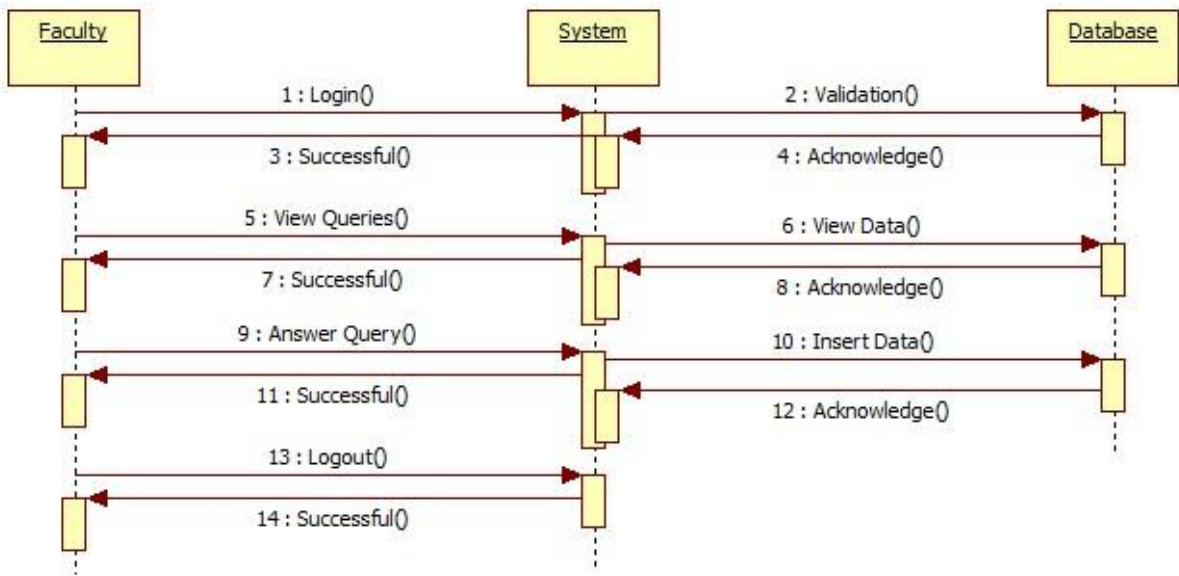
**Fig11.2. UseCase Diagram of the Learner/Student**

This is the Use case diagram of the student/learner which shows the interaction of the learner/student with the system. Here student have to do registration on the system then he can login .student can study the course material on the system as well he can ask the query , receive the solutions from the faculty.

**3.5.3 Sequence Diagram:-** The Sequence Diagram is often known as Event diagram or also called as the event Scenarios. It depicts the different object interaction arranged in the different time sequence. Here we can see in our project e-learning the sequence of event taking place in the given time sequence. We have shown the sequence diagram of the the admin , faculty and the student and the sequence of the event performed by them.

