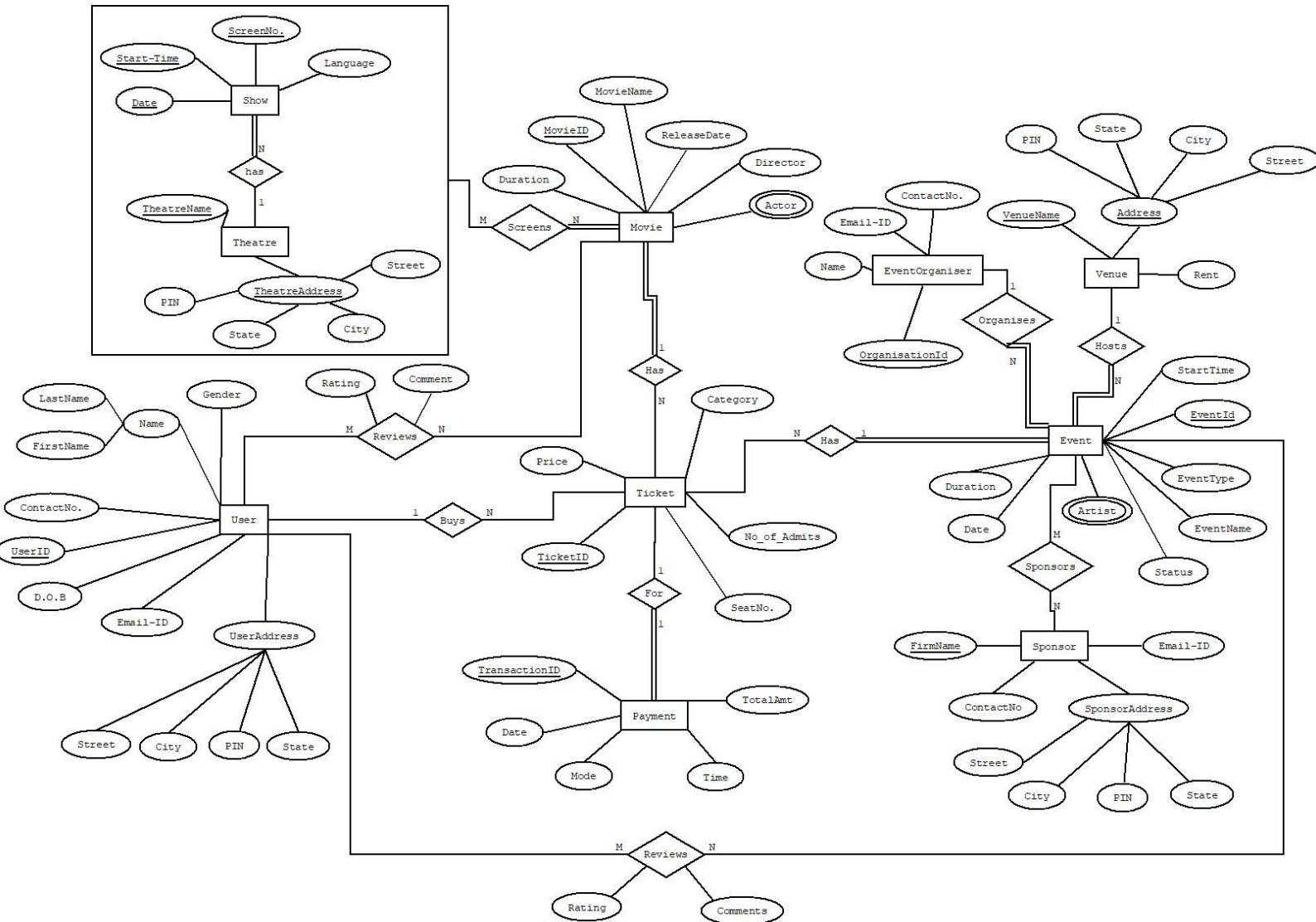
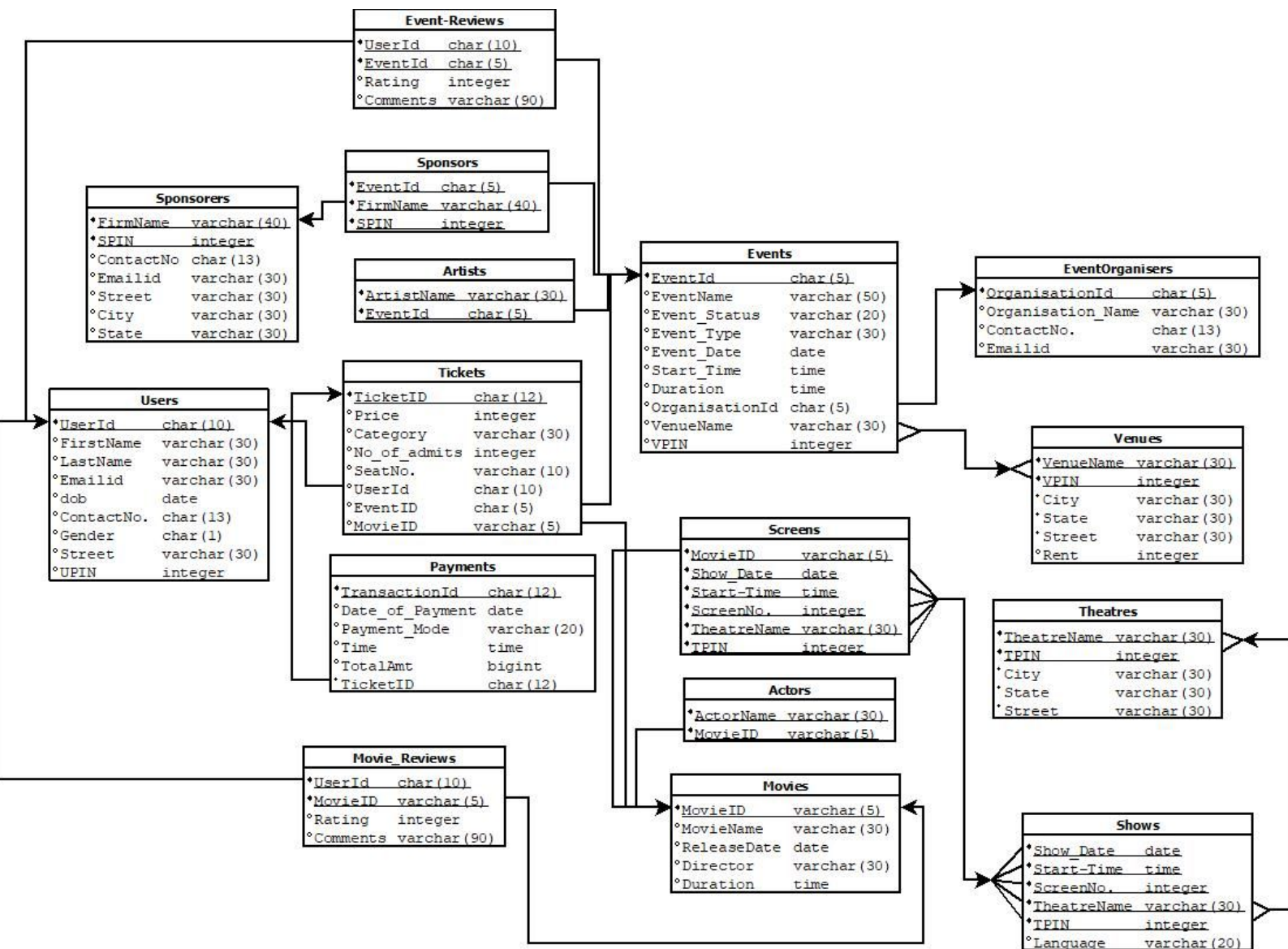


