

UNIVERSITY DATABASE MANAGEMENT SYSTEM

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INTRODUCTION

A university database management system (DBMS) is a crucial component of modern educational institutions, serving as a comprehensive software application designed to efficiently handle and organize vast amounts of data associated with university operations. With the increasing complexity of administrative tasks, academic programs, student information, and research activities, a robust DBMS plays a pivotal role in streamlining and centralizing data management processes within universities.

The primary purpose of a university DBMS is to provide a structured and efficient approach to store, retrieve, and manage various types of data related to students, faculty, courses, research projects, and more. It acts as a centralized repository, eliminating the need for disparate data storage systems and manual record-keeping.

PROBLEM

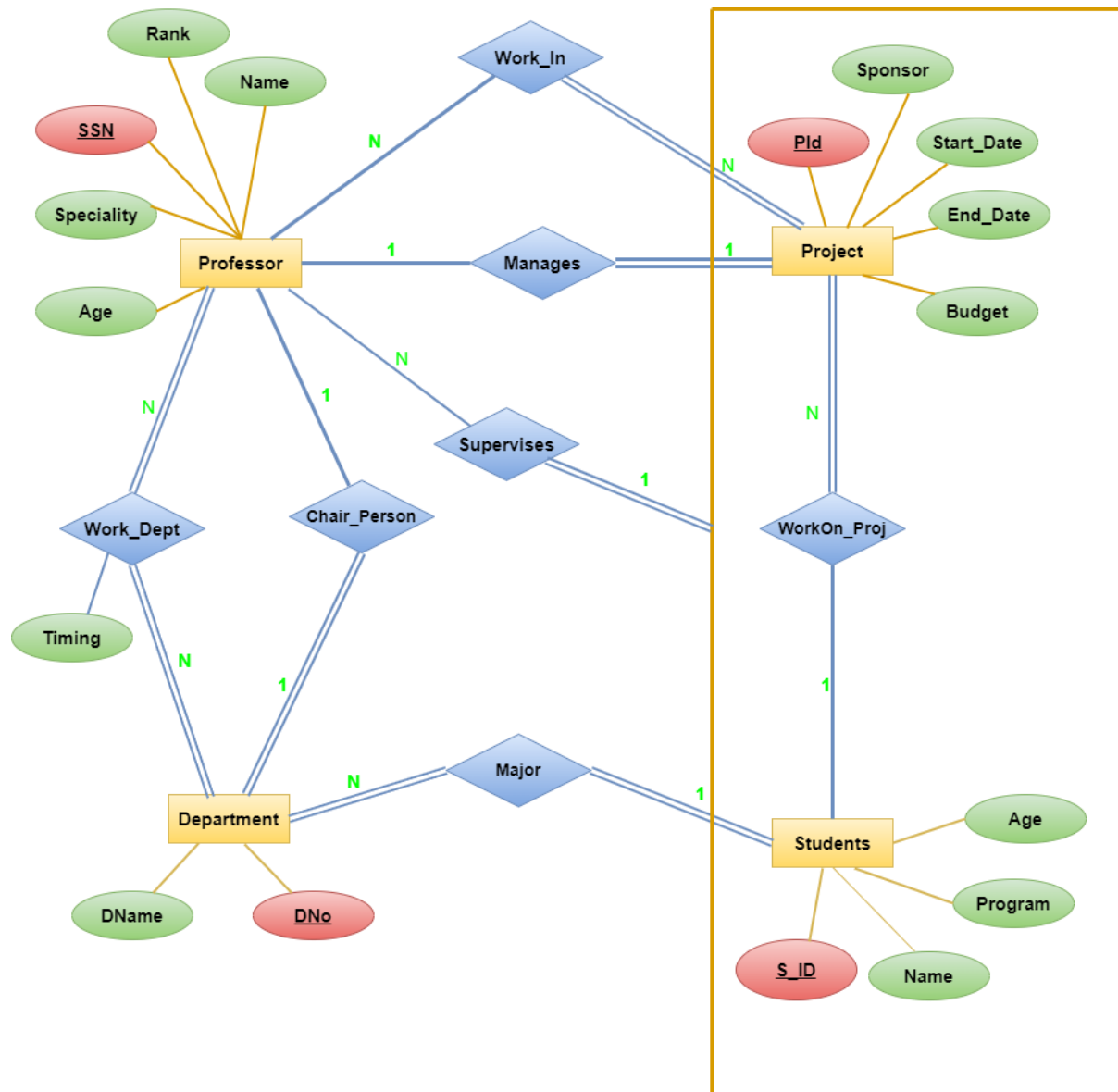
Suppose you are an Database Administrator and are charged with the task of managing all the record of the University.