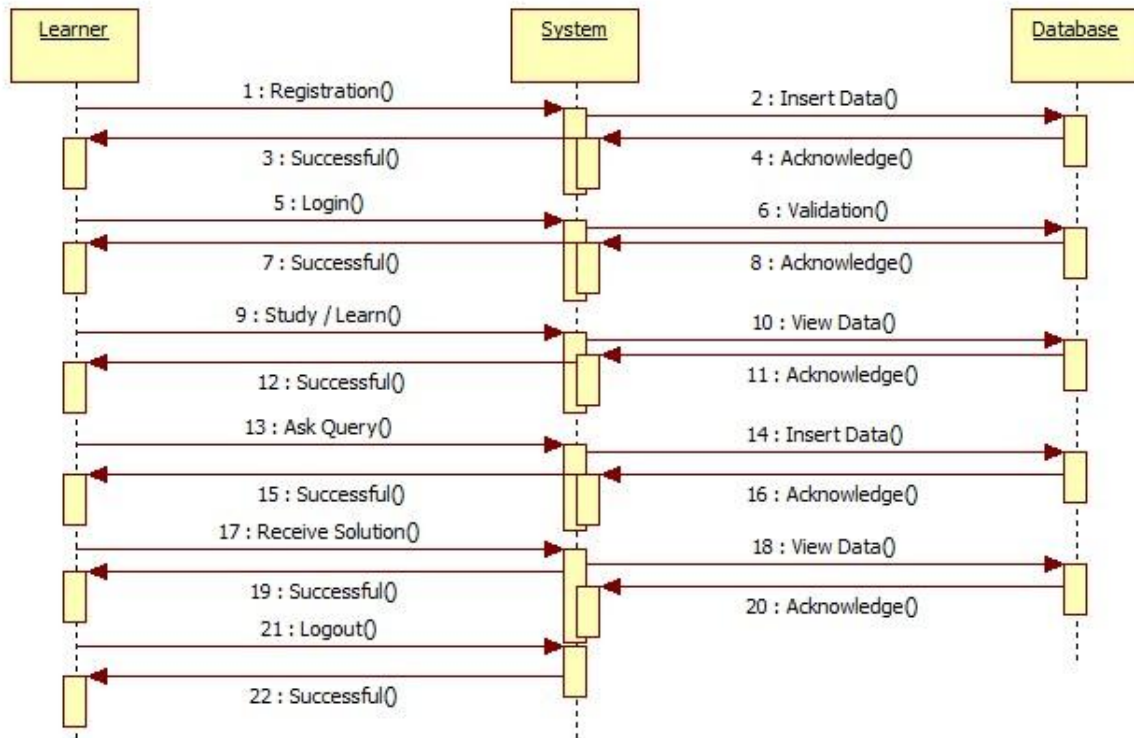


**Fig12. SequenceDiagram of the Admin of the system**



**Fig. SequenceDiagram of the Faculty of the system**



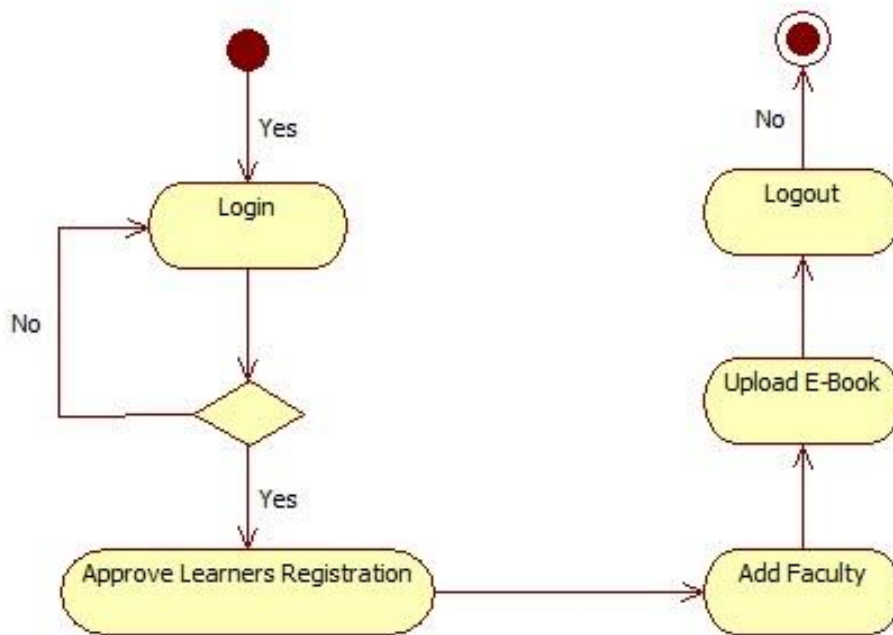


**Fig11.1. SequenceDiagram of the Learner/Student of the system**

This is the sequence diagram of the Learner involved in the e-learning system. Learner have to do registration on the system , data will be inserted on the database which will be acknowledge back to the system and the system will generate the the successful completion of the event. Now user can login on the system with valid login id and password which will be validated by the system on the database. If the validation is successful now the learner can access the study material on the system and ask quey from the faculty after which the learner will receive the solution, he can view the solution then he can successfully can logout. This is the sequence of event which will happen for the learner on the platform.

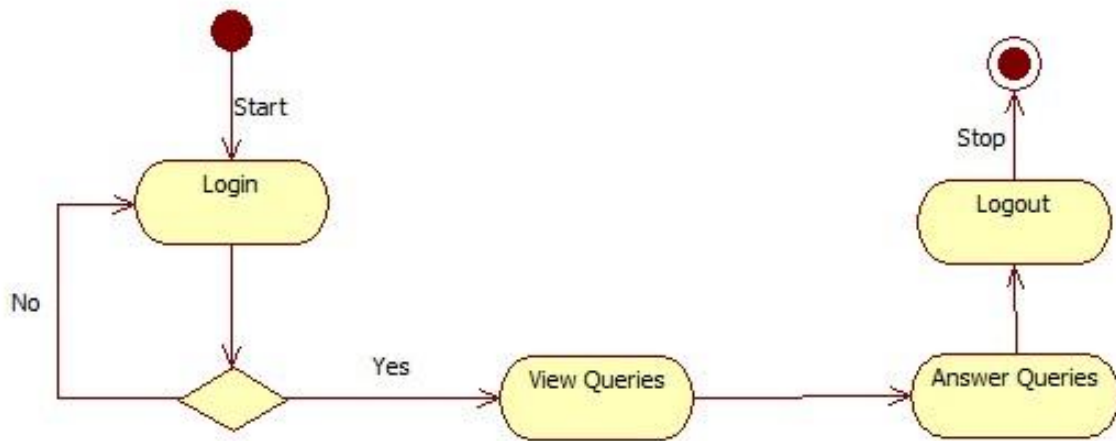
**3.5.4 Activity Diagram:--** Activity Diagram the graphical description of the workflow which includes the different stepwise activity and the different action of the user's choice. It shows the flow of control from different activities due to the action of the user. The different shape which helps in building the activity diagram are as follows:-

- 1) Ellipses which represents the action of the user.
- 2) Diamond represent the decision of the user.
- 3) Arrows represents the flow of the control or the data.
- 4) Black circle will represents the initial node or the start of the work flow.
- 5) Encircled Black Circle will represents the final node or the end of the activity.