ER Diagram



Relational Schema



Proof that relations are in Boyce-Codd Normal Form

1. 'Users' relation :

- Attribute :

Users { UserId, FirstName, LastName, Emailid, dob, ContactNo., Gender, Street, UPIN }

- Functional dependencies :

UserId->FirstName
UserId->LastName
UserId->Emailid
UserId->dob
UserId->ContactNo.
UserId->Gender
UserId->Street
UserId->UPIN

Let X = UserId ,

Computing the closure,

$X^+ = \{ \text{UserId, FirstName, LastName, Emailid, dob, ContactNo, Gender, Street, UPIN} \}$

Thus, **Primary key = UserId**

The left side of all the FDs in the minimal set of FDs for the relation 'Users' is UserId, which is the primary key of this relation, so **"Users" is in BCNF.**

2. 'Tickets' relation :

- Attribute :

Tickets { TicketID, Price, Category, No_of_admits, SeatNo., UserID, EventID, MovieID }

- Functional dependencies :
TicketID->Price
TicketID->Category
TicketID->No_of_admits
TicketID->SeatNo.
TicketID->UserID
TicketID->EventID
TicketID->MovieID

Let X = TicketID ,

Computing the closure,

$X^+ = \{ \text{TicketID, Price, Category, No_of_admits, SeatNo., UserID, EventId, MovieID} \}$