REQUIREMENT

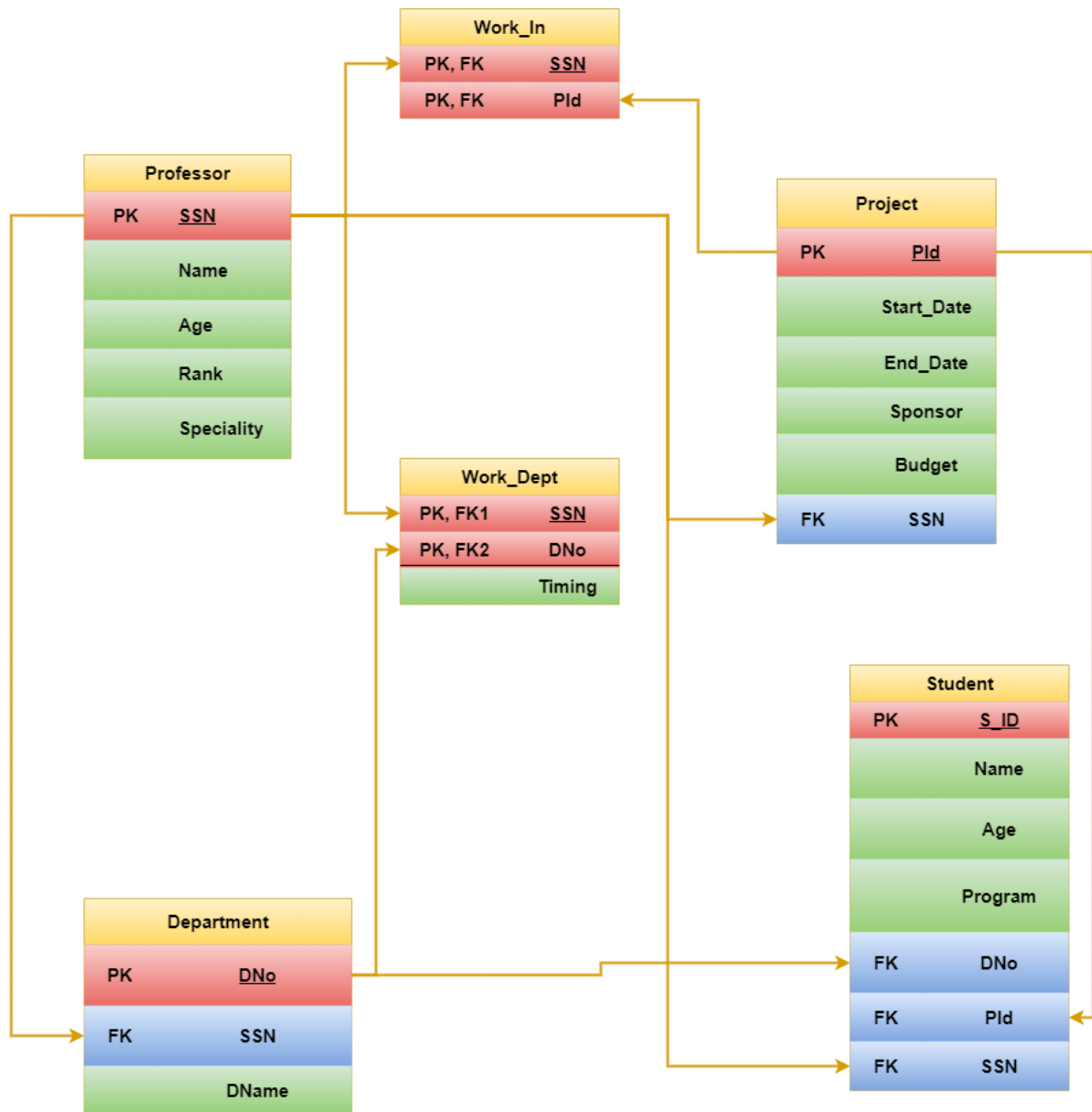
- Professors have an SSN, a name, an age, a rank, and a research specialty.
- Projects have a P_ID, a sponsor name, a starting date, an ending date, and a budget.
- students have an S_ID, a name, an age, and a degree program.
- Each project is managed by one professor.
- Each project is worked on by one or more professors.
- One Professors can work on multiple projects.
- Each project is worked on by one or more graduate students.
- When students work on a project, a professor must supervise their work on the project.

