SPORTS COMPLEX DATABASE MANAGEMENT SYSTEM

Team Members:

Tanmay Jha	Kaivalya Walwadkar	Vedant Nagre
207177	207233	207246
Section A	Section B	Section B

Problem Statement

To create a Database Management System to facilitate the functioning of a Sports Complex with a well structured Database. The database includes various entities like the members and the inventory making it easy to access and update.

Sports Complexes nowadays, are very complicated having hundreds of coaches, employees, players all working for and with each other. Maintaining tabs on their whereabouts and mutual connections and providing them the required tools and machinery and managing the complex has become a very difficult and cumbersome task.

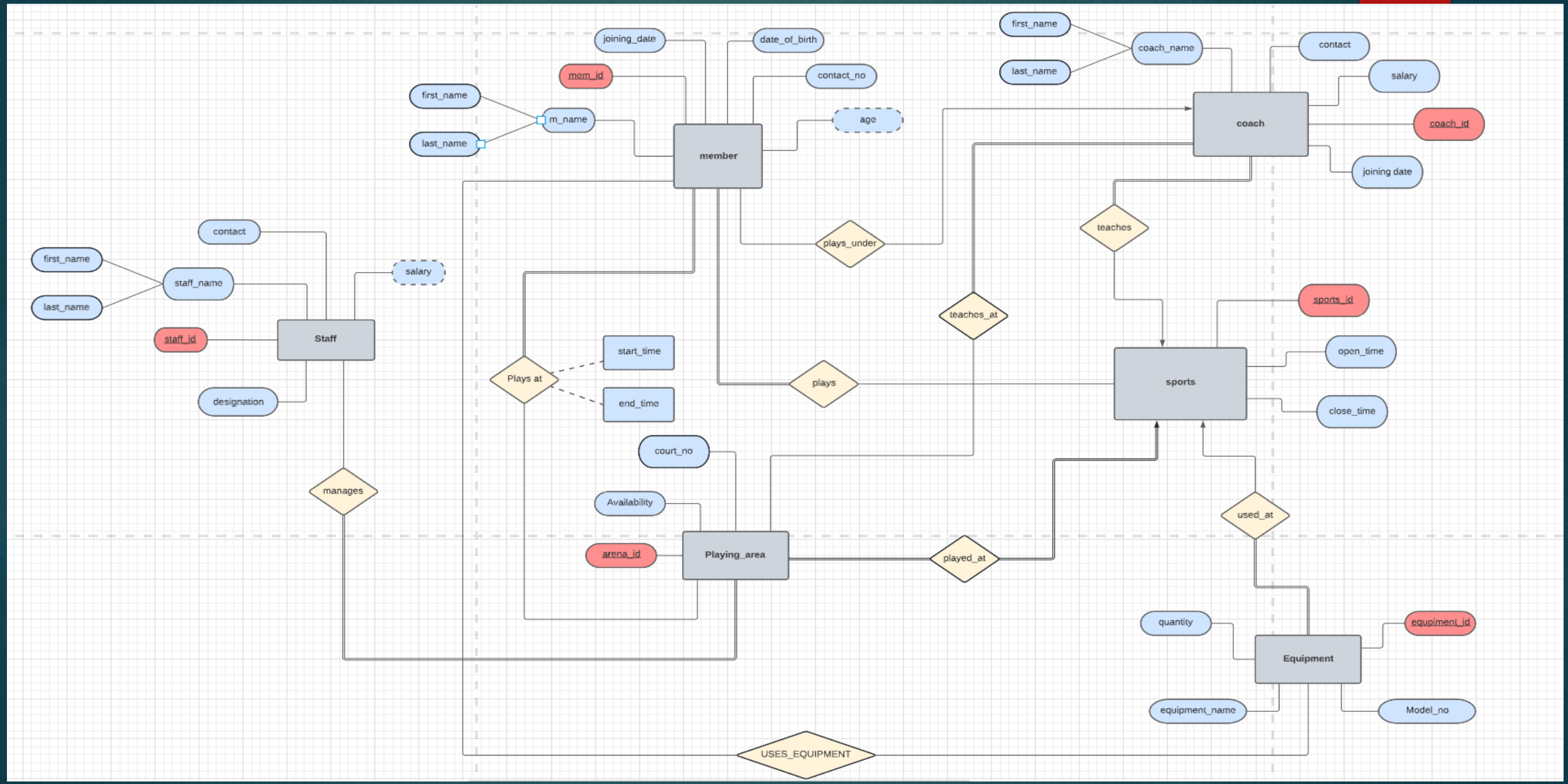
Hence, this database will act as a one time hard work to make most of the tasks in future faster, cheaper and easier to accomplish.

