COLLEGE MANAGEMENT SYSTEM

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Problem Statement:

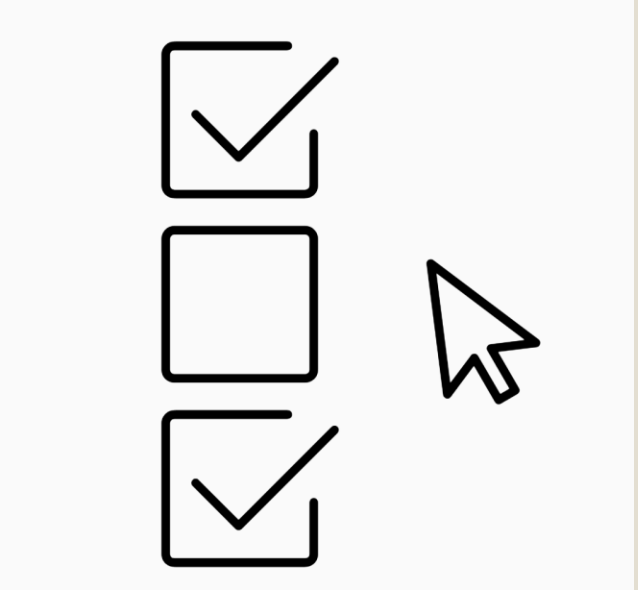
To Develop a DBMS for a College Management System

- A typical medium to large sized college consists of thousands of students, along with hundreds of faculty members and courses in multiple programmes and semesters.
- Some of India's oldest colleges and their enrolments are shown here.
- This massive scale of entities can pose a challenge from the point of view of scheduling classes, events and avoiding clashes.
- Through this project we plan to design an efficient and easy to use database system with a user-friendly front end that can effectively solve this problem for colleges and universities.

Rank	University	Founded	State	Enrollment
1	Indira Gandhi National Open University	1985	Delhi	4,000,000+
2	University of Mumbai	1857	Maharashtra	549,432+
3	University of Pune	1948	Maharashtra	500,000+
4	Dr. B. R. Ambedkar Open University	1982	Telangana	450,000+
5	University of Delhi	1922	Delhi	400,000+
6	Yashwantrao Chavan Maharashtra Open University	1989	Maharashtra	400,000+
7	Sikkim Manipal University	1995	Sikkim	390,000+
8	Osmania University	1918	Telangana	300,000+
9	Uttar Pradesh Technical University	2000	Uttar Pradesh	150,000+
10	Madhya Pradesh Bhoj Open University	1991	Madhya Pradesh	150,000+

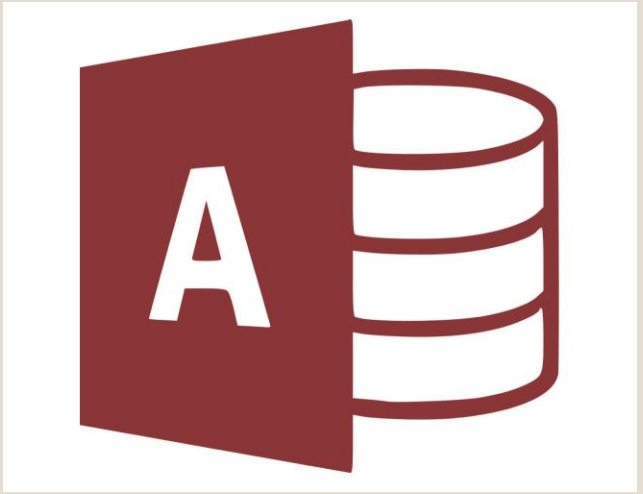
Goals of the project

- Create a database management system to keep track of students and faculty in a college, along with their necessary details.
- Achieving this objective is difficult using a manual system as the information is scattered, can be redundant and collecting relevant information may be very time consuming. This project aims to solve these issues.
- Details of all students and faculty must be stored in a logical and efficient manner.
- Details must be easy to view or modify, as required.



