K. J. Somaiya College of Engineering, Mumbai-77
(Autonomous College Affiliated to University of Mumbai)

Batch: A1	**Roll No.:**	**1611015**

Experiment No. 02

Grade: AA / AB / BB / BC / CC / CD /DD

Title: Database Design and Implementation Process

Objective:

- Implement Database System Life Cycle.

Expected Outcome of Experiment:

CO1: Design and tune database.

Books/ Journals/ Websites referred:

1. Elmasri & Navathe " fundamentals of Database Systems" V edition. PEARSON Education.
2. Korth, Silberschatzsu darshan "Database systems, concepts" 5th edition McGraw Hill.
3. Raghu Ramkrishnan & Johannes Gehrke "Database Management System" Tata McGraw Hill. III edition.

Pre Lab/ Prior Concepts:

Database System, ER diagram and Relation mapping, SQL

Case Study of large database system

Virtual Classroom :
Online learning tool for Students.

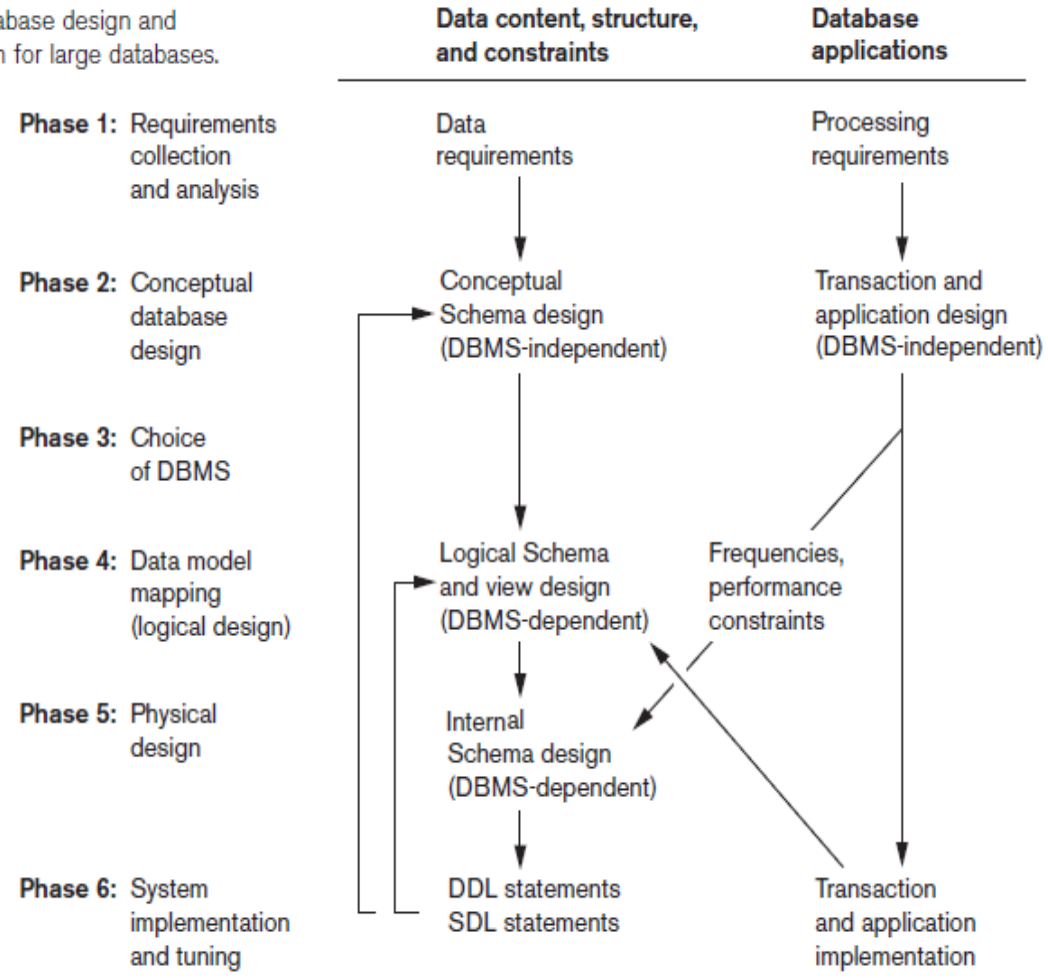
fucntionality:

1. A faculty creates course and uploads course contents to be available for enrolled students
2. A student can enroll in a course,view course details, access content
3. Faculty can create assignments and quiz based on the course
4. Student can answer quiz and upload answers to assignments
5. Student can interact and ask doubts to other students or faculty through discussion forum
6. System generates grade based on quiz answers and assignments graded by Faculty
7. Certificate is generated for successful completion of course

Database Design and Implementation System Life Cycle

Phases w.r.t to case study

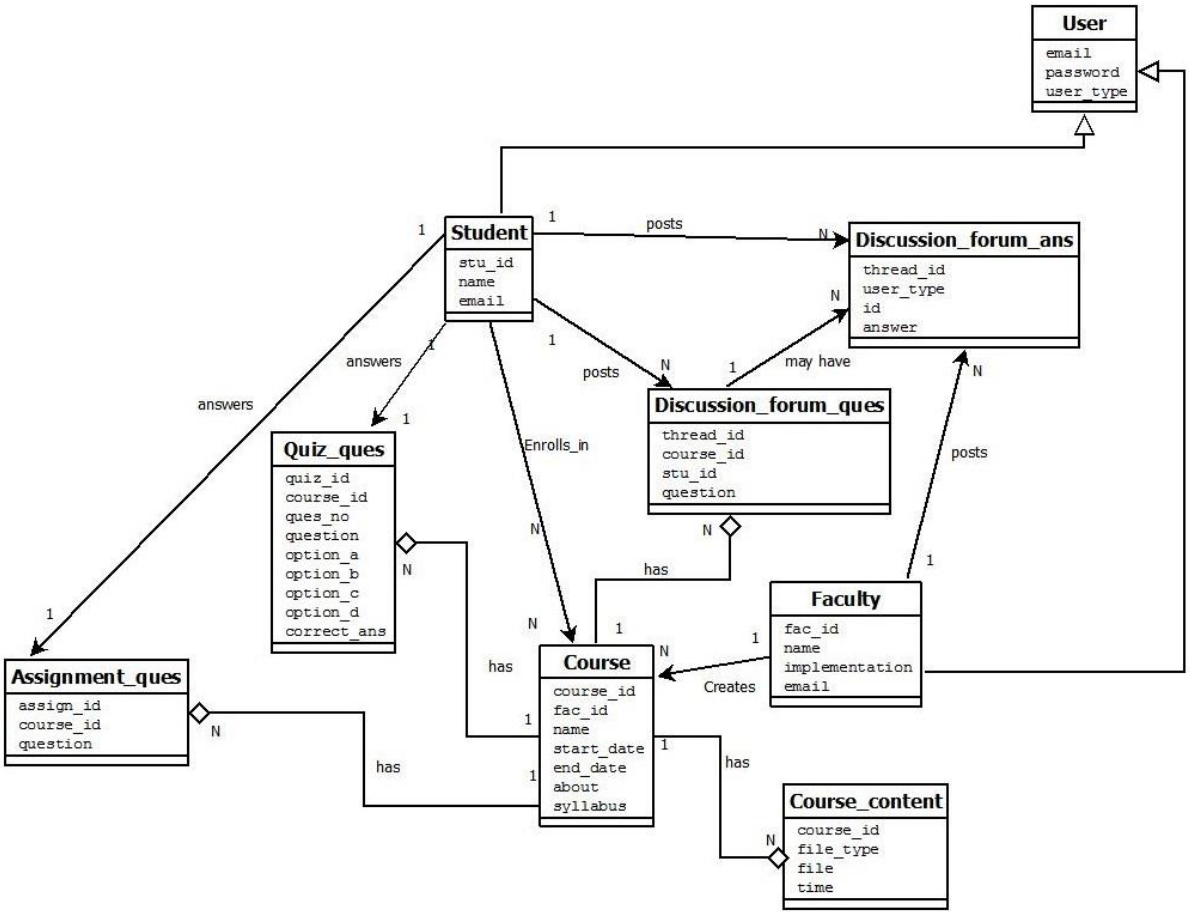
Figure 10.1
Phases of database design and implementation for large databases.