Any required information can be easily accessed from the database by the allowed individuals. The permissions will be granted by the Database Administrator to the required workers to either access or update

Entities:

- Member - People who have paid for a timed or lifetime membership of the sports complex and are authorized to use the complex's resource according to their will.
- Coach - People with more authorization than members who have joined the complex by the intention of teaching and training the member.
- Sports - The sports played in the complex with proper membership count and support from the authority.
- Staff - The employees of the complex such as the managers and security worker are identified by the word staff.
- Playing Area - The various courts, grounds, pitches, etc where the respective sports are played is stored as the 'Playing Area' entity.
- Equipment - The equipment for sports such as Rackets, Bats, Balls, kits, etc are identified by the entity Equipment.

Entity Relationship (ER) Diagram :



Relational Schema :

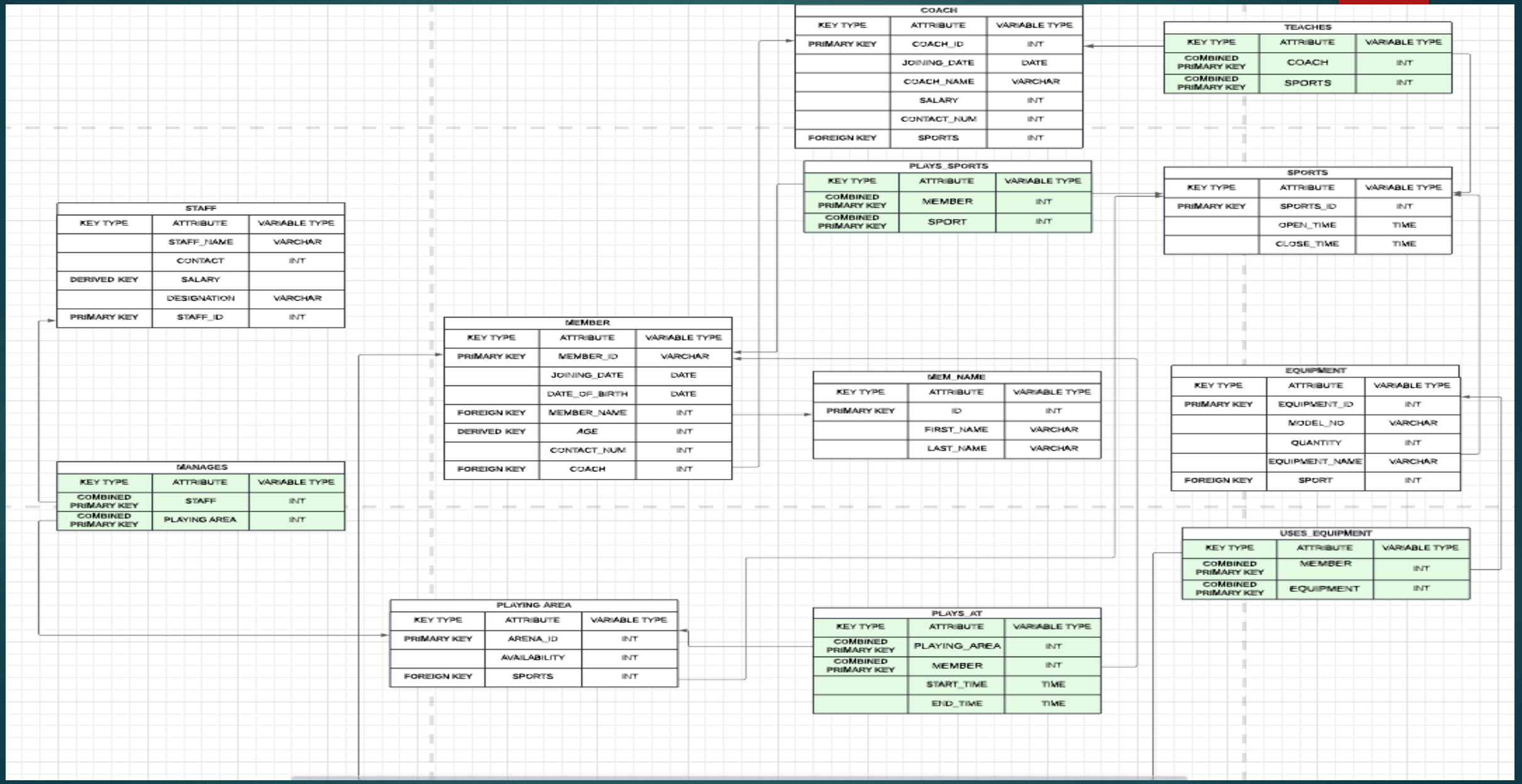


Table Creations

CREATE TABLE coach(coach_id int NOT NULL PRIMARY KEY AUTO_INCREMENT COMMENT 'Primary Key', join_date DATE, coach_name VARCHAR(30), salary INT, contact_no INT);

CREATE TABLE equipment(equipment_id int NOT NULL PRIMARY KEY AUTO_INCREMENT COMMENT 'Primary Key', model_no VARCHAR(20), quantity INT, equipment_name VARCHAR(20), sport INT);

CREATE TABLE mem_name(mem_id int NOT NULL PRIMARY KEY AUTO_INCREMENT COMMENT 'Primary Key', first_name VARCHAR(20), last_name VARCHAR(20));

CREATE TABLE member(mem_id int NOT NULL PRIMARY KEY AUTO_INCREMENT COMMENT 'Primary Key', join_date DATE, date_of_birth DATE, contact_no INT, m_name INT, coach INT);