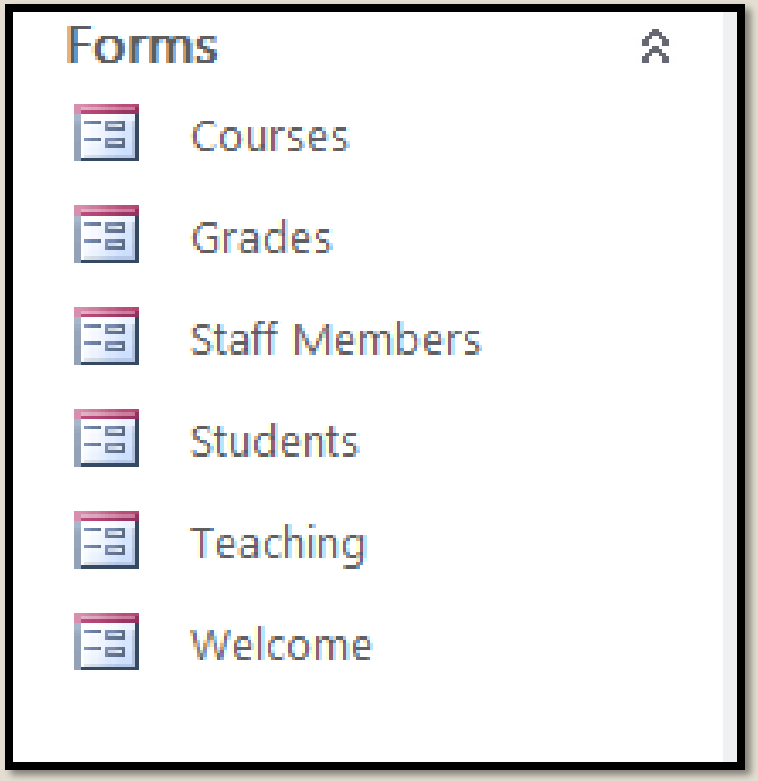
Tools Used

- Back End: Microsoft Access 2016
  - Several tables have been used to store data.
- Front End: Microsoft Access 2016
  - Forms have been used to make the database more user-friendly.
- Microsoft Windows or Linux is required to run this software.

