Data And Application
Project Phase 3

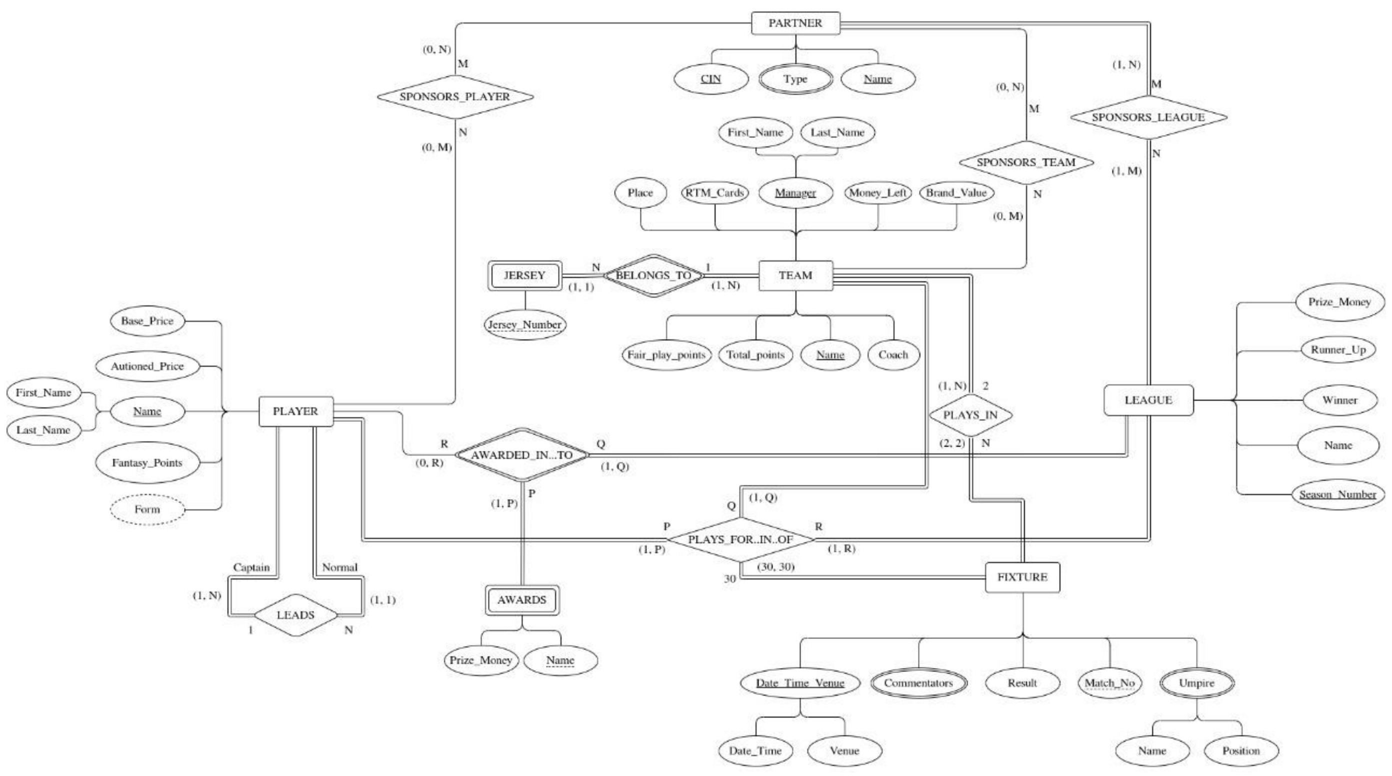
IPL FANTASY LEAGUE

Improvements in ER Model and the System in General:

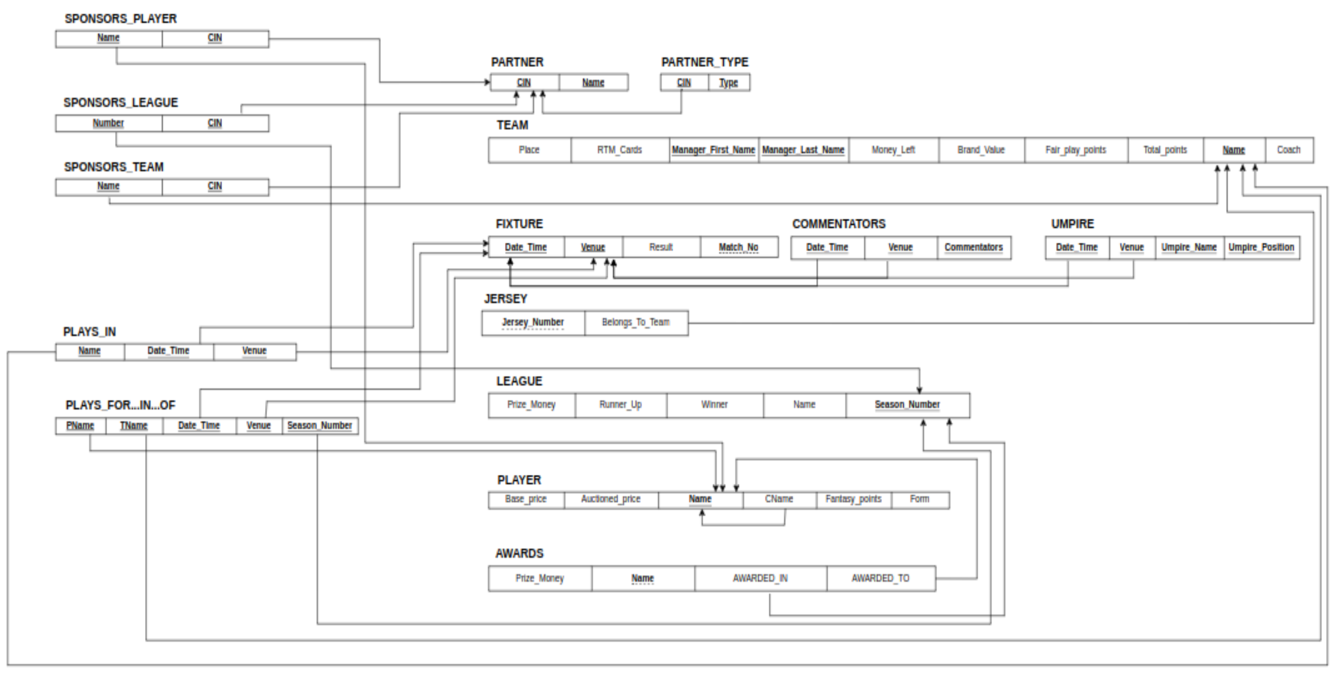
ER Model to Relational Model:

Below steps describe the steps of an algorithm for ER-to-relational mapping. The **LEAGUE** ER Schema is shown below, and the corresponding **LEAGUE** relational database schema followed by it to illustrate the mapping steps. Our mapping will create tables with simple single-valued attributes. The relational model constraints which include primary keys and referential integrity constraints on the relations will also be specified in the mapping results.

Entity Relationship Schema



Relational Database Schema



Step 1: Mapping of Regular Entity Types:

For each regular (strong entity) type E in the ER schema we created a relation R that includes all the simple attributes of E. We included only the simple component attributes of a composite attribute. We chose one of the key attributes of E as the primary key of R. If the chosen key of E is composite, then the set of simple attributes that formed it were together denoted as the primary key of R. In our case,

- The composite attribute Date_Time_Venue of "FIXTURE" was converted to simple attributes Date_Time and Venue
- The composite attribute Manager of "TEAM" was converted to simple attributes Manager_First_Name and Manager_Last_Name

Step 2: Mapping of Weak Entity Types:

For each weak entity type W in the ER schema with owner entity type E, we created a relation R and included all its simple attributes (or simple components of composite attributes) of W as attributes of R. In addition, include as foreign key attributes of R, the primary key attribute(s) of the relation(s) that correspond to the owner entity type(s) (this takes care of mapping the identifying relationship type of W). In our case,

- The relation "JERSEY" was created with Jersey_Number as a partial key and Belongs_To_Team as a foreign key referencing <u>Name</u> of "TEAM".
- The relation "AWARDS" was created with Prize_Money as simple attribute and Name as partial key. The identifying relationships are AWARDED_IN and AWARDED_TO where AWARDED_IN is a foreign key referencing <u>Season_Number</u> of "LEAGUE" and AWARDED_TO is a foreign key referencing <u>Name</u> of "PLAYER".