CREATE TABLE playingarea(arena_id int NOT NULL PRIMARY KEY AUTO_INCREMENT COMMENT 'Primary Key', availability INT, sports INT);

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CREATE TABLE sports(  sports_id int NOT NULL PRIMARY KEY AUTO_INCREMENT COMMENT 'Primary Key',  open_time TIME,  close_time TIME);

CREATE TABLE staff(  staff_id int NOT NULL PRIMARY KEY AUTO_INCREMENT COMMENT 'Primary Key',  staff_name VARCHAR(30),  contact INT,  designation VARCHAR(20));

CREATE TABLE teaches(  coach INT,  sports INT,  PRIMARY KEY (coach, sports));

CREATE TABLE uses_equipment(  member INT,  equipment INT,  PRIMARY KEY (member, equipment));CREATE TABLE manages(  staff INT,  playingarea INT,  PRIMARY KEY (staff, playingarea));

CREATE TABLE plays_sports(  member INT,  sports INT,  PRIMARY KEY (member, sports));

CREATE TABLE plays_at(  playingarea INT,  member INT,  start_time TIME,  end_time TIME,  PRIMARY KEY (playingarea, member));
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ALTER TABLE coachADD FOREIGN KEY (sports) REFERENCES sports(sports_id) ON DELETE CASCADE;

ALTER TABLE equipmentADD FOREIGN KEY (sport) REFERENCES sports(sports_id) ON DELETE CASCADE;

ALTER TABLE memberADD FOREIGN KEY (m_name) REFERENCES mem_name(id) ON DELETE CASCADE;

ALTER TABLE memberADD FOREIGN KEY (coach) REFERENCES coach(coach_id) ON DELETE CASCADE;

ALTER TABLE playingareaADD FOREIGN KEY (sports) REFERENCES sports(sports_id) ON DELETE CASCADE;

ALTER TABLE managesADD FOREIGN KEY (staff) REFERENCES staff(staff_id) ON DELETE CASCADE;

ALTER TABLE managesADD FOREIGN KEY (playingarea) REFERENCES playingarea(arena_id) ON DELETE CASCADE;