- One student can work on only one project at a time.
- Departments have a department number, a department name.
- Departments have a professor (known as the chairman) who runs the department.
- Professors work in one or more departments, and for each department that they work in, a time percentage is associated with their job.
- Students have one major department in which they are working on their degree.

E-R MODEL



RELATION TABLE



All the Table has been Normalize Till BCNF

NORMALIZATION

Relation : Proffesor (SSN, Name, Age, Rank, Speciality)

FD's : {SSN \rightarrow Name
SSN \rightarrow Age
SSN \rightarrow Rank
SSN \rightarrow Speciality
}

Ans: Here primary key is SSN.

1NF

There is no any multivalued attribute in this relation so it's in 1NF.

2NF

In this relation there is only one prime attribute so it's in 2NF.

3NF

There is no any non prime attribute which derives any non prime attribute that's it proves that it

is in 3NF.

BCNF

In all the functional dependency, deriving attribute is primary key hence it's in BCNF.

Relation : student(S_ID, Name, Age, Program, DNo, PId, SSN)

FD's : { S_ID \rightarrow Name
S_ID \rightarrow Age
S_ID \rightarrow Program
S_ID \rightarrow DNo
S_ID \rightarrow PId
S_ID \rightarrow SSN

}

Ans: Here primary key is S_ID.

1NF

There is no any multivalued attribute in this relation so it's in 1NF.

2NF

In this relation there is only one prime attribute so it's in 2NF.

3NF

There is no any non prime attribute which derives any non prime attribute that's it proves that it

is in 3NF.

BCNF

In all the functional dependency, deriving attribute is primary key hence it's in BCNF.

Relation : work_in(SSN, PId)

FD's : { }

Ans : Here there is no any functional dependency.

And combination of SSN and PId is Primary Key.

So by default it is in BCNF.

Relation : work_Dept(SSN, DNo, Timing)

FD's : {SSN DNo \longrightarrow Timing

}

Ans : Here combination of both SSN and DNo is primary key.

1NF

There is no any multivalued attribute in this relation so it's in 1NF.

2NF

In this relation there is no partial dependency so it's in 2NF.

3NF

There is only one functional dependency so question of transitive dependency doesn't arise. So

. it's in 3NF.

BCNF

The only one functional dependency has primary key has deriving attribute so it is in BCNF.

Relation : Project (PId, Start_Date, End_Date, Sponsor, Budget, SSN)

FD's : { PId \longrightarrow Start_Date
PId \longrightarrow End_Date
PId \longrightarrow Sponsor
PId \longrightarrow Budget
PId \longrightarrow SSN
}

Ans: Here primary key is PId.

1NF

There is no any multivalued attribute in this relation so it's in 1NF.

2NF

In this relation there is only one prime attribute so it's in 2NF.

3NF

There is no any non prime attribute which derives any non prime attribute that's it proves that it is in 3NF.