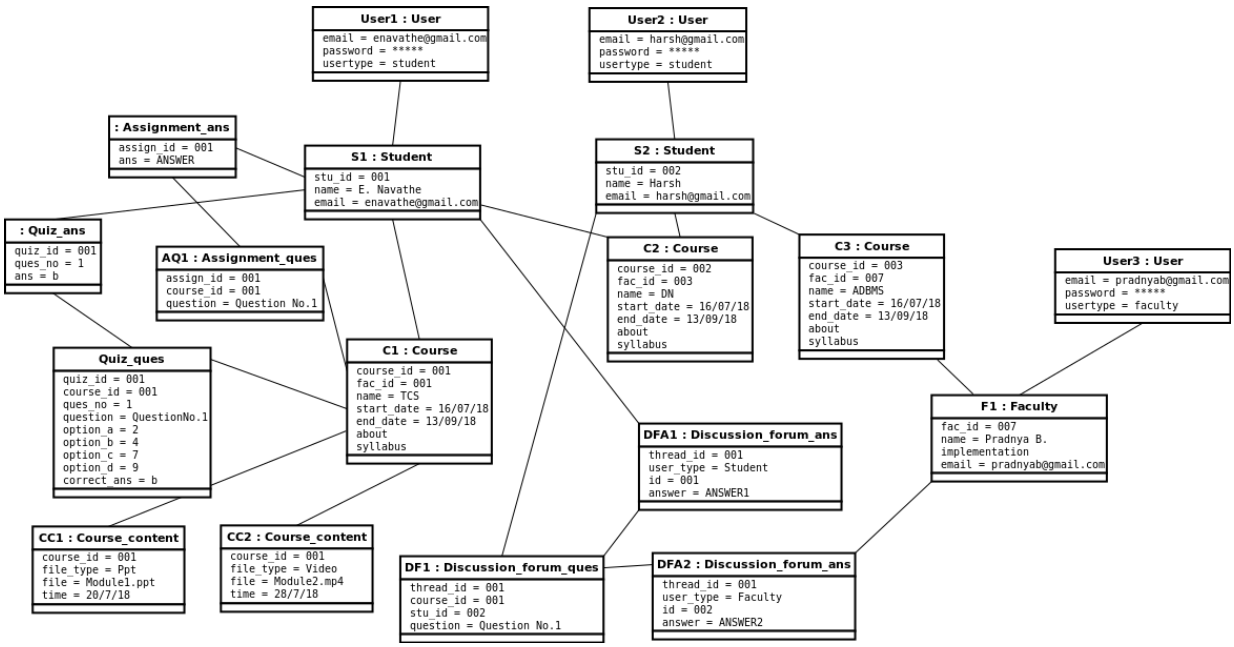
Implementation details

1. Requirement Collection (Screenshots of UML Diagram)

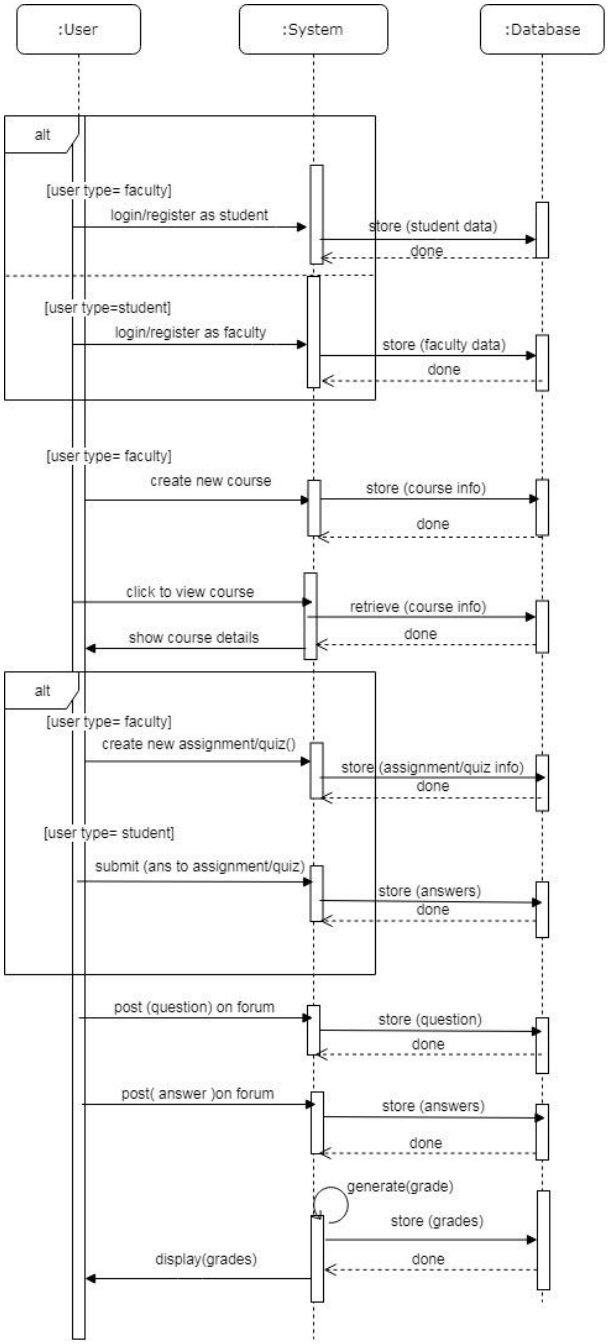
   Class diagram:



Object diagram:

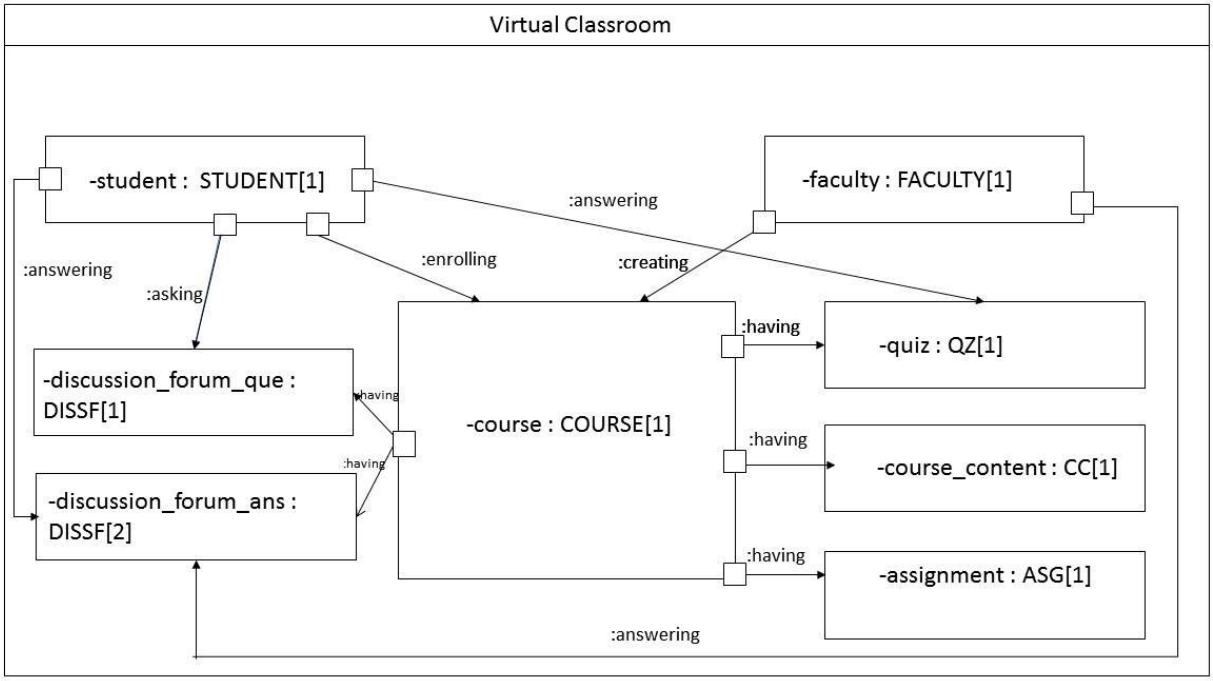


Sequence diagram:

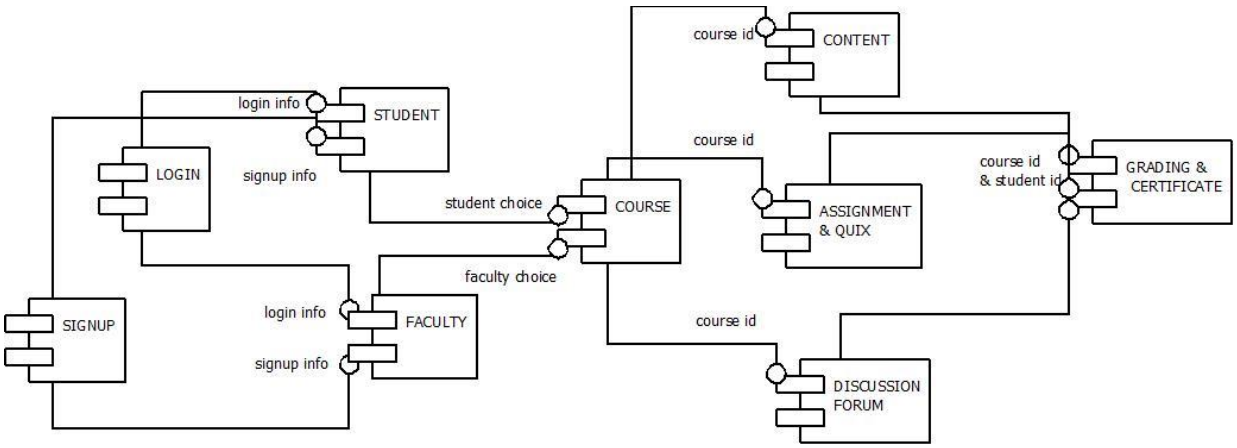


Composite diagram:

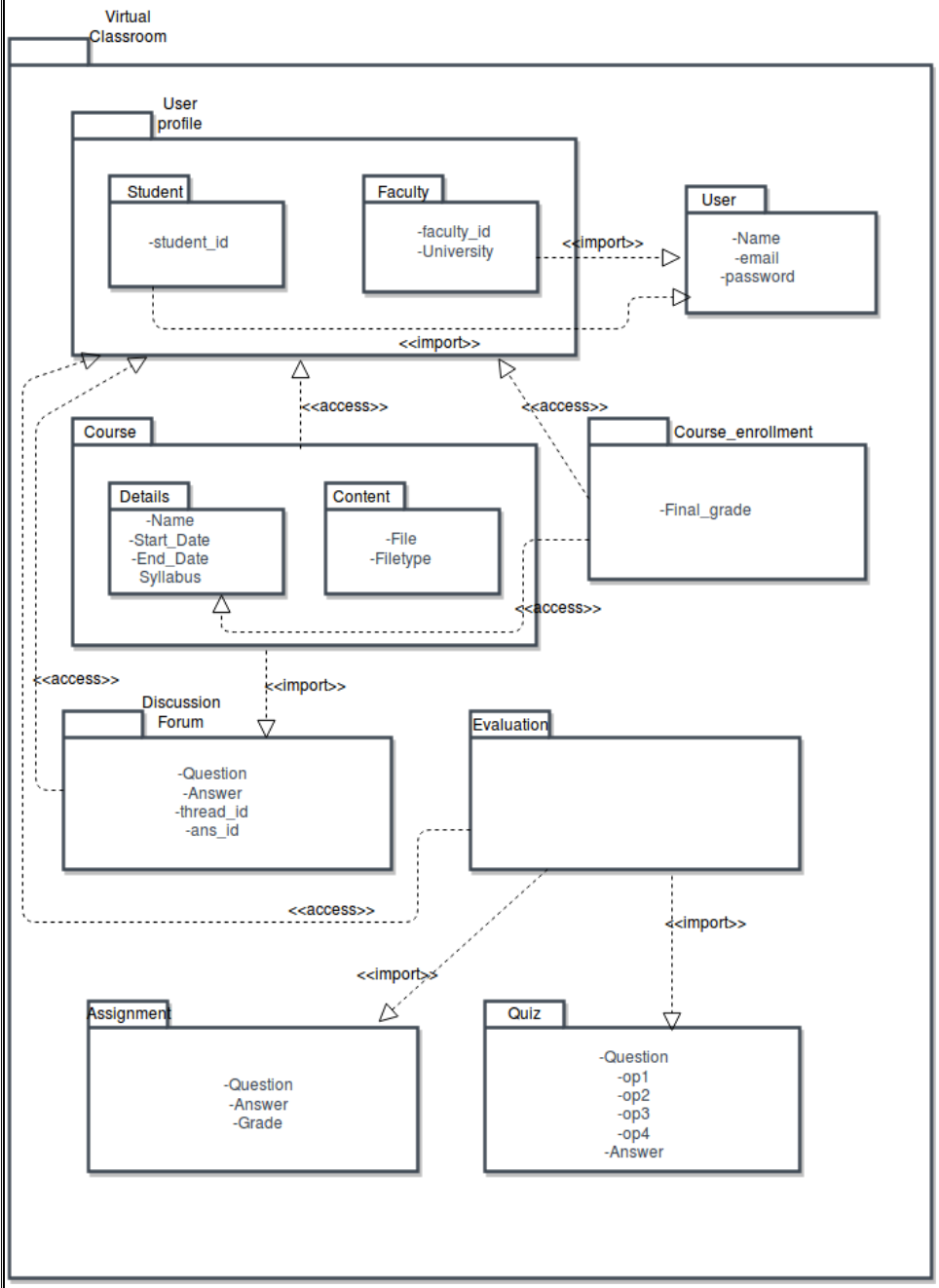
Composite diagram:



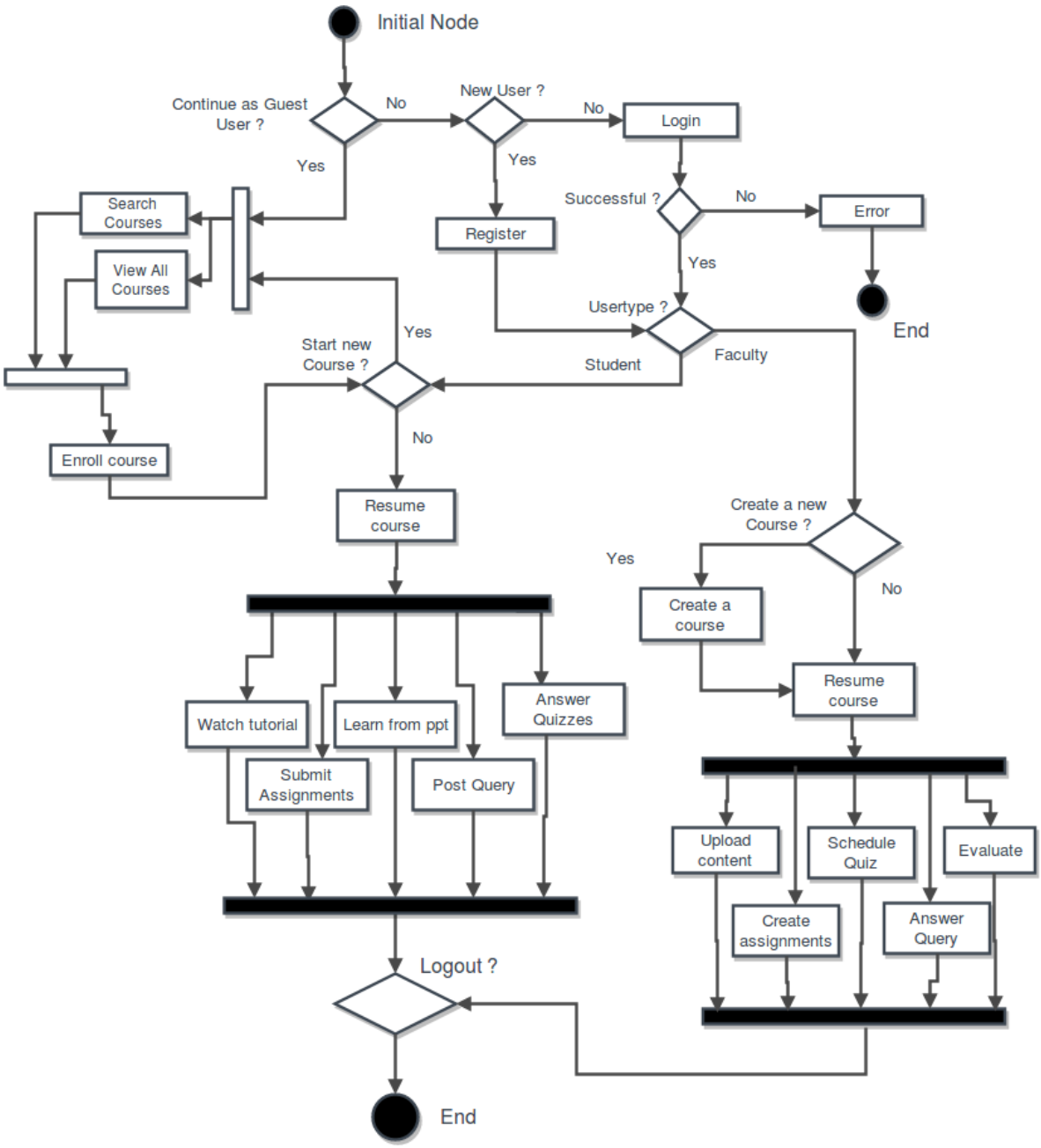
Component diagram:



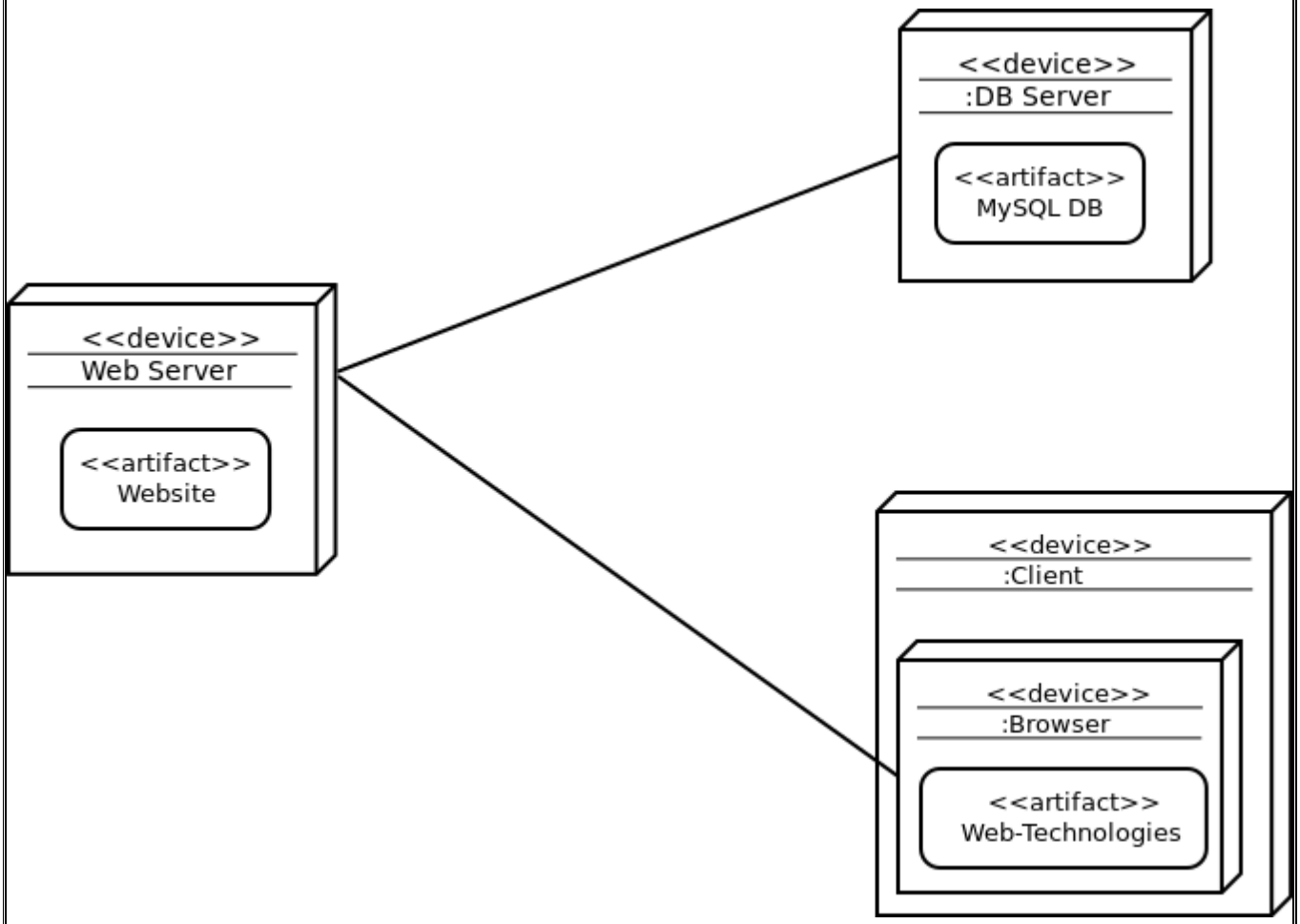
Package diagram:



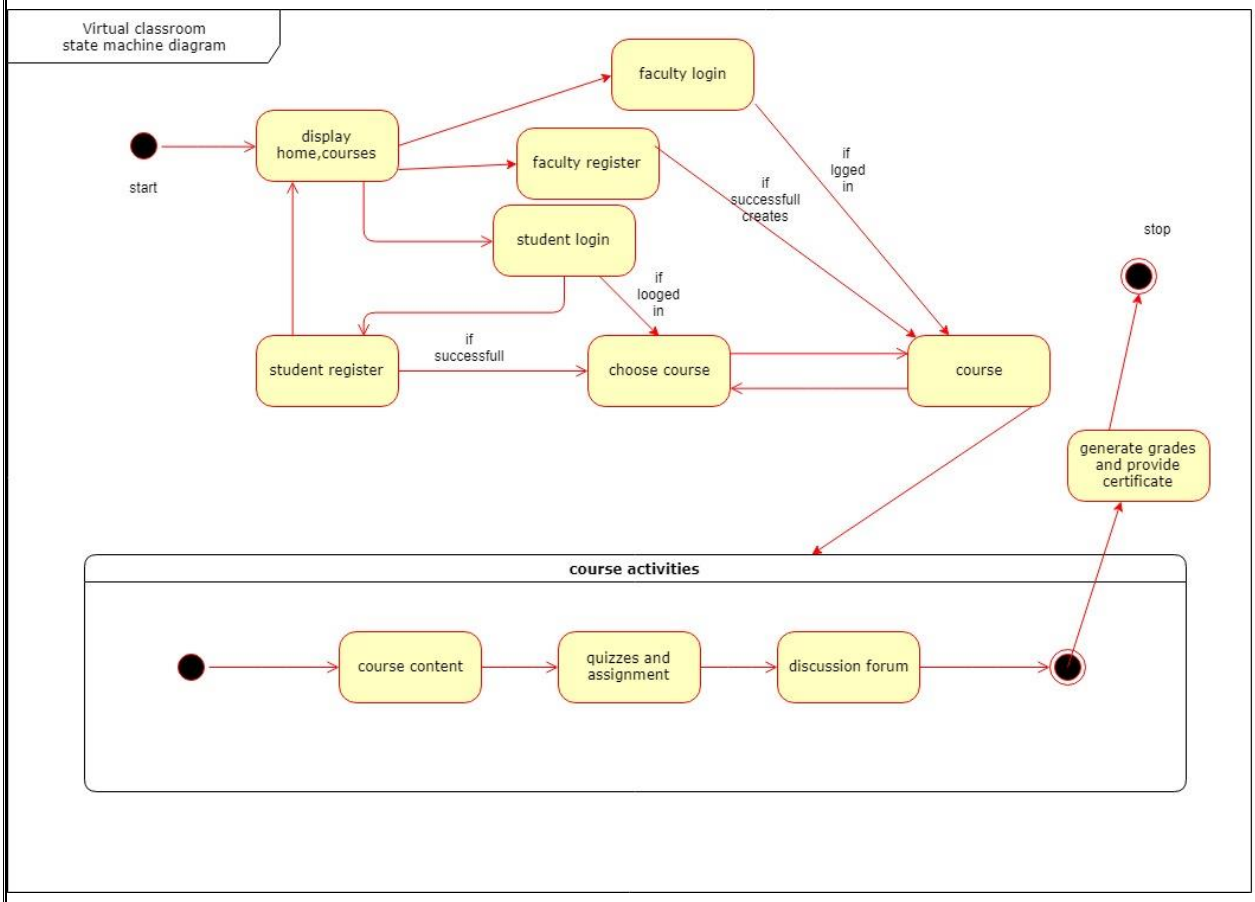
Activity diagram:



Deployment diagram;

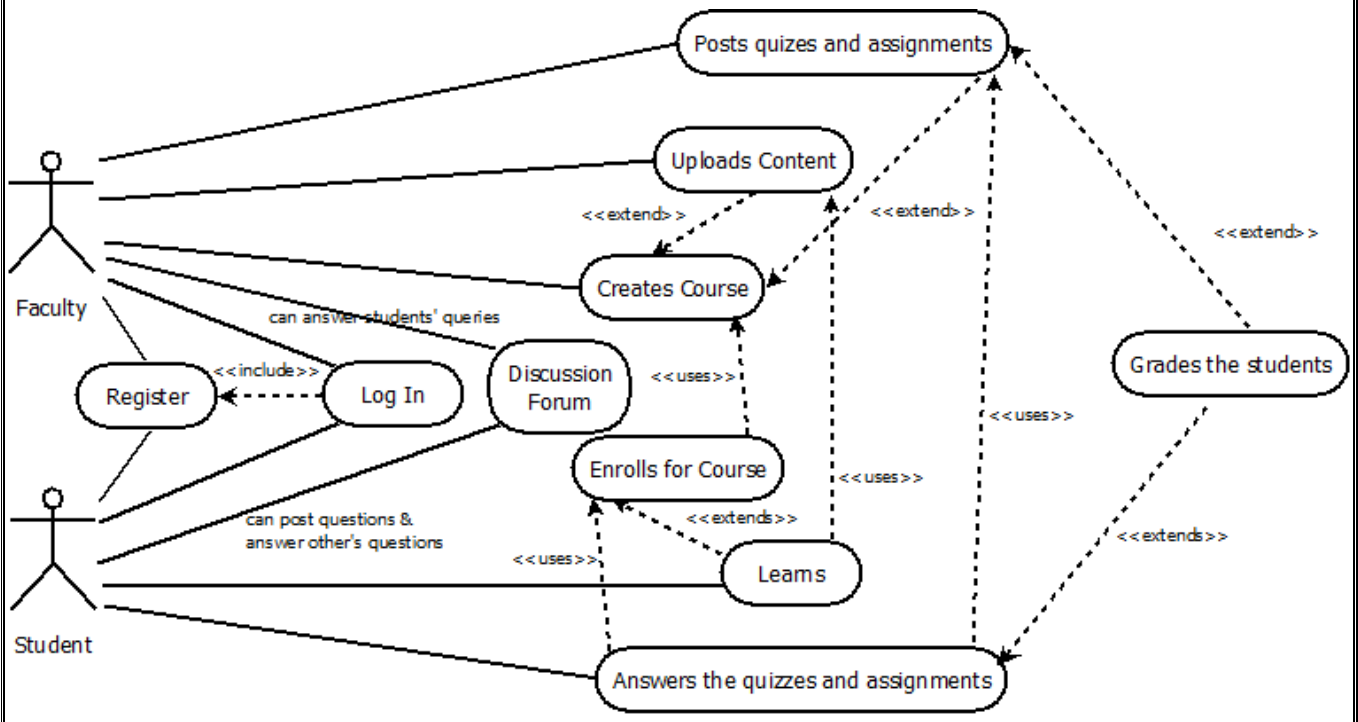


State machine diagram:

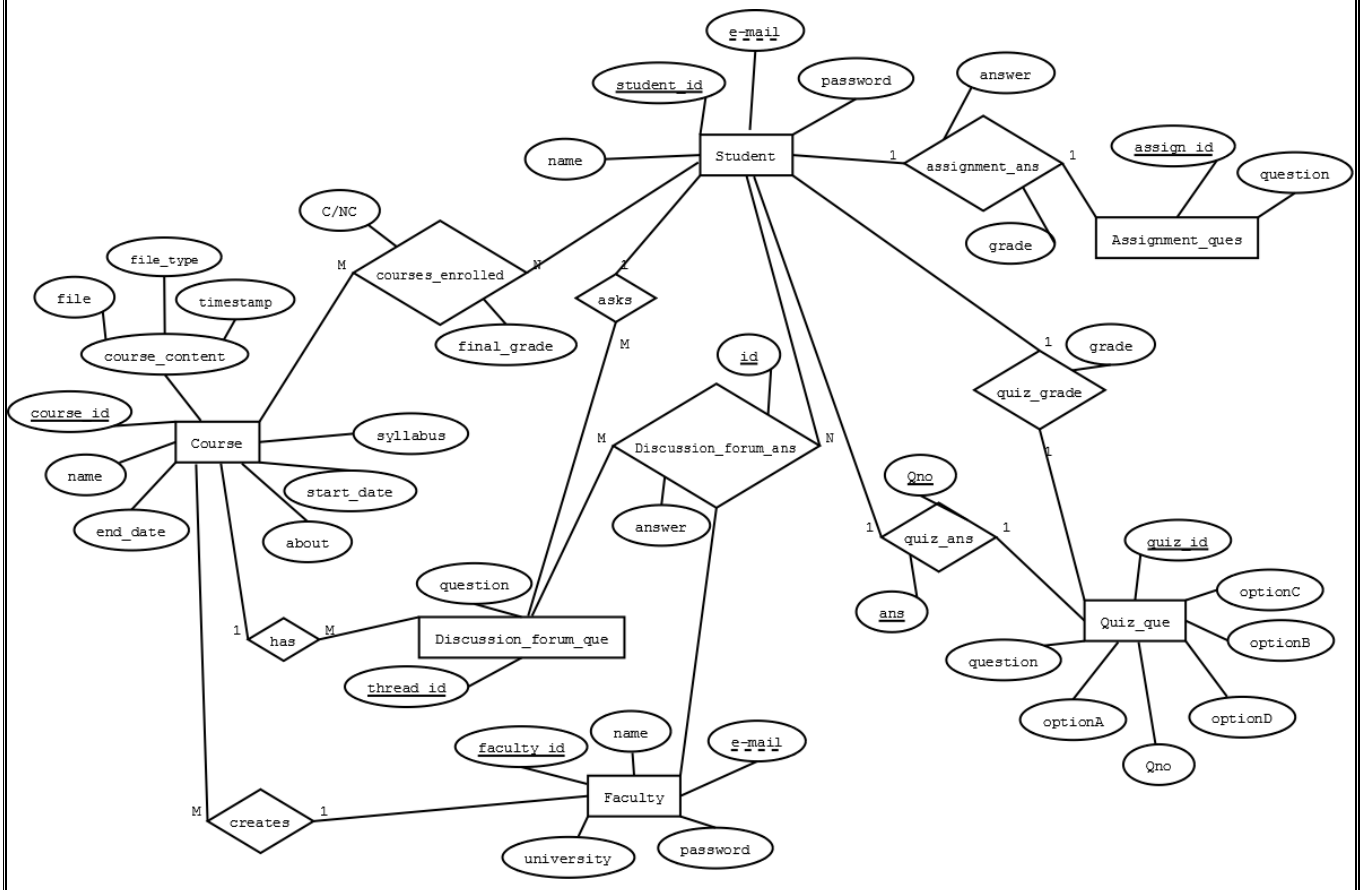


Text

Use case diagram:



2. Conceptual Database(Screenshots of EER)



3. Relational Database (Screenshots)

Relational Model (Virtual Classroom):

Student :

Student_id	First_Name	Last_Name	email	password

Faculty :

Faculty_id	First_Name	Last_Name	University	email	password

Course :

Course_id	Faculty_id	Name	Start_Date	End_Date

Course_enrolled :

Student_id	Course_id	Completion_Status	Final_Grade

Course_Content :

Course_id	File	TimeStamp	File_Type

Discussion_Forum_Question :

Course_id	Student_id	Thread_id	Question

Discussion_Forum_Answer :

Course_id	Id	Thread_id	Answer	User_Type

Assignment_Question :

Course_id	Assignment_id	Question

Assignment_Answer:

Assignment_id	Student_id	Answer	Grade

Quiz_Question :

Course_id	Quiz_i	Question_no	Question	Option_A	Option_B	Option_C	Option_D	Correct_Ans

Quiz_Answer :

Quiz_id	Course_id	Student_id	Question_no	Answer

Quiz_Grade :

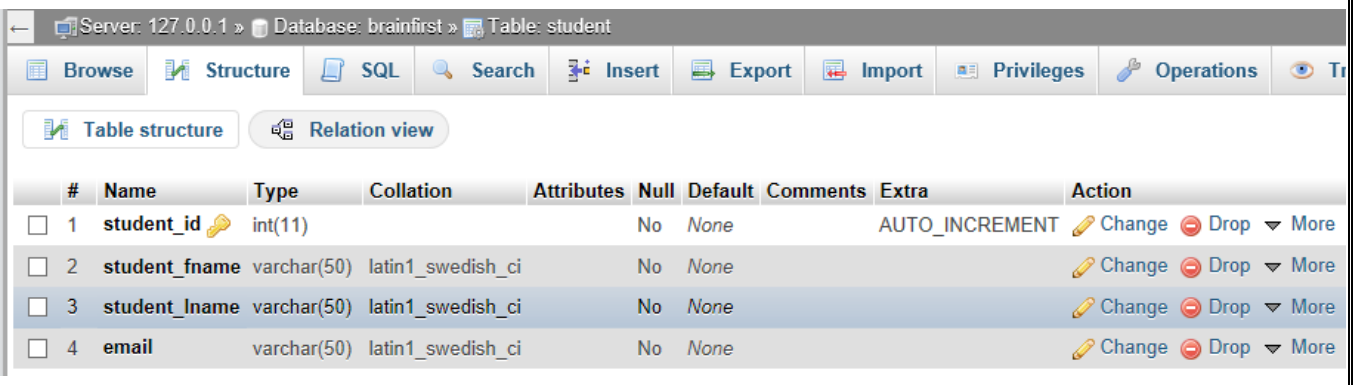
Quiz_id	Student_id	Course_id	Grade

Primary Keys :

Table	Foreign Key
Course	Faculty → Faculty_id
Course_enrolled	Student → Student_id, Course → Course_id
Course_Content	Course → Course_id
Discussion_forum_question	Course → Course_id, Student → Student_id
Discussion_forum_ans	Course → Course_id, Depending on value of attribute 'UserType' , 'id' becomes foreign key of Student or Faculty. Student → Student_id, Faculty → Faculty_id
Assignment_Question	Course → Course_id
Assignment_Answer	Assignment → Assignment_id, Student → Student_id
Quiz_Question	Course → Course_id
Quiz_Answer	Student → Student_id, Quiz → Quiz_id, Course → Course_id
Quiz_Grade	Student → Student_id, Quiz → Quiz_id, Course → Course_id

4. Physical Database(Screenshots of database tables)

Physical Tables Implementation:



Server: 127.0.0.1 » Database: brainfirst » Table: faculty

Browse | Structure | SQL | Search | Insert | Export | Import | Privileges | Operations

Table structure | Relation view

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	faculty_id	int(11)			No	None		AUTO_INCREMENT	Change Drop More
2	faculty_fname	varchar(50)	latin1_swedish_ci		No	None			Change Drop More
3	faculty_lname	varchar(50)	latin1_swedish_ci		No	None			Change Drop More
4	email	varchar(50)	latin1_swedish_ci		No	None			Change Drop More

Server: 127.0.0.1 » Database: brainfirst » Table: course

Browse | Structure | SQL | Search | Insert | Export | Import | Privileges | Operations | Tracki

Table structure | Relation view

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	course_id	int(11)			No	None		AUTO_INCREMENT	Change Drop More
2	faculty_id	int(11)			No	None			Change Drop More
3	course_name	varchar(100)	latin1_swedish_ci		No	None			Change Drop More
4	start_date	date			No	None			Change Drop More
5	end_date	date			No	None			Change Drop More
6	about	varchar(1000)	latin1_swedish_ci		No	None			Change Drop More
7	syllabus	blob			No	None			Change Drop More

Server: 127.0.0.1 » Database: brainfirst » Table: course_enrolled

Browse | Structure | SQL | Search | Insert | Export | Import | Privileges | Operations