ALTER TABLE plays_atADD FOREIGN KEY (playingarea) REFERENCES playingarea(arena_id) ON DELETE CASCADE;

ALTER TABLE plays_atADD FOREIGN KEY (member) REFERENCES member(member_id) ON DELETE CASCADE;

ALTER TABLE uses_equipmentADD FOREIGN KEY (member) REFERENCES member(member_id); ON DELETE CASCADE;

ALTER TABLE uses_equipmentADD FOREIGN KEY (equipment) REFERENCES equipment(equipment_id) ON DELETE CASCADE;

ALTER TABLE teachesADD FOREIGN KEY (coach) REFERENCES coach(coach_id) ON DELETE CASCADE;

ALTER TABLE teachesADD FOREIGN KEY (sports) REFERENCES sports(sports_id) ON DELETE CASCADE;

- -- coach
- INSERT INTO coach VALUES(101, '2017-12-09', 'Siddhant', 10000, 86684);
- INSERT INTO coach VALUES(102, '2017-11-12', 'Manoj', 12000, 456987);
- INSERT INTO coach VALUES(103, '2017-11-13', 'Vedant', 12000, 456987);
- INSERT INTO coach VALUES(104, '2017-12-11', 'Tanmay', 10000, 86684);
- INSERT INTO coach VALUES(105, '2017-11-14', 'Kaimvalya', 12000, 456987);
- INSERT INTO coach VALUES(106, '2017-12-12', 'Gayatri', 10000, 86684);
- INSERT INTO coach VALUES(107, '2017-11-15', 'Prudhvi', 12000, 456987);
- INSERT INTO coach VALUES(108, '2017-12-13', 'Shraman', 10000, 86684);
- INSERT INTO coach VALUES(109, '2017-11-16', 'ManojAnna', 12000, 456987);
- INSERT INTO coach VALUES(110, '2017-12-14', 'ManojRao', 10000, 86684);
- INSERT INTO coach VALUES(111, '2017-11-17', 'ManojBhai', 12000, 456987);
- INSERT INTO coach VALUES(112, '2017-12-15', 'Yash', 10000, 86684);
- INSERT INTO coach VALUES(113, '2017-11-18', 'Yamsh', 12000, 456987);
- INSERT INTO coach VALUES(114, '2017-12-16', 'Simdhant', 10000, 86684);

- -- sports;
- INSERT INTO SPORTS VALUES(11, TIME("06:15:00"), TIME("14:15:00"));
- INSERT INTO SPORTS VALUES(12, TIME("05:20:00"), TIME("13:20:00"));
- INSERT INTO SPORTS VALUES(13, TIME("08:30:00"), TIME("15:25:00"));
- INSERT INTO SPORTS VALUES(14, TIME("09:00:00"), TIME("14:45:00"));
- INSERT INTO SPORTS VALUES(15, TIME("05:45:00"), TIME("14:45:00"));-- equipment;
- INSERT INTO equipment VALUES(1111, 'A777', 2200, 'Racquet', 11);
- INSERT INTO equipment VALUES(1122, 'A555', 220, 'Shuttle', 11);
- INSERT INTO equipment VALUES(1133, 'A222', 1704, 'Net', 11);
- INSERT INTO equipment VALUES(1144, 'E111', 2300, 'Bat', 12);
- INSERT INTO equipment VALUES(1155, 'F444', 1540, 'stumps', 12);
- INSERT INTO equipment VALUES(1166, 'C123', 906, 'Shin Pads', 14);
- INSERT INTO equipment VALUES(1177, 'A321', 600, 'FootBall', 14);
- INSERT INTO equipment VALUES(1188, 'B523', 2375, 'VolleyBall', 13);
- INSERT INTO equipment VALUES(1199, 'A098', 8700, 'Cricket Kit', 12);