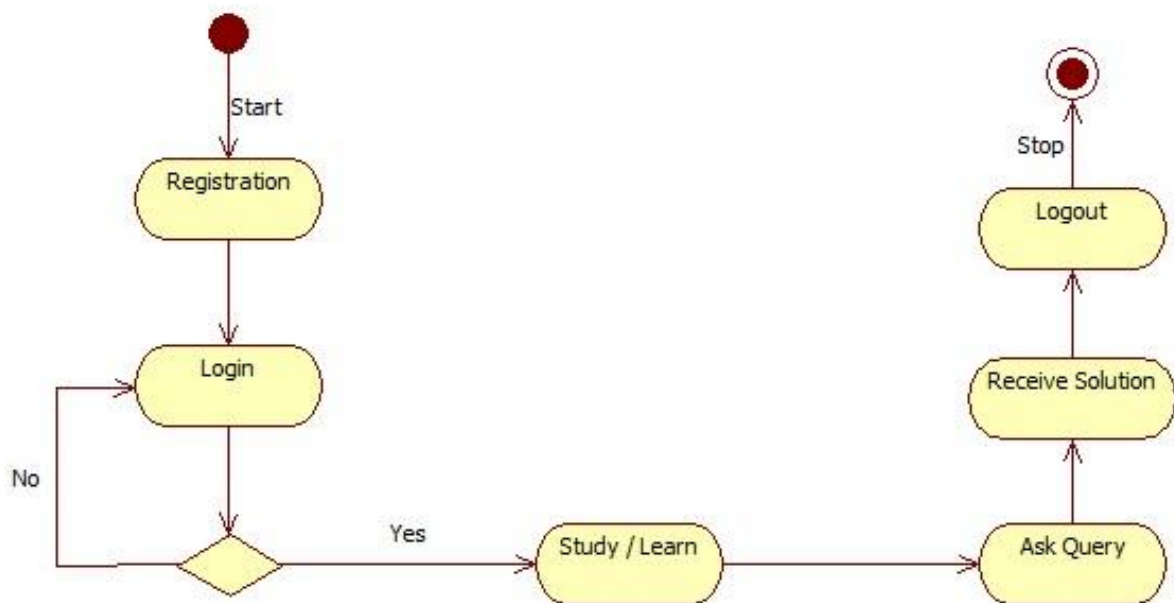


**Fig12.1. ActivityDiagram of the Admin**

This is the activity diagram of the admin here admin will login if the login id is valid then he will proceed to the next action otherwise it will be back to login page. After login on the system he can approve the learner's registration then adding faculty after that admin can also upload study material on the system.

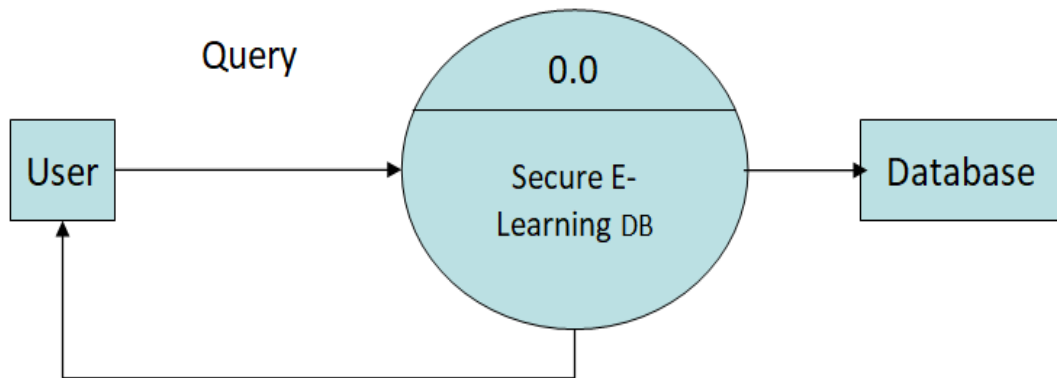
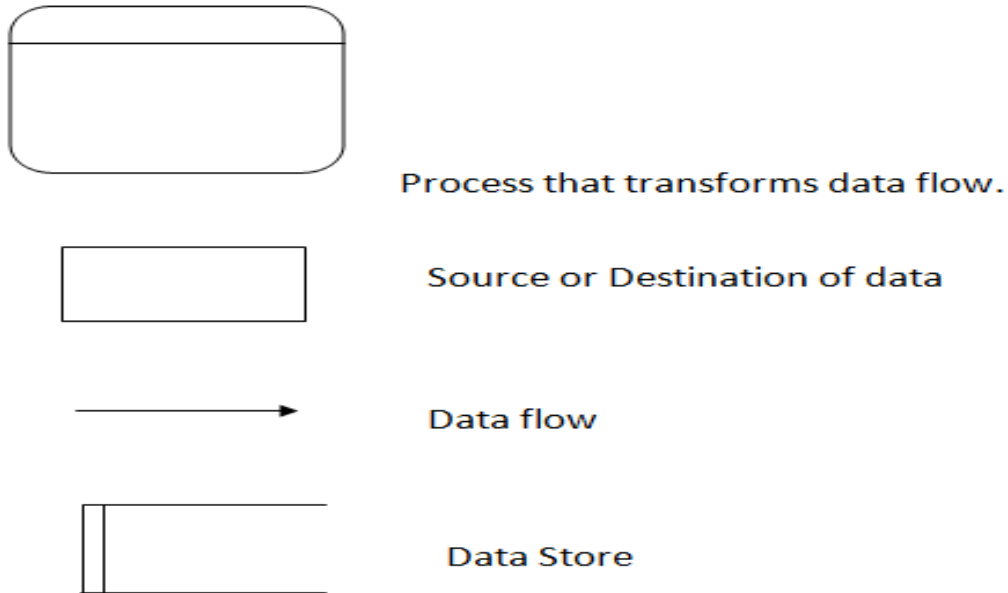