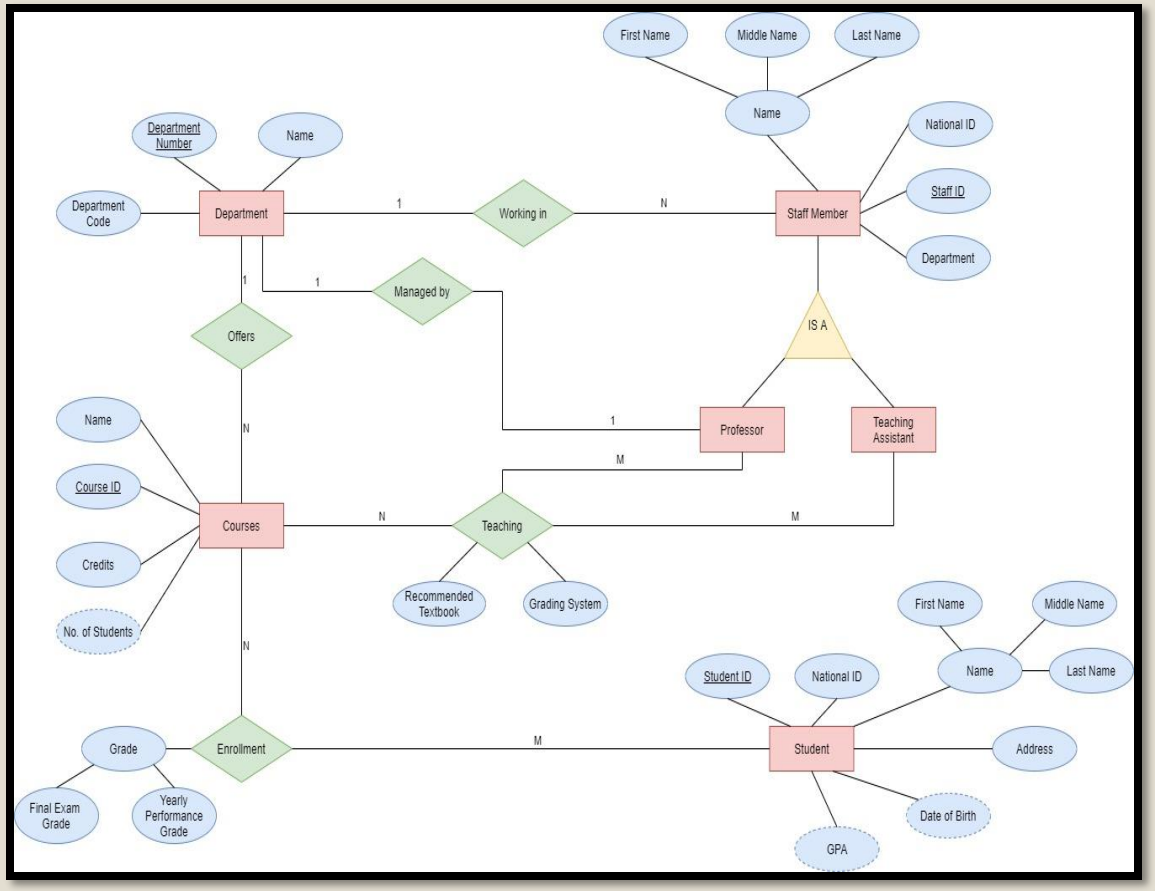


Frontend

- We have used Microsoft Access 2016 for the Frontend.
- We have used macros and forms to design the frontend part in MS Access.
- We created a total of 6 forms.
- They are extremely easy to edit and read the data compared to the tables.
- All the forms are listed in the image.



Backend: ER Diagram and Schema



ER MODEL

STAFF_MEMBER:

STAFF_ID (PK)	FNAME	MNAME	LNAME	NATIONAL_ID	DEPARTMENT_ NUMBER (FK)

STUDENT:

STUDENT_ID (PK)	NATIONAL_ID	FNAME	MNAME	LNAME	ADDRESS

DEPARTMENT:

DEPARTMENT_NUMBER (PK)	DEPARTMENT_CODE	NAME	STAFF_ID (FK) (FOR MANAGER)

COURSE:

COURSE_ID (PK)	NAME	CREDITS	DEPARTMENT_NUMBER (FK)

PROFESSOR:

STAFF_ID (PK)(FK)

TEACHING_ASSISTANT:

STAFF_ID (PK)(FK)

ENROLLMENT:

COURSE_ID (FK)	STUDENT_ID (FK)	YEARLY_PERFORMANCE_GRADE	FINAL_EXAM_GRADE

*primary key of this table is the combination of the first 2 cells

TEACHING:

STAFF_ID (FK) [FROM PROFESSOR RELATION]	STAFF_ID (FK) [FROM TEACHING ASSISTANT RELATION]	COURSE_ID (FK)	GRADING_SYSTEM	RECOMMENDED_MATERIAL

*primary key of this table is the combination of the first 3 cells

RELATIONAL SCHEMA

Backend: Tables

Staff_ID	national_id	fname	lname	mname	Department_number
4CS	123000000619	Sukumesh	Kumar		1
9CS	123000000561	Atharv	Narayan		1
2CS	123000000611	Rishikesh	Sharma		1
6IT	123000000591	Swarna	Ganguly		2
1IT	123000000529	Shyam	Chand	Kaushal	2
5IT	123000000401	Suraj	Nigam		2
9IT	123000000153	Arjun	Bhorkar	Ram	2
2EC	123000000369	Shreya	Soman		3
5EC	123000000625	Rajendra	Bhat	Naveen	3
7EC	123000000751	Jai	Mukhi		3
6EE	123000000824	Chandan	Khatri		4
3EE	123000000493	Riya	Chaudry		4
2EE	123000000409	Tejas	Dhaliwal	Singh	4
8ME	123000000109	Vipul	Ghosh		5
1ME	123000000740	Kailash	Sunder	Pradeep	5
3ME	123000000191	Lal	Arora	Madhu	5