- --mem_name
- INSERT INTO mem_name VALUES(11,'Ramanujan','Srinivasa');
- INSERT INTO mem_name VALUES(12,'Shakuntala','Devi');
- INSERT INTO mem_name VALUES(13,'Vedanta','Pythagorusa');
- INSERT INTO mem_name VALUES(14,'Expecto','Patronum');
- INSERT INTO mem_name VALUES(15,'Avada','Kadabra');
- INSERT INTO mem_name VALUES(16,'Accio','Horcrux');
- INSERT INTO mem_name VALUES(17,'Firebolt','Nimbus');
- INSERT INTO mem_name VALUES(18,'Sirius','Black');
- INSERT INTO mem_name VALUES(19,'Remus','Lupin');
- INSERT INTO mem_name VALUES(20,'Harry','Potter');
- INSERT INTO mem_name VALUES(21,'Ronald','Weasley');
- INSERT INTO mem_name VALUES(22,'Bilbo','Baggins');
- INSERT INTO mem_name VALUES(23,'Aragorn','Elessar');

- -- member
- INSERT INTO member VALUES(11,'2019-12-08','1992-10-01',12323,11,112);
- INSERT INTO member VALUES(12,'2020-01-09','1889-10-01',86234,12,111);
- INSERT INTO member VALUES(13,'2019-03-07','2000-10-01',25362,13,110);
- INSERT INTO member VALUES(14,'2018-11-10','1980-10-01',74822,14,109);
- INSERT INTO member VALUES(16,'2018-08-06','2000-10-01',53627,15,108);
- INSERT INTO member VALUES(15,'2021-12-11','2000-10-01',35312,16,107);
- INSERT INTO member VALUES(17,'2018-08-05','2000-10-01',23462,17,106);
- INSERT INTO member VALUES(18,'2017-05-12','2000-10-01',12331,18,105);
- INSERT INTO member VALUES(19,'2021-08-04','2000-10-01',56542,19,104);
- INSERT INTO member VALUES(20,'2022-03-13','2000-10-01',56754,20,103);
- INSERT INTO member VALUES(21,'2018-08-03','2000-10-01',23411,21,102);
- INSERT INTO member VALUES(22,'2019-08-14','2000-10-01',12323,22,101);
- INSERT INTO member VALUES(23,'2019-03-02','2000-10-01',12323,23,113);

- --playing area
- INSERT INTO playingarea VALUES(11, 1, 11);
- INSERT INTO playingarea VALUES(12, 0, 11);
- INSERT INTO playingarea VALUES(13, 0, 12);
- INSERT INTO playingarea VALUES(14, 1, 12);
- INSERT INTO playingarea VALUES(15, 1, 13);
- INSERT INTO playingarea VALUES(16, 0, 14);
- INSERT INTO playingarea VALUES(17, 0, 14);
- INSERT INTO playingarea VALUES(18, 0, 14);
- INSERT INTO playingarea VALUES(19, 1, 12);
- INSERT INTO playingarea VALUES(20, 0, 11);
- INSERT INTO playingarea VALUES(21, 0, 14);

- --staff
- INSERT INTO staff VALUES(11, 'Sid', 23463, 'Sweeper');
- INSERT INTO staff VALUES(12, 'Siddhant', 23453, 'Manager');
- INSERT INTO staff VALUES(13, 'Siddhu', 23763, 'Sweeper');
- INSERT INTO staff VALUES(14, 'Siddhi', 23423, 'Sweeper');
- INSERT INTO staff VALUES(15, 'SidRam', 23423, 'Admin');
- INSERT INTO staff VALUES(16, 'Pankya', 34234, 'Watchman');
- INSERT INTO staff VALUES(17, 'Pinky', 65757, Cleaner');
- INSERT INTO staff VALUES(18, 'Funky', 46563, 'Accountant');
- INSERT INTO staff VALUES(19, 'Saddy', 34532, 'Receptionist');
- INSERT INTO staff VALUES(20, 'Maddy', 89782, 'Supervisor';

- --MANAGES TABLE
- INSERT INTO MANAGES VALUES(11, 11);
- INSERT INTO MANAGES VALUES(12, 13);
- INSERT INTO MANAGES VALUES(15, 16);
- INSERT INTO MANAGES VALUES(18, 19);
- INSERT INTO MANAGES VALUES(182q, 11);
- INSERT INTO MANAGES VALUES(14, 16);
- INSERT INTO MANAGES VALUES(15, 18);
- INSERT INTO MANAGES VALUES(16, 14);
- INSERT INTO MANAGES VALUES(17, 11);