**Fig12.1. ActivityDiagram of the Faculty**

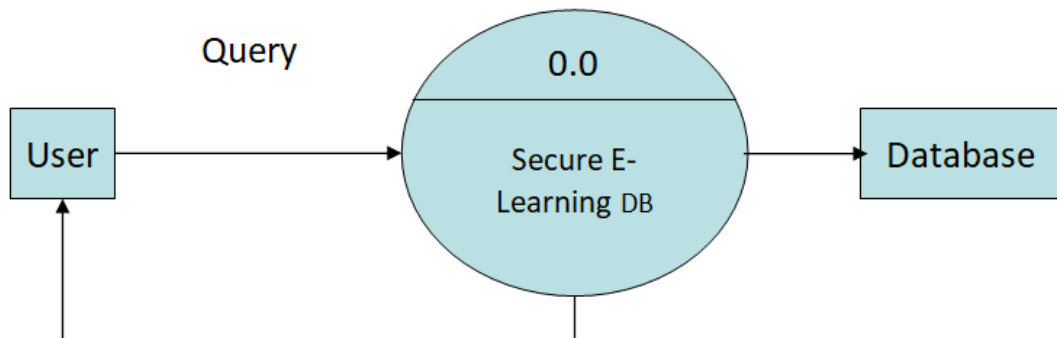


**Fig12.2. ActivityDiagram of the Learner**

**3.5.5 Data Flow Diagrams:--** The data flow diagram (DFD) is the method of describing the flow of a data of the processes or a given system. Basically four types of symbols are used to construct the DFD which are as follows:-

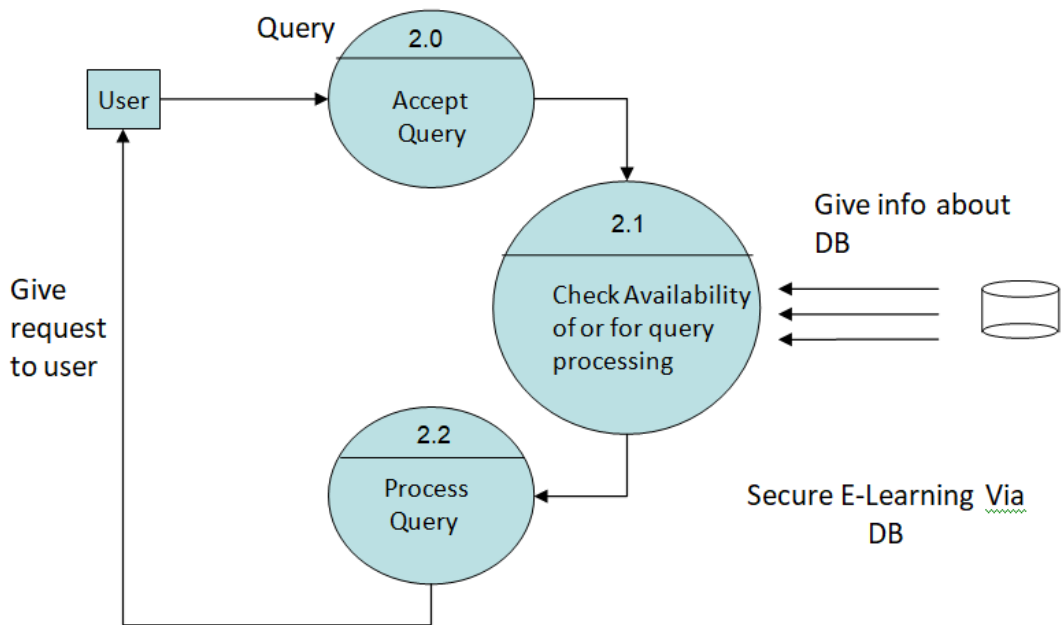


**Fig13.1 DFD Level 0**



**Fig13.2 DFD LEVEL 1**

I



**Fig13.3 DFD Level 2**

## Chapter 4 :Algorithm Used

### **4.1 Triple Des Algorithm Used to secure data and learner information:**

Algorithm:--

1)Run DES 3 times

2)Triple DES Consist of 3 DES keys, which are k1, k2, k3 each of which are 56 bits.

3)The Encryption Algorithm is as follows:--

a)  $C = Ek_3(Dk_2(Ek_1(\text{Plain text})))$  where c= cipher text

Here, DES encrypt with key k1.then decrypt with key k2,and again DES encrypt with key k3.

4)The Decryption Algorithm is as follows:--

b)  $\text{Plain text} = Dk_1(Ek_2(Dk_3(\text{Cipher text})))$

i.e. Decryption is the reverse.

Decrypt with K3, encrypt with K2,and then decrypt with key k1.

## Key Generation Procedure

7. Select any two different large random prime number P, Q such that  $P \neq Q$ .
8. Compute  $n = P * Q$
9. Calculate:  $\phi(n) = (p-1)(q-1)$
10. Select an integer e such that  $1 < e < \phi(n)$
11. Calculate D to satisfy the congruence relation  $d * e = 1 \pmod{\phi(n)}$ ; d is kept as private key exponent.
12. The Public Key are (n, e) and the private key is (n, d)

### ENCRYPTION

Plain text:  $P < n$ .

Cipher text :  $C = P^e \pmod n$ .

### DECRYPTION

Cipher text : C

Plain text :  $P = C^d \pmod n$

## 4.2 Pseudo Code of KNN Algorithm

1. Load data
2. Initialise the value of p
3. For getting the predicted class, iterate it from 1 to total number of training data points
  1. Calculate the distance between test data and each row of training data. Here we will use Euclidean distance as our distance metric since it's the most popular method.
  2. Sort the calculated distances in ascending order based on distance values
  3. Get top p rows from the sorted array
  4. Get the most frequent class of these rows
  5. Return the predicted class

## Chapter 5:Testing

### **5.1 TESTING**

As this project is developed on very large scale , we always tries to find the bugs or error in the project to make our project bugles and error free we need to perform the testing. If the different parts of the system works efficiently in all fields and provides the desired output as per the need of the user i.e it provides the proper output for the given input then the project is said to have passed the testing phase successfully. So, it make the project successful it must pass the testing phase. Testing is the important part of the software development . Therefore more focus is given to find the bugs in the code.