Staff Member (BCNF)

Staff_ID
1IT
1ME
2CS
2EC
3EE
5EC
6EE
6IT
8ME
9CS

Teaching Assistant (BCNF)

Staff_ID
2EE
3ME
4CS
5IT
7EC
9IT

Professor (BCNF)

Course_ID	Student_ID	yearly_perfo	final_exam_grad
CS251	19ICS052	0	0
CS251	19ICS101	0	0
CS251	19ICS111	0	0
CS251	19ICS123	0	0
CS251	19ICS190	0	0
CS251	19ICS191	0	0
CS251	19ICS836	0	0
CS251	19ICS958	0	0
CS254	19ICS052	0	0
CS254	19ICS101	0	0
CS254	19ICS111	0	0
CS254	19ICS123	0	0
CS254	19ICS190	0	0
CS254	19ICS191	0	0
CS254	19ICS836	0	0
CS254	19ICS958	0	0
CS255	19ICS052	0	0
CS255	19ICS101	0	0
CS255	19ICS111	0	0
CS255	19ICS123	0	0
CS255	19ICS190	0	0
CS255	19ICS191	0	0
CS255	19ICS836	0	0
CS255	19ICS958	0	0

Enrollment(BCNF)

Student_ID	national_ID	fname	lname	mname	address
19ICS052	123000000219	Kiran	Bhagat	Chetan	51/6, Chetan House, D B Gupta Road, Karol Bagh, New Delhi, 110005
19ICS101	123000000100	Rakesh	Singh	Dilip	125 /, Shiv Sagar Indl Estate, Babasaheb Kotakar Road, Goregaon , Mumbai, Mahara
19ICS111	123000000254	Rohan	Raghavan		318, Mahavir Ind Estate, M Caves Road, Chakala, Andheri(e)
19ICS123	123000000654	Kabir	Dubey		67,tankrdctptblr-53, Chickpet
19ICS190	123000000900	Himanshu	Barve	Prasad	Sitladevi Temple Road, Near Union Bank, Mahim, Mumbai, Maharashtra 400016
19ICS191	123000000901	Bhupesh	Kumar	Raut	1 A, Ladha Bhai Mansion, Queens Road, Opera House, Mumbai, Maharashtra
19ICS836	123000000174	Asvathama	Ponnada		18-a, 4th Flr, Natraj Studio, Andheri-kurla Road, Pereira Sadan, Andheri(e), Mumbai
19ICS958	123000000570	Avantas	Ghosal		384, Veer Savarkar Marg, Prabhadevi, Mumbai, Maharashtra
19IEC069	123000000250	Rithvik	Shikare		83, Valipalayam, Coimbatore, Tamil Nadu, 641601
19IEC127	123000000321	Manu	Mehta		63, 24/1, S.c.b Building, Agiary Lane, Chira Bazar, Mumbai, Maharashtra, 400002

Student (BCNF)

TABLES(Continued)

Course_ID	Name	Credits	Department_
CS251	Database Systems	4	1
CS254	Database Systems Lab	2	1
CS255	Operating Systems Lab	2	1
CS300	Operating Systems	4	1
EC341	Computer Arithmetic	4	3
EC342	Embedded System Design	4	3
EC344	Analog Integrated Circuits	4	3
EE359	Energy Auditing	4	4
EE360	Microprocessors	4	4
EE361	Power System Communications	4	4
EE362	Operation and control of Power Systems	4	4
IT110	Digital System Design	4	2
IT150	Object Oriented Programming	4	2
IT200	Computer Communication and Networking	4	2
IT202	Data Structures and Algorithms-I	3	2
ME201	Basic Engineering Thermodynamics	4	5
ME202	Fluid Mechanics and Machinery	4	5
ME203	Mechanics of Machinery	4	5
ME204	Basic Manufacturing Processes	4	5
ME251	Applied Thermodynamics	3	5
ME252	Analysis and Design of Machine Components	4	5
ME253	Computer Aided Engineering	3	5

Courses (1NF)