Step 3: Mapping of Binary 1:1 Relationship Types:

No Binary 1:1 Relationship Types exists in our schema

Step 4: Mapping of Binary 1:N Relationship Types:

We have employed the **foreign key approach** which identifies the relation S that represents the participating entity type at the N-side of the relationship type for each regular binary 1:N Relationship type R and includes as foreign key in S the primary key of the relation T that represents the other entity type participating in R. In our case,

- CName has been added as a foreign key to "PLAYER" referencing <u>Name</u> of "PLAYER" to denote the "LEADS" relation such that player "CName" LEADS a player "Name"
- The "PLAYS_IN" relation was created with Name as a foreign key referencing <u>Name</u> of "TEAM", Date_Time as a foreign key referencing <u>Date_Time</u> of "FIXTURE" and Venue as a foreign key referencing <u>Venue</u> of "FIXTURE"

Step 5: Mapping of Binary M:N Relationship Types:

We have employed the **Relationship relation / cross-reference approach**. For each binary M:N relationship type R, we created a new relation S to represent R. Include as foreign key attributes in S the primary keys of the relations that represent the participating entity types; their combination will form the primary key of S. Also, we included any simple attributes of the M:N relationship type (or simple components of composite attributes) as attributes of S. In our case,

- The relation "SPONSORS_PLAYER" was created with Name as a foreign key referencing <u>Name</u> of "PLAYER" and CIN as a foreign key referencing <u>CIN</u> of "PARTNER"
- The relation "SPONSORS_LEAGUE" was created with Season as a foreign key referencing <u>Season_Number</u> of "LEAGUE" and CIN as a foreign key referencing <u>CIN</u> of "PARTNER"
- The relation "SPONSORS_TEAM" was created with Name as a foreign key referencing <u>Name</u> of "TEAM" and CIN as a foreign key referencing <u>CIN</u> of "PARTNER"

Step 6: Mapping of Multivalued Attributes:

For each multivalued attribute A, we created a new relation R. This relation R will include an attribute corresponding to A, plus the primary key attribute K—as a foreign key in R—of the relation that represents the entity type or relationship type that has A as a multivalued attribute. The primary key of R is the combination of A and K. If the multivalued attribute is composite, we included its simple components. In our case,

- The relation “PARTNER_TYPE” was created with CIN as a foreign key referencing CIN of “PARTNER” and Type as key attribute
- The relation “COMMENTATORS” was created with Date_Time as a foreign key referencing Date_Time of “FIXTURE”, Venue as a foreign key referencing Venue of “FIXTURE” and Commentators as key attribute.
- The relation “UMPIRE” was created with Date_Time as a foreign key referencing Date_Time of “FIXTURE”, Venue as a foreign key referencing Venue of “FIXTURE” and Umpire_Name and Umpire_Position as key attributes.

Step 7: Mapping of N-ary Relationship Types:

We have employed the **Relationship relation / cross-reference approach**. For each n-ary relationship type R, where n > 2, we created a new relationship relation S to represent R. We included the primary keys of the relations that represent the participating entity types as foreign key attributes in S. Also, we included any simple attributes of the n-ary relationship type (or simple components of composite attributes) as attributes of S. In our case,

- The relation “PLAYS_FOR...IN...OF” was created with PName as a foreign key referencing Name of “PLAYER”, TName as a foreign key referencing Name of “TEAM”, Date_Time and Venue as foreign keys referencing Date_Time and Venue of “FIXTURE” respectively and Season_Number as a foreign key referencing Season_Number of “LEAGUE”

Step 8: Options for mapping Specialization or Generalization:

No subclasses existed in our Schema

Step 9: Mapping of Union Types (Categories):

No Union Type existed in our Schema

Normalization:

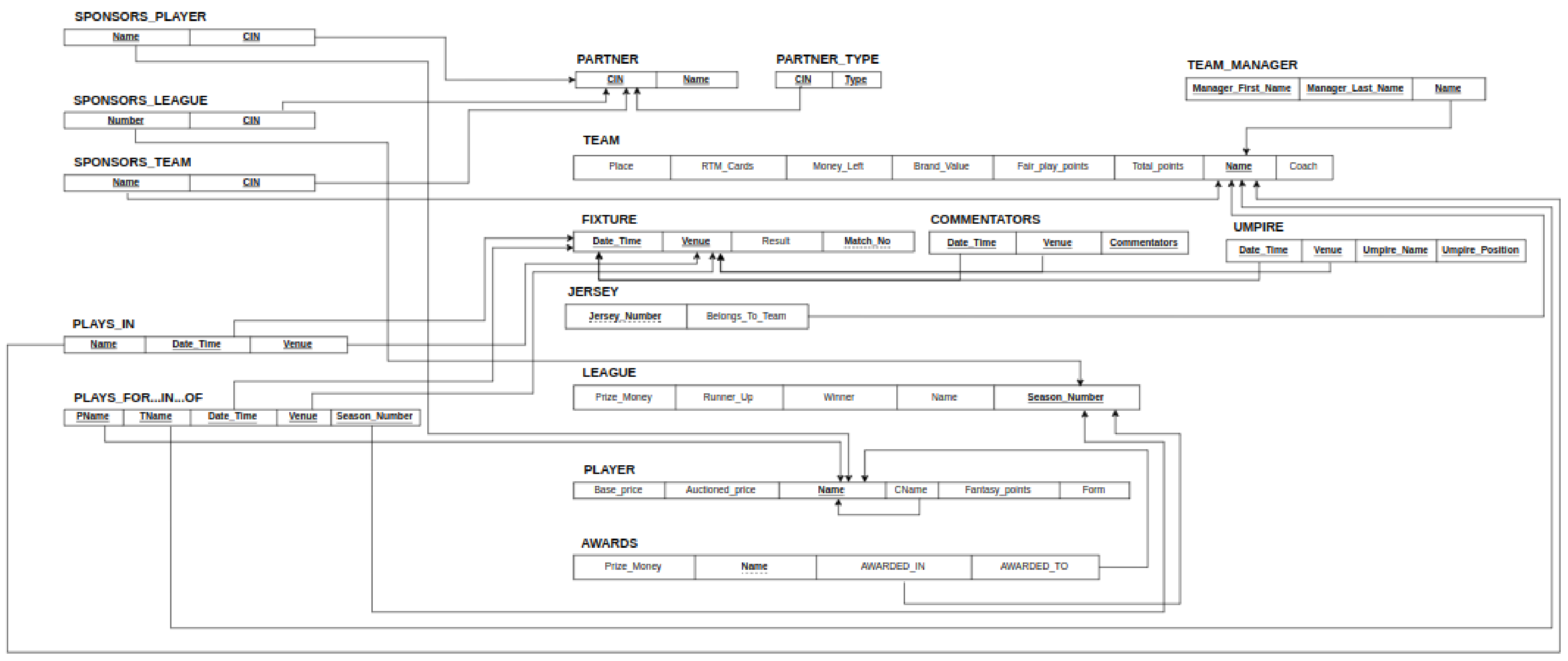
Conversion of Relational Model to 1NF:

Relation schema is in 1NF if the values in domain of each attribute are atomic. **The relational model is already in 1NF** as new relations for multivalued attributes were created in Step 6 and Composite attributes were converted to atomic attributes in Step 1.

Conversion of Relational Model to 2NF:

A relation schema is in 2NF if every non-prime attribute A in R is fully functionally dependent on every key of R. In our case,

- The superkey {Name, Manager_First_Name, Manager_Last_Name} of “TEAM” was broken down into just Name as the only primary key and another relation “TEAM_MANAGER” was created with Name as foreign key referencing Name of “TEAM” with {Manager_First_Name, Manager_Last_Name} as key attributes. This was done because both the subsets {Name} and {Manager_First_Name, Manager_Last_Name} could uniquely identify each of the non-prime attributes of “TEAM” which violates the guidelines of 2NF.