One of the basic principle of the testing is that one should not do testing to show that the code/project is running perfectly and there is no error but the intention of the tester must be to find the error in the code/project i.e his intention is to show that the program/code is not working.

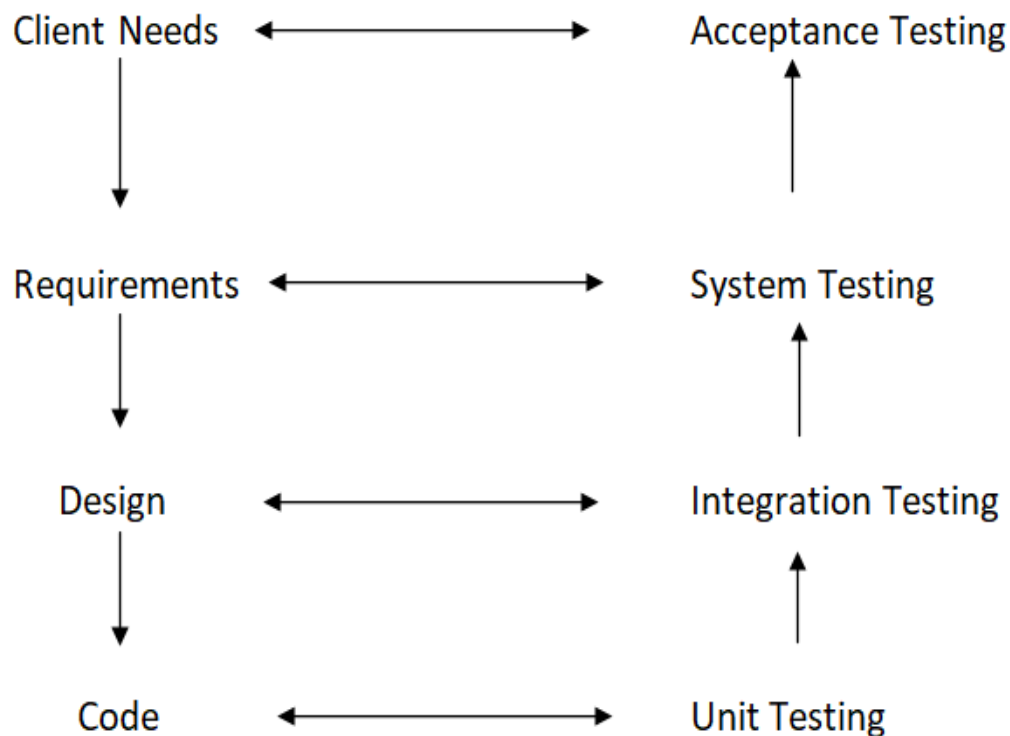
We have done the system testing here to find whether it fulfil the need of the user or not. We have written the entire code completely using the PHP coding language .This new system have been tested holistically with different inputs and matching the given output with the desired output of the users and all the components have been verified from every perspective of the user.

During testing phase we discover some error which were corrected and validated before implementing the components in to the system .

#### **Levels of the Testing**

In order to discover the bugs or error in the code/project we have used the concept of the level testing during testing phase. The different levels of the testing which were done are as follows:-





Before the user acceptance testing a different series of testing is performed by the tester for the proposed system.

Different steps involved in the testing phase are as follows:-

### 1. **Unit Testing**

The main focus of the Unit Testing is to verify the smallest unit of the software design, i.e the module. Unit testing is also known as “Module Testing ” . Different modules are tested one at a time in separate. This process of testing is done at programming/coding stage itself. In this unit testing each module is tested to find if they are working properly with the given input they provide desired output of the user or not.

### 2. **Integration Testing**

After the unit testing integration testing is performed , integration testing is the systematic testing of the system design and the program structure. Data is distributed across an interface, One module can have impact on the other module while integrating to form the system. In this testing All modules are tested as whole after combining them with the focus to discover the errors associated with it . Here the objective is to take unit tested module and combined them to build program structure.

### **3. System testing**

After Integration testing we perform the system testing , in this phase it is ensured that the project is working perfectly and giving the desired output for the given input efficiently. Testing is very important at this phase for the success of the project. This testing phase makes a logical assumption that if all the parts of the project are working efficiently and correctly, then target will be achieved successfully.

### **4. Validation Testing**

After the completion of the Integration testing and the system testing and the errors have been discovered and resolved correctly and efficiently , then the validation phase begins. Validation testing in very simple language can be explained as the validation testing is said to be successful when the program/project function according to the customers need. After doing the validation test there we will get the two possible conditions which may exists. One of them is the function or characteristics which matches to the specification and the other one is the deviation from the users specification needs which is discovered in the proposed system/project.

### **5. Output Testing**

After completing the validation testing, the next move is Output testing of the proposed project. It is one of the important testing because no system is useful if that system does not produce the desired output in the specific format. In this testing user specify the format in which he require the output.

### **6. User Acceptance Testing**

User Acceptance of the given system is one of the important factor for the success of any system. The Proposed system is tested accordingly the users acceptance by constantly in touch with him. And develop the system according to the user needs.

**Test Cases**

**1)User Login/Registration:** student/learner need to register on the platform by completing the basic detail forms. There are number of fields in the registration form to be filled by the user and each field must be filled by the user.

**2)Admin Login:** - Admin's login id and password have been kept compulsory fields, and if the id and password don't match to the original id and password then it will pop up an error message.