Teaching(BCNF)

Department_	Department_number	Name	Staff_ID(manager)
CS		1 COMPUTER SCIENCE	2CS
IT		2 INFORMATION TECHNOLOGY	1IT
ECE		3 ELECTRONICS AND COMMUNICATION	2EC
EEE		4 ELECTRONICS AND ELECTRICAL	3EE
ME		5 MECHANICAL	1ME

Department(BCNF)

Backend: Normalisation

Normalization of data can be considered a process of analysing the given relation schemas to achieve the desirable properties of

(1) minimizing redundancy and latency

(2) minimizing the insertion, deletion, and update anomalies

- **First Normal Form (1NF):**

Test: Relation should have no multivalued attributes or nested relations.

Example: COURSE relation

- **Second Normal Form (2NF):**

Test: For relations where, primary key contains multiple attributes, no non-key attribute should be functionally dependent on a part of the primary key.

- **Third Normal Form (3NF):**

Test: There should be no transitive dependency of a non-key attribute on the primary key.

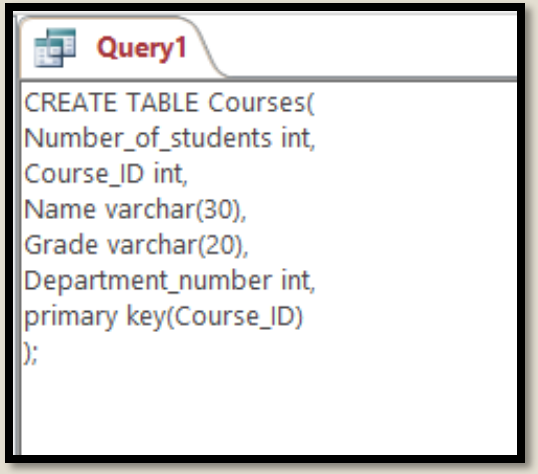
- **Boyce-Codd Normal Form (BCNF):**

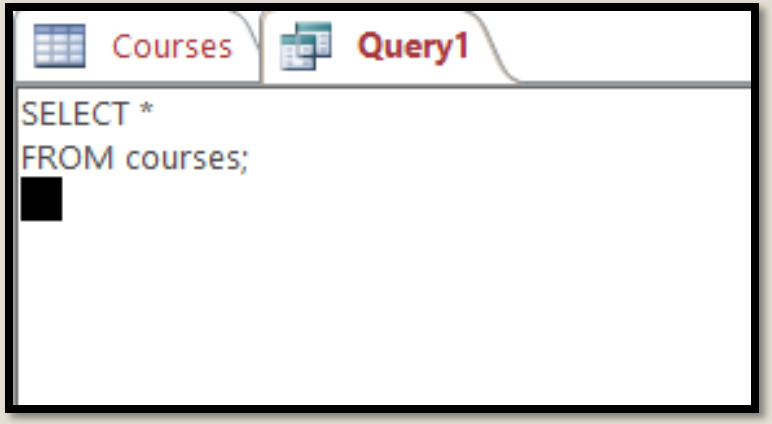
Test: A relation schema R is in BCNF if whenever a nontrivial functional dependency $X \rightarrow A$ holds in R, then X is a superkey of R.

Example: All the relations in our schema except COURSE relation

CRUD

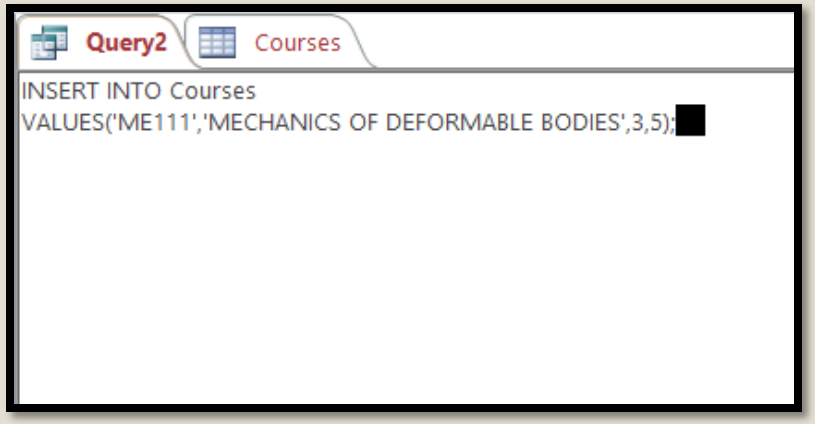
- The full form of CRUD is Create, Read, Update and Delete.
- They are the most basic operations in SQL.
- The queries corresponding to create and read are attached below.