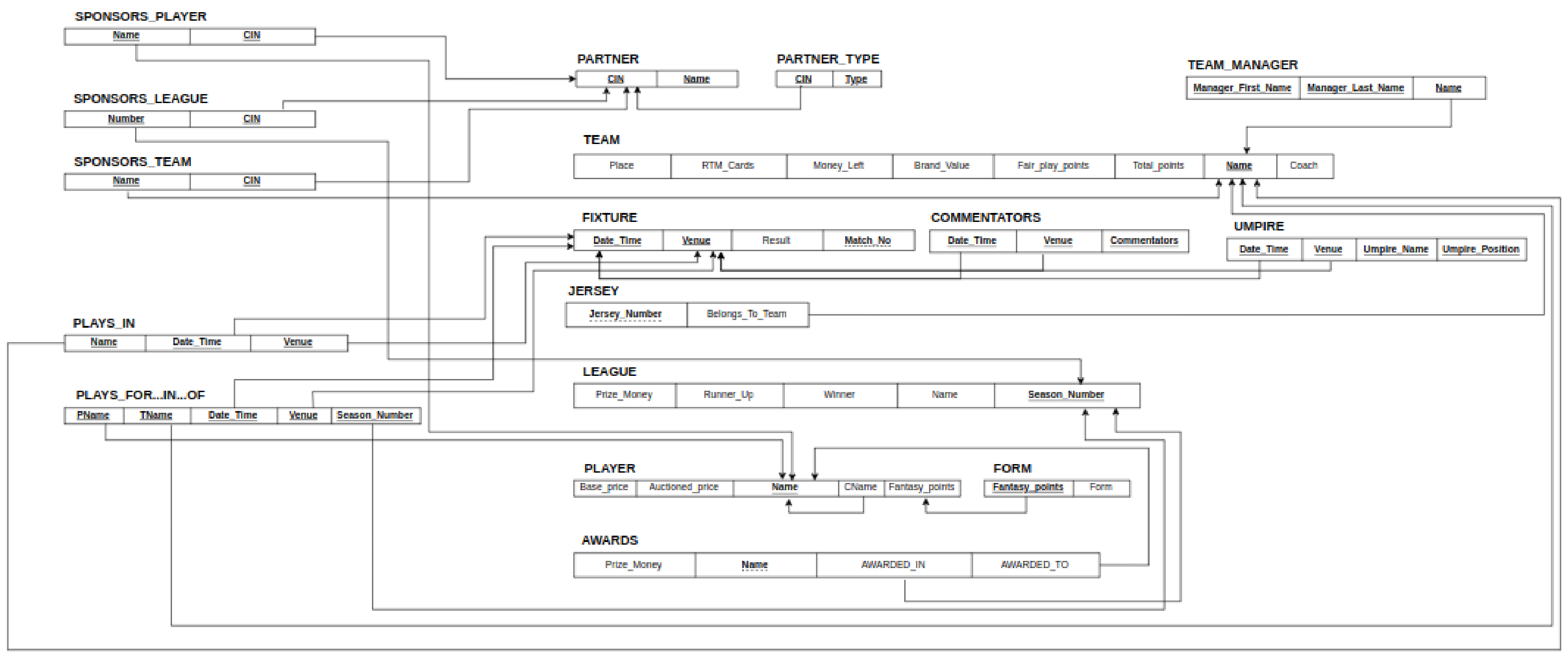


Conversion of Relational Model to 3NF:

A relation schema is in 3NF if all non-trivial dependencies in F+ are of the form X->A with either

- X is a superkey
- A is a prime attribute

In our case, there was a relation from Fantasy_Points to Form (derived attribute) of “PLAYER” and Fantasy_Points is not a prime attribute. Thus, the relation “FORM” was created with Fantasy_Points as a foreign key referencing Fantasy_Points of “PLAYER” and Form as a simple attribute.


SPONSORS_PLAYER
Name
CIN
SPONSORS_LEAGUE
Number
CIN
SPONSORS_TEAM
Name
CIN
PARTNER
CIN
Name
PARTNER_TYPE
CIN
Type
TEAM_MANAGER
Manager_First_Name
Manager_Last_Name
Name
TEAM
Place
RTM_Cards
Money_Left
Brand_Value
Fair_play_points
Total_points
Name
Coach
FIXTURE
Date_Time
Venue
Result
Match_No
COMMENTATORS
Date_Time
Venue
Commentators
UMPIRE
Date_Time
Venue
Umpire_Name
Umpire_Position
JERSEY
Jersey_Number
Belongs_To_Team
PLAYS_IN
Name
Date_Time
Venue
PLAYS_FOR...IN...OF
PName
TName
Date_Time
Venue
Season_Number
LEAGUE
Prize_Money
Runner_Up
Winner
Name
Season_Number
PLAYER
Base_price
Auctioned_price
Name
CName
Fantasy_points
FORM
Fantasy_points
Form
AWARDS
Prize_Money
Name
AWARDED_IN
AWARDED_TO