Sr no.	Module	Scenario	Test Case 1(Positive)	Test case 2(Negative)
1	Start up	Start application	Application started	An error occur while starting the website if internet is not there.
2	Internet connectivity	Start application	Website run smoothly if internet was connected.	Website hanged up on showing the toast for <b>"no internet connection"</b>
3	login	Login id and password	If A user was already entered into database then the user was sent to another activity	If A user was not entered into database the application shows a toast with text <b>"unauthorised user."</b>

4	login	Login id and password	If user id and password is received by email then the user can use it to login on the system and perform activity.	If user id and password is not received by the user then another activity is opened up asking user id and password.
5	Create complaint	Complaint is generated	If title contain some words and problem is reported it successfully.	If title is kept blank them a problem is generated during submit which show <b>“Title cannot be left blank.”</b>

## Chapter 6 Performance Analysis

### 6.1 Project Main Page snapshot



#### About US

Now in days every individual recommends that learning should be at any-place and any-time, and this recommendation is resolved by E-Learning system. Course material also has been secured by using file encryption and decryption technique so that no one can access material outside the platform.

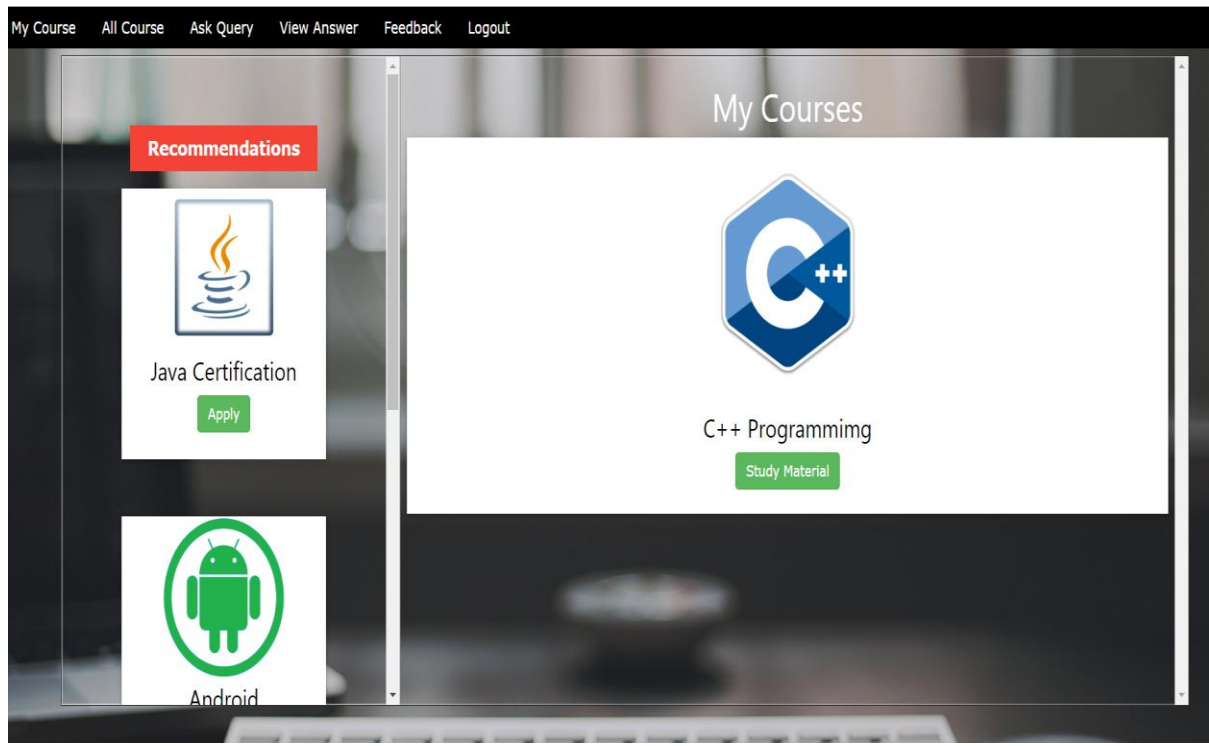
### 6.2 ADMIN PAGE(Snapshot of the Project)

Add Faculty
Approve Learner
Add Course
Upload Study Material
View Learners
View Study Material
Feedback
Delete Course
Logout