Thus, **Primary key = TicketID**

The left side of all the FDs in the minimal set of FDs for the relation 'Tickets' is TicketID, which is the primary key of this relation, so **"Tickets" is in BCNF.**

3. 'Events' relation :

- Attribute :
Events { EventId, EventName, Event_Status, Event_Type, Event_Date, Start-Time, Duration, OrganisationId, VenueName, VPIN}
- Functional dependencies :
EventId->EventName
EventId->Event_Status
EventId->Event_Type
EventId->Event_Date
EventId->Start-Time
EventId->Duration

EventId->OrganisationId
EventId->VenueName
EventId->VPIN

Let $X = \text{EventId}$,

Computing the closure,

$X^+ = \{ \text{EventId}, \text{EventName}, \text{Event_Status}, \text{Event_Type}, \text{Event_Date}, \text{Start-Time}, \text{Duration}, \text{OrganisationId}, \text{VenueName}, \text{VPIN} \}$

Thus, **Primary key = EventId**

The left side of all the FDs in the minimal set of FDs for the relation 'Events' is EventId , which is the primary key of this relation, so **"Events" is in BCNF**.

4. 'Sponsorers' relation :

- Attribute :
Sponsorers { FirmName, SPIN, ContactNo., Emailid, Street, City, State }
- Functional dependencies :
 {FirmName,SPIN}->ContactNo
 {FirmName,SPIN}->Street
 {FirmName,SPIN}->City
 {FirmName,SPIN}->State
 {FirmName,SPIN}->Emailid

Let $X = \{ \text{FirmName}, \text{SPIN} \}$,

Computing the closure,

$X^+ = \{ \text{FirmName}, \text{SPIN}, \text{ContactNo.}, \text{Emailid}, \text{Street}, \text{City}, \text{State} \}$

Thus, **Primary key = { FirmName,SPIN }**

The left side of all the FDs in the minimal set of FDs for the relation 'Sponsorers' is {FirmName,SPIN}, which is the primary key of this relation, so **"Sponsorers" is in BCNF**.

5. 'Movies' relation :

- Attribute :
Movies { MovieID, MovieName, ReleaseDate, Director, Duration }
- Functional dependencies :
MovieID \rightarrow MovieName
MovieID \rightarrow ReleaseDate
MovieID \rightarrow Director
MovieID \rightarrow Duration

Let X = MovieID ,

Computing the closure,

$X^+ = \{ \text{MovieID, MovieName, ReleaseDate, Director, Duration} \}$

Thus, **Primary key = MovieID**

The left side of all the FDs in the minimal set of FDs for the relation 'Movies' is MovieID, which is the primary key of this relation, so **"Movies" is in BCNF.**

6. 'Venues' relation :

- Attribute :
Venues { VenueName, VPIN, City, State, Street, Rent }
- Functional dependencies :
{VenueName,VPIN} \rightarrow City
{VenueName,VPIN} \rightarrow Street
{VenueName,VPIN} \rightarrow State

$\{\text{VenueName}, \text{VPIN}\} \rightarrow \text{Rent}$

Let $X = \{\text{VenueName}, \text{VPIN}\}$,

Computing the closure,

$X^+ = \{\text{VenueName}, \text{VPIN}, \text{City}, \text{State}, \text{Street}, \text{Rent}\}$

Thus, **Primary key = { VenueName, VPIN }**

The left side of all the FDs in the minimal set of FDs for the relation 'Venues' is $\{\text{VenueName}, \text{VPIN}\}$, which is the primary key of this relation, so **"Venues" is in BCNF.**

7. 'Payments' relation :

- Attribute :

Payments { TransactionId, Date_of_Payment, Payment_Mode, Time, TotalAmt, TicketID }

- Functional dependencies :

TransactionID \rightarrow Date_of_Payment

TransactionID \rightarrow Payment_Mode

TransactionID \rightarrow Time

TransactionID \rightarrow TotalAmt

TransactionID \rightarrow TicketID

Let $X = \text{TransactionID}$,

Computing the closure,

$X^+ = \{\text{TransactionId}, \text{Date_of_Payment}, \text{Payment_Mode}, \text{Time}, \text{TotalAmt}, \text{TicketID}\}$

Thus, **Primary key = TransactionID**

The left side of all the FDs in the minimal set of FDs for the relation 'Payments' is TransactionID, which is the primary key of this relation, so **"Payments" is in BCNF.**

8. 'Theatres' relation :

- Attribute :
Theatres { TheatreName, TPIN, City, State, Street }
- Functional dependencies :
 {TheatreName,TPIN}->City
 {TheatreName,TPIN}->Street
 {TheatreName,TPIN}->State

Let $X = \{\text{TheatreName}, \text{TPIN}\}$,

Computing the closure,

$X^+ = \{\text{TheatreName}, \text{TPIN}, \text{City}, \text{State}, \text{Street}\}$

Thus, **Primary key = { TheatreName,TPIN }**

The left side of all the FDs in the minimal set of FDs for the relation 'Theatres' is {TheatreName,TPIN}, which is the primary key of this relation, so **"Theatres"** is in **BCNF**.