Table structure | Relation view

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	student_id	int(11)			No	None			Change Drop More
2	course_id	int(11)			No	None			Change Drop More
3	whether_completed	varchar(4)	latin1_swedish_ci		Yes	None			Change Drop More
4	grade	varchar(5)	latin1_swedish_ci		Yes	None			Change Drop More

Server: 127.0.0.1 » Database: brainfirst » Table: course_content

Browse | Structure | SQL | Search | Insert | Export | Import | Privileges | Operations | Tra

Table structure | Relation view

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	course_id	int(11)			No	None			Change Drop More
2	file	longblob			No	None			Change Drop More
3	time	timestamp			No	CURRENT_TIMESTAMP			Change Drop More
4	file_type	varchar(10)	latin1_swedish_ci		No	None			Change Drop More

Server: 127.0.0.1 » Database: brainfirst » Table: discussion_forum_ques

Browse | Structure | SQL | Search | Insert | Export | Import | Privileges | Operations | Tr

Table structure | Relation view

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	course_id	int(11)			No	None			Change Drop More
2	student_id	int(11)			No	None			Change Drop More
3	thread_id	int(11)			No	None		AUTO_INCREMENT	Change Drop More
4	question	varchar(500)	latin1_swedish_ci		No	None			Change Drop More

Server: 127.0.0.1 » Database: brainfirst » Table: discussion_forum_ans

Browse | Structure | SQL | Search | Insert | Export | Import | Privileges | Opera

Table structure | Relation view

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	course_id	int(11)			No	None			Change Drop More
2	thread_id	int(11)			No	None			Change Drop More
3	user_type	varchar(10)	latin1_swedish_ci		No	None			Change Drop More
4	id	int(11)			No	None			Change Drop More
5	answer	text	latin1_swedish_ci		No	None			Change Drop More

Server: 127.0.0.1 » Database: brainfirst » Table: assignment_ques

Browse | Structure | SQL | Search | Insert | Export | Import | Privileges | Operations

Table structure | Relation view

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	course_id	int(11)			No	None			Change Drop More
2	assignment_id	int(11)			No	None		AUTO_INCREMENT	Change Drop More
3	question	longblob			No	None			Change Drop More

Server: 127.0.0.1 » Database: brainfirst » Table: assignment_ans

Browse | Structure | SQL | Search | Insert | Export | Import | Privileges | Operations

Table structure | Relation view

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	student_id	int(11)			No	None			Change Drop More
2	assignment_id	int(11)			No	None			Change Drop More
3	answer	longblob			No	None			Change Drop More
4	grade	varchar(10)	latin1_swedish_ci		Yes	None			Change Drop More

Server: 127.0.0.1 » Database: brainfirst » Table: quiz_ques

Browse | Structure | SQL | Search | Insert | Export | Import | Privileges | Operatio

Table structure | Relation view

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	course_id	int(11)			No	None			Change Drop More
2	quiz_id	int(11)			No	None			Change Drop More
3	ques_num	int(11)			No	None			Change Drop More
4	question	varchar(200)	latin1_swedish_ci		No	None			Change Drop More
5	option_a	varchar(50)	latin1_swedish_ci		No	None			Change Drop More
6	option_b	varchar(50)	latin1_swedish_ci		No	None			Change Drop More
7	option_c	varchar(50)	latin1_swedish_ci		No	None			Change Drop More
8	option_d	varchar(50)	latin1_swedish_ci		No	None			Change Drop More
9	correct_answer	varchar(50)	latin1_swedish_ci		No	None			Change Drop More

Server: 127.0.0.1 » Database: brainfirst » Table: quiz_ans

Browse | Structure | SQL | Search | Insert | Export | Import | Privileges | Operatio

Table structure | Relation view

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	student_id	int(11)			No	None			Change Drop More
2	course_id	int(11)			No	None			Change Drop More
3	quiz_id	int(11)			No	None			Change Drop More
4	ques_num	int(11)			No	None			Change Drop More
5	answer	varchar(50)	latin1_swedish_ci		No	None			Change Drop More

Server: 127.0.0.1 » Database: brainfirst » Table: quiz_grade

Browse | Structure | SQL | Search | Insert | Export | Import | Privileges | Operatio

Table structure | Relation view

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	course_id	int(11)			No	None			Change Drop More
2	student_id	int(11)			No	None			Change Drop More
3	quiz_id	int(11)			No	None			Change Drop More
4	grade	varchar(10)	latin1_swedish_ci		Yes	None			Change Drop More

Conclusion:

Design and implementation of database was done successfully.

Post Lab Descriptive Questions:

1. What are the strategies used schema design
   Following are statergies used in schema design

   Naming conventions:

1. Avoid using just ID as the PK of each table. It will lead to lots of aliasing when joining other tables and returning multiple IDs from several tables.
2. Beware of using SQL Server reserved words (User, Date, etc.) in table names, column names and elsewhere. Use of a reserved word will give a syntax error unless you specify [square brackets] around the value, making development slower and the statements longer.
3. Don't use hyphens, spaces, quotes, etc. Because they will be invalid or require [square brackets]. e.g. SELECT [category-id] FROM [custom-category]
4. Name the tables in the singular, not plural. For example, name the table Customer and Order rather than Customers and Orders. It is obvious that a table contains multiple customers and hopefully not a single row, so the plurality is somewhat redundant and may introduce inconsistency issues with some table names.

2.using proper constraints:
Constraints such as required fields, unique values, allowed values, etc., at the database level can perform additional validation to ensure the integrity of the data. These checks should not be the only place where validation occurs. Validation should be baked into the front end application as well. If the application catches a validation issue, a "pretty" error can be displayed to the end user.

2. What are the strategies used for View Integration explain w.r.t your case study

View integration used in our table is N-ary integration for as multiple user schemas merge into one. Views are used in our case study to show only the required tables as per the user type. Like, assignment answer of students shouldn't be viewed by other students but only the faculty.

3. Why it is important to design the schema and applications in Parallel
   Database design coordinates with the actual view of the database in the system and how it is going to look on the server side. Making factual views of database in the form of various diagrams mentioned above is a process of database design. This is an equally important step apart from implementation because it simplifies the efforts and confusions created while actual implementation. Database implementation is actual database creation on the physical level with the help of database querying languages like SQL or MongoDB. For implementing the database one needs to have a clear view of the system he/she is going to build thus database implementation and design should go hand in hand. When the system is live and we need to add some transactions or constraints onto the database, we again need to make the changes in the physical view. Refer the diagram on page-2 for details regarding this

Date: _____28-8-18_____