- --plays at
- INSERT INTO plays_at VALUES(21, 22, '21:30:00', '23:30:00');
- INSERT INTO plays_at VALUES(19, 18, '20:30:00', '22:30:00');
- INSERT INTO plays_at VALUES(12, 14, '19:30:00', '21:30:00');
- INSERT INTO plays_at VALUES(11, 16, '18:30:00', '20:30:00');
- INSERT INTO plays_at VALUES(15, 21, '02:30:00', '19:30:00');
- INSERT INTO plays_at VALUES(16, 23, '05:30:00', '18:30:00');

- --Uses equipment
- INSERT INTO USES_EQUIPMENT VALUES(11, 1122);
- INSERT INTO USES_EQUIPMENT VALUES(12, 1144);
- INSERT INTO USES_EQUIPMENT VALUES(13, 1166);
- INSERT INTO USES_EQUIPMENT VALUES(14, 1177);
- INSERT INTO USES_EQUIPMENT VALUES(15, 1199);
- INSERT INTO USES_EQUIPMENT VALUES(16, 1188);
- INSERT INTO USES_EQUIPMENT VALUES(17, 1111);
- INSERT INTO USES_EQUIPMENT VALUES(18, 1155);
- INSERT INTO USES_EQUIPMENT VALUES(19, 1133);

- --plays sports
- INSERT INTO plays_sports VALUES(11, 11);
- INSERT INTO plays_sports VALUES(12, 13);
- INSERT INTO plays_sports VALUES(14, 11);
- INSERT INTO plays_sports VALUES(11, 12);
- INSERT INTO plays_sports VALUES(16, 12);
- INSERT INTO plays_sports VALUES(19, 15);
- INSERT INTO plays_sports VALUES(23, 11);
- INSERT INTO plays_sports VALUES(19, 13);
- INSERT INTO plays_sports VALUES(14, 12);
- INSERT INTO plays_sports VALUES(12, 14);
- INSERT INTO plays_sports VALUES(12, 15);
- INSERT INTO plays_sports VALUES(14, 13);

- --teaches
- INSERT INTO teaches VALUES (101,11);
- INSERT INTO teaches VALUES (101,13);
- INSERT INTO teaches VALUES (102,15);
- INSERT INTO teaches VALUES (103,12);
- INSERT INTO teaches VALUES (105,14);
- INSERT INTO teaches VALUES (105,15);
- INSERT INTO teaches VALUES (101,14);
- INSERT INTO teaches VALUES (103,15);
- INSERT INTO teaches VALUES (104,14);
- INSERT INTO teaches VALUES (105,13);

NORMALIZATION TECHNIQUES INVOLVED AND UTILISED

STAFF		
KEY TYPE	ATTRIBUTE	VARIABLE TYPE
	STAFF_NAME	VARCHAR
	CONTACT	INT
DERIVED KEY	SALARY	
	DESIGNATION	VARCHAR
PRIMARY KEY	STAFF_ID	INT

TABLE NAME – **STAFF**

CANDIDATE KEY SET → {STAFF_ID , CONTACT}
PRIME ATTRIBUTES → {STAFF_ID}
NON-PRIME ATTRIBUTES → {CONTACT,SALARY,DESIGNATION,STAFF_NAME}

1NF – THE VALUES IN THE TABLE OBEY THE 1NF DISTRIBUTION AS THERE ARE NO MULTIVALUED OR COMPOSITE ATTRIBUTES.

2NF – THE CANDIDATE KEY OF THE GIVEN TABLE IS STAFF_ID AND REST ARE NON PRIME ATTRIBUTES.
IF THE NON PRIME ATTRIBUTES DEPEND ON ANY PROPER SUBSET OF THE CANDIDATE KEY THEN THE TABLE VIOLATES THE SECOND NORMAL FORM.

3NF - IF THERE EXISTS ANY TRANSITIVE DEPENDENCY IN THE TABLE THEN THE RULE OF THE 3NF IS VIOLATED.

BCNF – ALL ATTRIBUTES OF THE TABLE SHOULD BE REFERENCED BY A SUPER KEY.