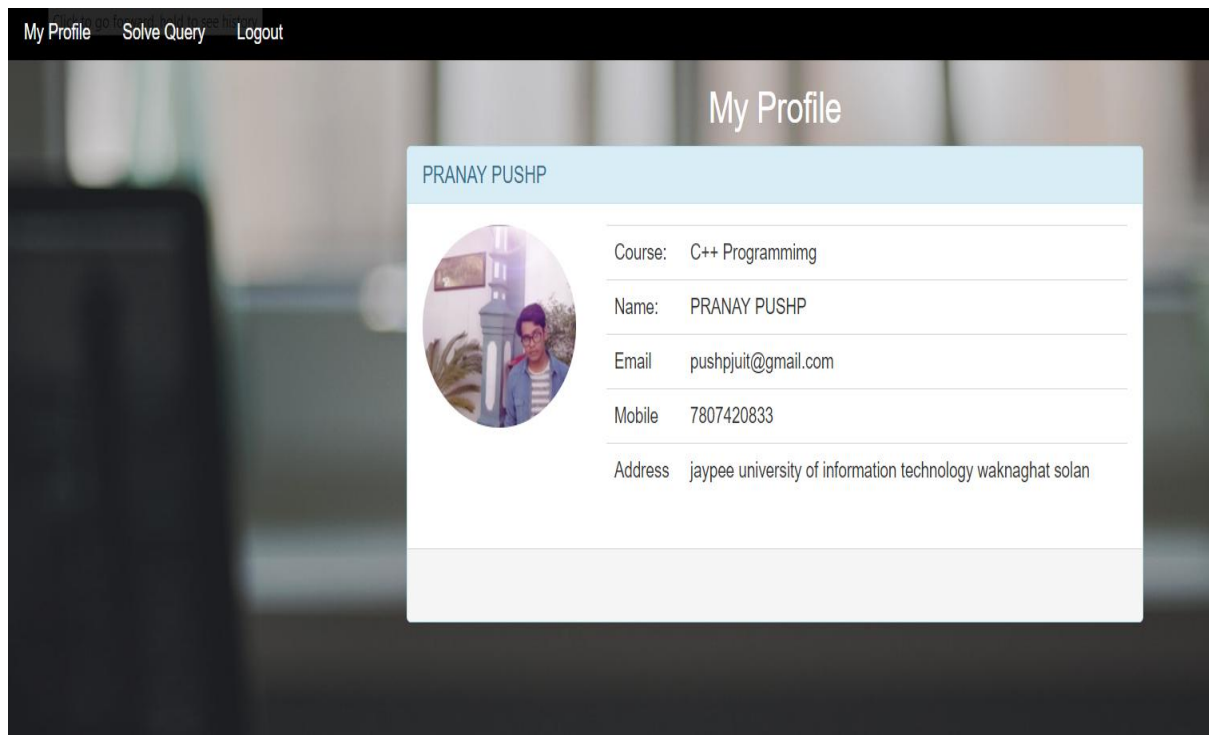
### Study Material

Book Name	File	Course	Edit	Delete
INDIAN HISTORY	Modern-India.pdf	CDS2019	<a href="#">Edit</a>	<a href="#">Delete</a>
Php Tutorial	phptutorial.pdf	PHP Web Development	<a href="#">Edit</a>	<a href="#">Delete</a>
Mysql and Php	php_tutorial.docx	PHP Web Development	<a href="#">Edit</a>	<a href="#">Delete</a>
Asp.net Tutorial	asp.net_tutorial.pdf	Asp.net Programming	<a href="#">Edit</a>	<a href="#">Delete</a>
Constitution of India	coi_part_full.pdf	Civil Services2019	<a href="#">Edit</a>	<a href="#">Delete</a>
c++	cbook.pdf	C++ Programmimg	<a href="#">Edit</a>	<a href="#">Delete</a>
c-book	cbook.pdf	C++ Programmimg	<a href="#">Edit</a>	<a href="#">Delete</a>
c++video	Introduction to Functions in C++ (HINDI).mp4	C++ Programmimg	<a href="#">Edit</a>	<a href="#">Delete</a>

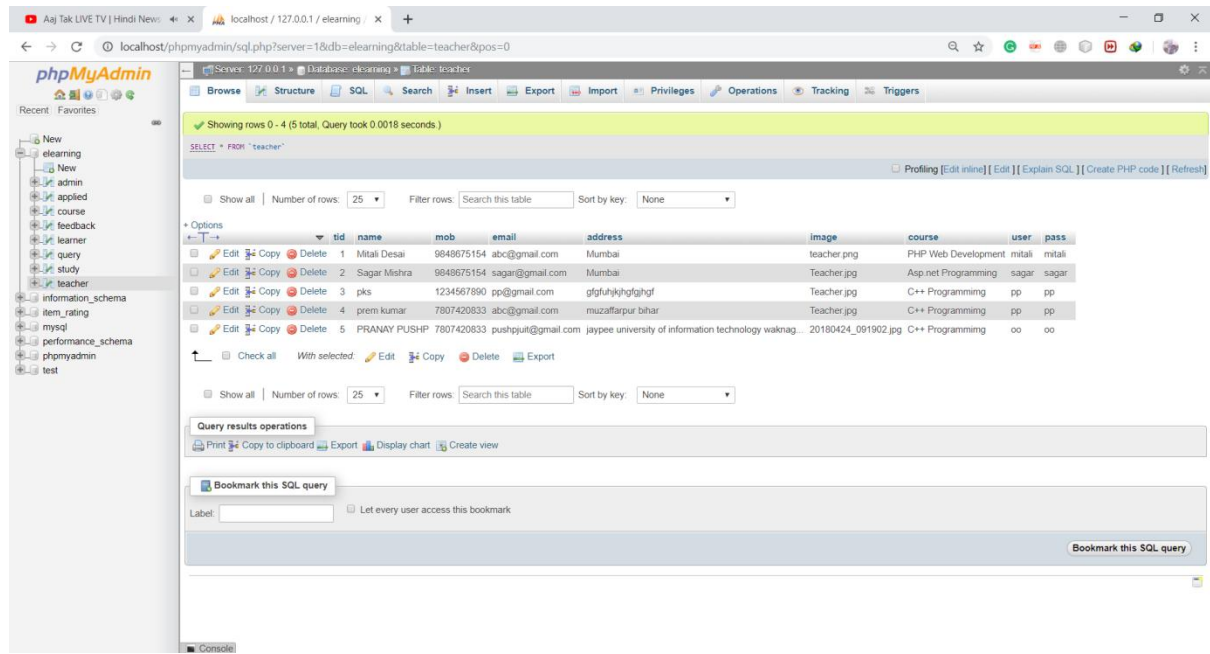
### 6.3 Student Page(Snapshot of the Project)