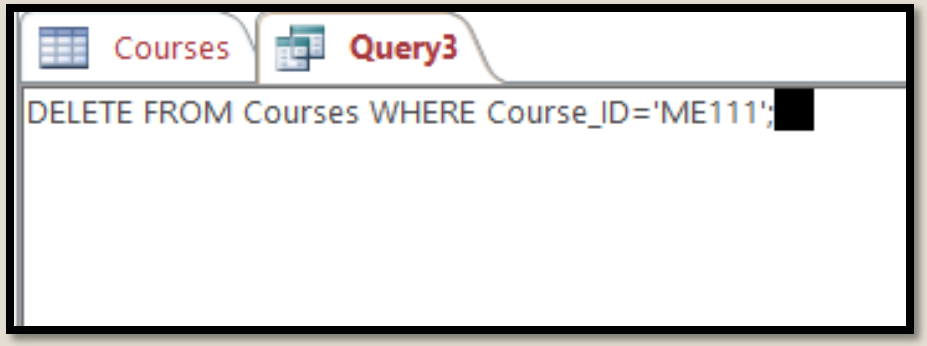




CRUD

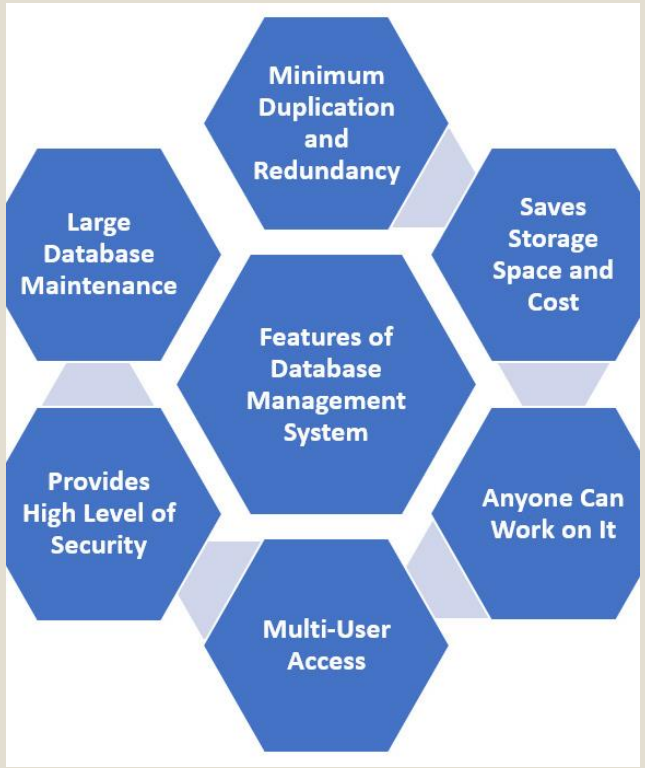
- All the operations are performed on Courses Relation.
- The queries corresponding to update and delete are attached below.





Conclusion

- Using Microsoft Access, we can easily create highly scalable and user-friendly database management systems
- Using proprietary software like Access we can also get a high level of security.
- Normalisation was used to increase speed and computational efficiency and minimize the latency while accessing the data.
- Normalisation also minimized redundancy and duplication of data significantly.
- CRUD operations can be used to manipulate the database while protecting the integrity of the data through application of inbuilt policies in Access.
- Using these tools and techniques we can enable colleges and universities to organize and manage classes and events successfully in a scalable manner.



Any Questions?

THANK YOU