NORMALIZATION TECHNIQUES INVOLVED AND UTILISED

MEMBER		
KEY TYPE	ATTRIBUTE	VARIABLE TYPE
PRIMARY KEY	MEMBER_ID	VARCHAR
	JOINING_DATE	DATE
	DATE_OF_BIRTH	DATE
FOREIGN KEY	MEMBER_NAME	INT
DERIVED KEY	AGE	INT
	CONTACT_NUM	INT
FOREIGN KEY	COACH	INT

TABLE NAME – **MEMBER**

CANDIDATE KEY SET → {MEMBER _ID, CONTACT_NUM}
PRIME ATTRIBUTES → {MEMBER_ID, CONTACT_NUM}
NON-PRIME ATTRIBUTES → {JOINING_DATE,DATE_OF_BIRTH, MEMBER_NAME,AGE}

1NF – THE ATTRIBUTE MEMBER_NAME IS COMPOSED OF TWO PARTS, THE FIRST NAME AND THE SECOND NAME, THIS IS A VIOLATION OF THE 1NF RULE AS ONE CANNOT HAVE MULTIVALUED ATTRIBUTES OR COMPOSITE ATTRIBUTES.
TO SOLVE THIS PROBLEM WE DECOMPOSE THE TABLE INTO TWO SEPARATE TABLES, MEMBER → {FIRST NAME, MEMBER_ID , JOINING DATE, DATE_OF_BIRTH} AND {LAST NAME, MEMBER_ID};
2NF – THE CANDIDATE KEY OF THE GIVEN TABLE IS STAFF_ID AND REST ARE NON PRIME ATTRIBUTES.
IF THE NON PRIME ATTRIBUTES DEPEND ON ANY PROPER SUBSET OF THE CANDIDATE KEY THEN THE TABLE VIOLATES THE SECOND NORMAL FORM.

3NF - IF THERE EXISTS ANY TRANSITIVE DEPENDENCY IN THE TABLE THEN THE RULE OF THE 3NF IS VIOLATED. THERE EXISTS NO TRANSITVE DEPENDENCY IN MEMBER.

BCNF – ALL ATTRIBUTES OF THE TABLE SHOULD BE REFERENCED BY A SUPER KEY.

NORMALIZATION TECHNIQUES INVOLVED AND UTILISED

PLAYING AREA		
KEY TYPE	ATTRIBUTE	VARIABLE TYPE
PRIMARY KEY	ARENA_ID	INT
	AVAILABILITY	INT
FOREIGN KEY	SPORTS	INT

TABLE NAME – **PLAYING AREA**

CANDIDATE KEY SET → {ARENA_ID}
PRIME ATTRIBUTES → {ARENA_ID}
NON-PRIME ATTRIBUTES → {AVAILABILITY}

1NF- SINCE THERE ARE NO MULTIVALUED OR COMPOSITE ATTRIBUTES IN THE TABLE THE TABLE OBEYS 1NF.

2NF – CANDIDATE KEY REFERENCES ALL ATTRIBUTES SO 2NF IS AUTOMATIC.
3NF - IF THERE EXISTS ANY TRANSITIVE DEPENDENCY IN THE TABLE THEN THE RULE OF THE 3NF IS VIOLATED. THERE EXISTS NO TRANSITVE DEPENDENCY IN MEMBER.

BCNF – ALL ATTRIBUTES OF THE TABLE SHOULD BE REFERENCED BY A SUPER KEY.

NORMALIZATION TECHNIQUES INVOLVED AND UTILISED

EQUIPMENT		
KEY TYPE	ATTRIBUTE	VARIABLE TYPE
PRIMARY KEY	EQUIPMENT_ID	INT
	MODEL_NO	VARCHAR
	QUANTITY	INT
	EQUIPMENT_NAME	VARCHAR
FOREIGN KEY	SPORT	INT

TABLE NAME – **EQUIPMENT**

CANDIDATE KEY SET → {EQUIPMENT_ID, MODEL_NO}
PRIME ATTRIBUTES → {EQUIPMENT_ID, MODEL_NO}
NON-PRIME ATTRIBUTES → {QUANTITY, EQUIPMENT_NAME}

1NF – THE VALUES IN THE TABLE OBEY THE 1NF DISTRIBUTION AS THERE ARE NO MULTIVALUED OR COMPOSITE ATTRIBUTES.