BCNF

In all the functional dependency, deriving attribute is primary key hence it's in BCNF.

Relation : Department (DNo, DName, SSN)

FD's : {DNo \longrightarrow DName
DNo \longrightarrow SSN
}

Ans: Here primary key is DNo

1NF

There is no any multivalued attribute in this relation so it's in 1NF.

2NF

In this relation there is only one prime attribute so it's in 2NF.

3NF

There is no any non prime attribute which derives any non prime attribute that's it proves that it is in 3NF.

BCNF

In all the functional dependency, deriving attribute is primary key hence it's in BCNF.

SQL SCRIPT IMPLEMENTATION

creating database

```
create database university_database;  
use university_database;
```

creating proffesor Tables

```
CREATE TABLE proffesor (  
    SSN VARCHAR(8) PRIMARY KEY,  
    Name CHAR(20) NOT NULL,  
    Age INT NOT NULL,  
    Ran_K INT NOT NULL,  
    Speciality CHAR(25)  
);
```

Inserting Values in professor Table

```
INSERT INTO proffesor (SSN, Name, Age, Ran_k, Speciality)  
VALUES ('CS01', 'VK', 50, 1, 'SE');  
  
INSERT INTO proffesor (SSN, Name, Age, Ran_k, Speciality)  
VALUES ('CS02', 'Vidyardthi', 53, 2, 'DS'), ('CS03', 'DK Lobiyal', 50, 1,  
'CN'),  
  
('CS04', 'RK Agarwal', 60, 1, 'DAA'), ('CS05', 'Manju Khari', 45, 3, 'CF'),  
('CS06', 'Poonam Agarwal', 40, 2, 'AI');  
  
INSERT INTO proffesor (SSN, Name, Age, Ran_k, Speciality)  
VALUES ('ME01', 'DP Mahto', 43, 1, 'Robotics'), ( 'ME02', 'SK  
Chourasia', 33, 3, 'VLSI'),
```

('PH01', 'Goutam Mukherjee', 55, 1, 'Thermal Physics'), ('PH02', 'Amit Banerjee', 30, 3, 'Photonics'),
 ('PH03', 'Sudipto Chatterjee', 50, 1, 'Mathematics');

select * from professor;

	SSN	Name	Age	Ran_K	Speciality
▶	CS01	VK	50	1	SE
	CS02	Vidyardthi	53	2	DS
	CS03	DK Lobiyal	50	1	CN
	CS04	RK Agarwal	60	1	DAA
	CS05	Manju Khari	45	3	CF
	CS06	Poonam Agarwal	40	2	AI
	ME01	DP Mahto	43	1	Robotics
	ME02	SK Chourasia	33	3	VLSI
	PH01	Goutam Mukherjee	55	1	Thermal Physics
	PH02	Amit Banerjee	30	3	Photonics
	PH03	Sudipto Chatterjee	50	1	Mathematics
✱	NULL	NULL	NULL	NULL	NULL

#Creating Department Table

```
CREATE TABLE department(
    DNo INT NOT NULL UNIQUE,
    DName CHAR(20),
    SSN VARCHAR(8) ,
    PRIMARY KEY(DNo),
    FOREIGN KEY (SSN) REFERENCES proffesor(SSN)
);
```

inserting data into Department Table

```
INSERT INTO department (DNo, DName, SSN) VALUES (1, 'Computer Application', 'CS01');
```

```
INSERT INTO department (DNo, DName, SSN) VALUES (2, 'EE', 'CS02');
```

```
INSERT INTO department (DNo, DName, SSN) VALUES (3, 'Management', 'PH01');
```

```
INSERT INTO department (DNo, DName, SSN) VALUES (4, 'Computer Science', 'PH02');
```

```
(5, 'ME', 'CS03'), (6, 'ECE', 'CS04')
```

Select * from department;