9. 'EventOrganisers' relation :

- Attribute :
EventOrganisers { OrganisationID, Organisation_Name, ContactNo., Emailid }
- Functional dependencies :
 OrganisationID->Organisation_Name
 OrganisationID->ContactNo.
 OrganisationID->Emailid

Let $X = \text{OrganisationID}$,

Computing the closure,

$X^+ = \{ \text{OrganisationID}, \text{Organisation_Name}, \text{ContactNo.}, \text{Emailid} \}$

Thus, **Primary key = OrganisationID**

The left side of all the FDs in the minimal set of FDs for the relation

'EvenOrganisers' is OrganisationID, which is the primary key of this relation, so

"EventOrganisers" is in BCNF.

10. 'Movie_Reviews' relation :

- Attribute :

Movie_Reviews { UserID, MovieID, Rating, Comments }

- Functional dependencies :

{UserID,MovieID} -> Rating

{UserID,MovieID} -> Comments

Let $X = \{ \text{UserID}, \text{MovieID} \}$,

Computing the closure,

$X^+ = \{ \text{UserID}, \text{MovieID}, \text{Rating}, \text{Comments} \}$

Thus, **Primary key = { UserID,MovieID }**

The left side of all the FDs in the minimal set of FDs for the relation

'Movie_Reviews' is {UserID,MovieID}, which is the primary key of this relation,

so **"Movie_Reviews" is in BCNF.**

11. 'Event_Reviews' relation :

- Attribute :

Event_Reviews { UserID, EventId, Rating, Comments }

- Functional dependencies :

{UserID, EventId} -> Rating

{UserID, EventId} -> Comments

Let $X = \{ \text{UserId}, \text{EventId} \}$,
Computing the closure,
 $X^+ = \{ \text{UserId}, \text{EventId}, \text{Rating}, \text{Comments} \}$
Thus, **Primary key = { UserId, EventId }**

The left side of all the FDs in the minimal set of FDs for the relation 'Event_Reviews' is {UserId, EventId}, which is the primary key of this relation, so **"Event_Reviews" is in BCNF.**

12. 'Screens' relation :

- Attribute :
Screens { MovieID, TheatreName, TPIN, Show_Date, Start-Time, ScreenNo. }

Here, **Primary key = { MovieID, TheatreName, TPIN, Show_Date, Start-Time, ScreenNo. }**

According to the BCNF Rule, all attribute primary key relations are always BCNF.
Hence, **"Screens" is in BCNF.**

13. 'Actors' relation :

- Attribute :
Actors { ActorName, MovieID }

Here, **Primary key = { ActorName, MovieID }**

According to the BCNF Rule, all attribute primary key relations are always in BCNF. Hence **"Actors" is in BCNF.**

14. 'Artists' relation :

- Attribute :
Artists { ArtistName, EventId }

Here, **Primary key = { ArtistName, EventId }**

According to the BCNF Rule, all attribute primary key relations are always in BCNF. Hence **“Artists” is in BCNF.**

15. ‘Sponsors’ relation :

- Attribute :
Sponsors { EventId, FirmName, SPIN }

Here, **Primary key = { EventId, FirmName, SPIN }**

According to the BCNF Rule, all attribute primary key relations are always in BCNF. Hence **“Sponsors” is in BCNF.**

16. ‘Shows’ relation :

- Attribute :
Shows { Show_date, Start-Time, ScreenNo., Language, TheatreName, TPIN }
- Functional dependencies :
{Show_date, Start-Time, ScreenNo., TheatreName, TPIN} -> Language

Let $X = \{ \text{Show_date, Start-Time, ScreenNo., TheatreName, TPIN} \}$,

Computing the closure,

$X^+ = \{ \text{Show_date, Start-Time, ScreenNo., Language, TheatreName, TPIN} \}$

Thus, **Primary key = {Show_date, Start-Time, ScreenNo., TheatreName, TPIN}**

The left side of all the FDs in the minimal set of FDs for the relation 'Shows' is {Show_date, Start-Time, ScreenNo., TheatreName, TPIN}, which is the primary key of this relation, so **"Shows" is in BCNF.**