2NF – IF THE NON PRIME ATTRIBUTES DEPEND ON ANY PROPER SUBSET OF THE CANDIDATE KEY THEN THE TABLE VIOLATES THE SECOND NORMAL FORM.

3NF - IF THERE EXISTS ANY TRANSITIVE DEPENDENCY IN THE TABLE THEN THE RULE OF THE 3NF IS VIOLATED.

BCNF – ALL ATTRIBUTES OF THE TABLE SHOULD BE REFERENCED BY A SUPER KEY.
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NORMALIZATION TECHNIQUES INVOLVED AND UTILISED

COACH		
KEY TYPE	ATTRIBUTE	VARIABLE TYPE
PRIMARY KEY	COACH_ID	INT
	JOINING_DATE	DATE
	COACH_NAME	VARCHAR
	SALARY	INT
	CONTACT_NUM	INT
FOREIGN KEY	SPORTS	INT

TABLE NAME – **COACH**

CANDIDATE KEY SET → {COACH_ID}
PRIME ATTRIBUTES → {COACH_ID}
NON-PRIME ATTRIBUTES → {JOINING_DATE,COACH_NAME,SALARY,CONTACT_NUM}

1NF – THE VALUES IN THE TABLE OBEY THE 1NF DISTRIBUTION AS THERE ARE NO MULTIVALUED OR COMPOSITE ATTRIBUTES.

2NF – IF THE NON PRIME ATTRIBUTES DEPEND ON ANY PROPER SUBSET OF THE CANDIDATE KEY THEN THE TABLE VIOLATES THE SECOND NORMAL FORM.

3NF - IF THERE EXISTS ANY TRANSITIVE DEPENDENCY IN THE TABLE THEN THE RULE OF THE 3NF IS VIOLATED.

BCNF – ALL ATTRIBUTES OF THE TABLE SHOULD BE REFERENCED BY A SUPER KEY.
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NORMALIZATION TECHNIQUES INVOLVED AND UTILISED

SPORTS		
KEY TYPE	ATTRIBUTE	VARIABLE TYPE
PRIMARY KEY	SPORTS_ID	INT
	OPEN_TIME	TIME
	CLOSE_TIME	TIME

TABLE NAME – SPORTS

CANDIDATE KEY SET → {SPORTS_ID}
PRIME ATTRIBUTES → {SPORTS_ID}
NON-PRIME ATTRIBUTES → {OPEN_TIME, CLOSE_TIME}

1NF – THE VALUES IN THE TABLE OBEY THE 1NF DISTRIBUTION AS THERE ARE NO MULTIVALUED OR COMPOSITE ATTRIBUTES.

2NF – IF THE NON PRIME ATTRIBUTES DEPEND ON ANY PROPER SUBSET OF THE CANDIDATE KEY THEN THE TABLE VIOLATES THE SECOND NORMAL FORM.

3NF - IF THERE EXISTS ANY TRANSITIVE DEPENDENCY IN THE TABLE THEN THE RULE OF THE 3NF IS VIOLATED.

BCNF – ALL ATTRIBUTES OF THE TABLE SHOULD BE REFERENCED BY A SUPER KEY.

Query

- select * from staff s natural join manages m natural join playingarea p where s.staff_id=m.staff and m.playingarea=p.arena_id;

	staff_id int	staff_name varchar(30)	contact int	designation varchar(20)	staff	playingarea	arena_id	availability	sports
1	11	Sid	23463	Sweeper	11	11	11	1	11
2	17	Pinky	65757	Inventerer	17	11	11	1	11
3	19	Saddy	34532	Receptionist	19	11	11	1	11
4	12	Siddhant	23453	Manager	12	13	13	0	12
5	16	Pankya	34234	Watchman	16	14	14	1	12
6	14	Siddhi	23423	Sweeper	14	16	16	0	14
7	15	SidRam	23423	Admin	15	16	16	0	14
8	15	SidRam	23423	Admin	15	18	18	0	14
9	18	Funky	46563	Accountant	18	19	19	1	12