	DNo	DName	SSN
▶	1	Computer Application	CS01
	2	EE	CS02
	3	Management	PH01
	4	Computer Science	PH02
	5	ME	CS03
	6	ECE	CS04
●	NULL	NULL	NULL

creating project table

```
CREATE TABLE project (  
    PId VARCHAR(8) NOT NULL UNIQUE,  
    Start_Date DATE NULL,  
    End_Date DATE NULL,  
    Sponsor CHAR(10) NULL,  
    Budget INT NULL,  
    SSN VARCHAR(8) NULL,  
    PRIMARY KEY (PId),  
    FOREIGN KEY (SSN)  
    REFERENCES proffesor (SSN)  
);
```

inserting data into project table

```
INSERT INTO project (PId, Start_Date, Sponsor, Budget, SSN) VALUES  
( 'P101', '2023-03-02', 'RAJA', 15000, 'CS01');
```

```
INSERT INTO project (PId, Start_Date, Sponsor, Budget, SSN) VALUES  
( 'P102', '2023-04-05', 'Krishna', 10000, 'CS02');
```

```
INSERT INTO project (PId, Start_Date, End_Date, Sponsor, Budget,  
SSN) VALUES ('P103', '2022-06-01', '2023-02-10', 'Amazon', 20000,  
'PH01');
```

```
INSERT INTO project (PId, Start_Date, End_Date, Sponsor, Budget,  
SSN) VALUES
```

```
( 'P104', '2021-01-02', '2022-05-20', 'Microsoft', 30000, 'PH02'), ( 'P105',  
'2020-01-01', '2023-05-05', 'JP Morgan', 50000, 'ME02');
```

Select * from Project;

	PIId	Start_Date	End_Date	Sponsor	Budget	SSN
▶	P101	2023-03-02	NULL	RAJA	15000	CS01
	P102	2023-04-05	NULL	Krishna	10000	CS02
	P103	2022-06-01	2023-02-10	Amazon	20000	PH01
	P104	2021-01-02	2022-05-20	Microsoft	30000	PH02
	P105	2020-01-01	2023-05-05	JP Morgan	50000	ME02
●	NULL	NULL	NULL	NULL	NULL	NULL

creating student table

```
CREATE TABLE student (  
  S_ID VARCHAR(8) NOT NULL UNIQUE,  
  Name CHAR(20) NOT NULL,  
  Age INT NOT NULL,  
  Program CHAR(10) NOT NULL,  
  DNo INT NULL,  
  PId VARCHAR(8) NULL,  
  SSN VARCHAR(8) NULL,  
  PRIMARY KEY (S_ID),  
  FOREIGN KEY (DNo)  
REFERENCES department (DNo),  
  
  FOREIGN KEY (PId)  
REFERENCES project (PId),
```


FOREIGN KEY (SSN)

REFERENCES professor (SSN)

);

inserting values into student table

```
INSERT INTO student (S_ID, Name, Age, Program, DNo, PId, SSN)
VALUES ('MCA01', 'Ankit', 23, 'MCA', 1, 'P101', 'CS01');
```

```
INSERT INTO student (S_ID, Name, Age, Program, DNo, PId, SSN)
VALUES ('MCA02', 'Rohit', 25, 'Mtech', 2, 'P102', 'CS02'),
```

```
('Soni123', 'Soni', 22, 'MCA', 1, 'P105', 'CS06'), ('Krishn57', 'Krishna', 21, 'AI', 4, 'P104', 'ME01'),
```

```
('Ankit05', 'Ankar', 25, 'MSC', 3, 'P103', 'ME02'), ('Prash01', 'Prashant', 45, 'Ph.d', 4, 'P101', 'ME02'),
```

```
('Anup45', 'Anupam', 34, 'MCA', 4, 'P101', 'CS03'), ('Aroo34', 'Aroohi', 20, 'BTech', 5, 'P102', 'CS04'),
```

```
('Kus045', 'Khushi', 23, 'Mtech', 2, 'P103', 'CS04'), ('Sour01', 'Sourav', 34, 'Ph.d', 3, 'P101', 'CS03');
```

Select * from student;

[illegible]

THANK YOU