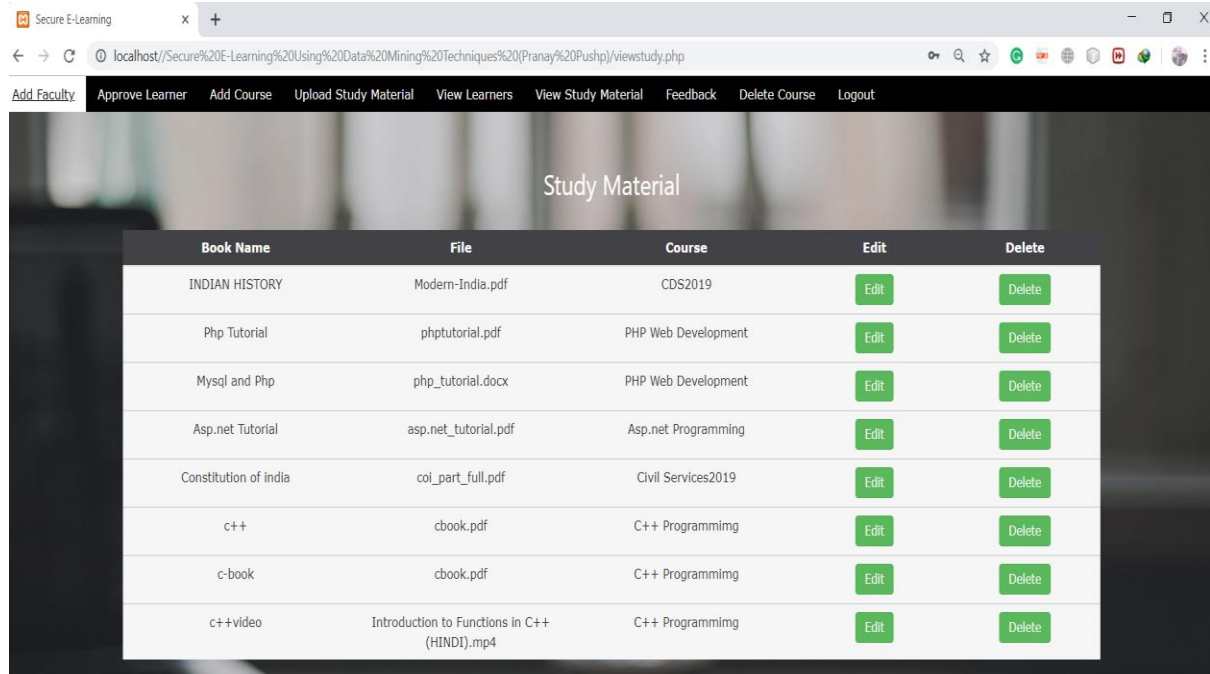
### 6.4 Faculty page(Snapshot of the Project)



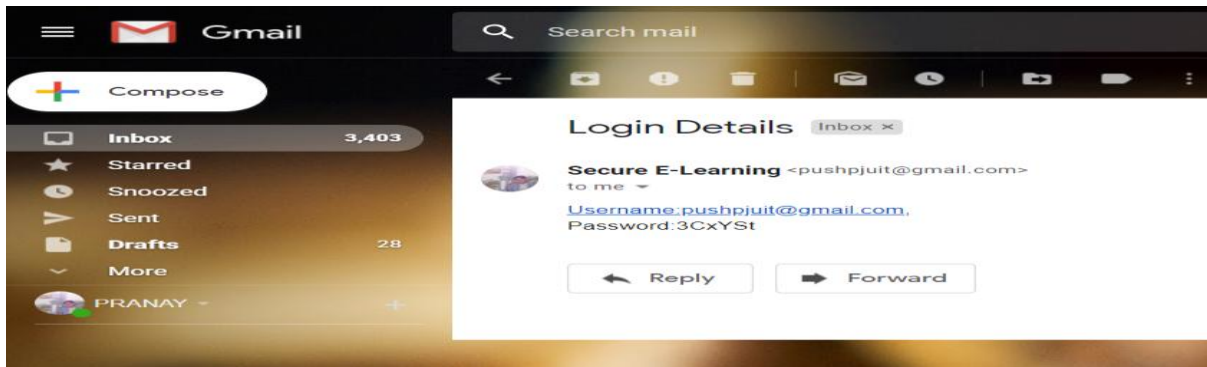
## 6.5Sql data base snapshot



## 6.6 study Material



## 6.7 Admin Allow the learner via mail(send userid and password)





## **Chapter 07 CONCLUSION**

The online learning platform will play important role in the improving the learning experience of many learner/student who have limited resources and facility . On this e-learning platform learner not only get quality education but also get recommendation about hthe course which he should opt or apply to enhance his learning capability aswell This platform also uses cryptography to secure the e-learning material as well data or information of the learner .

Smart and secure education will Provide Students/learner a richer and diverse learning environment .It will provides cheap and affordable solutions to the higher cost of the academic institutions aswell as they can learn at any time at any place of their choice. In our project we have provided informative and interactive audio-video learning modules with the recommendation using data mining techniques.

### **ADVANTAGES OF PROJECT**

- I. The e-learning Platform will provide security to learning material using encryption and decryption techniques as well as secure learner details.
- II. The System will provide better learning experience and better learning material through e-book as well as through audio-video lectures.
- III. Our project will provide good interaction between student and the faculty ,student can ask queries as well as give feedback about the course and faculty will reply to the queries of the learner.
- IV. In our system learner will have to register on the platform and the mail will be sent to learners registered mail which will contain user id and password which will allow student to register or apply for course.
- V. Learning on the platform will be more interactive and easier, and friendly through audio-video lectures.
- VI. Student can download different e-books/journal and research paper directly from the system.

### **Limitations:**

- I. Active and good internet connection is required to learn on this system.
- II. The System may provide false data if data/material is not uploaded properly by the admin.
- III. On our system Only approved learner by the admin can access their profile and use different material.

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