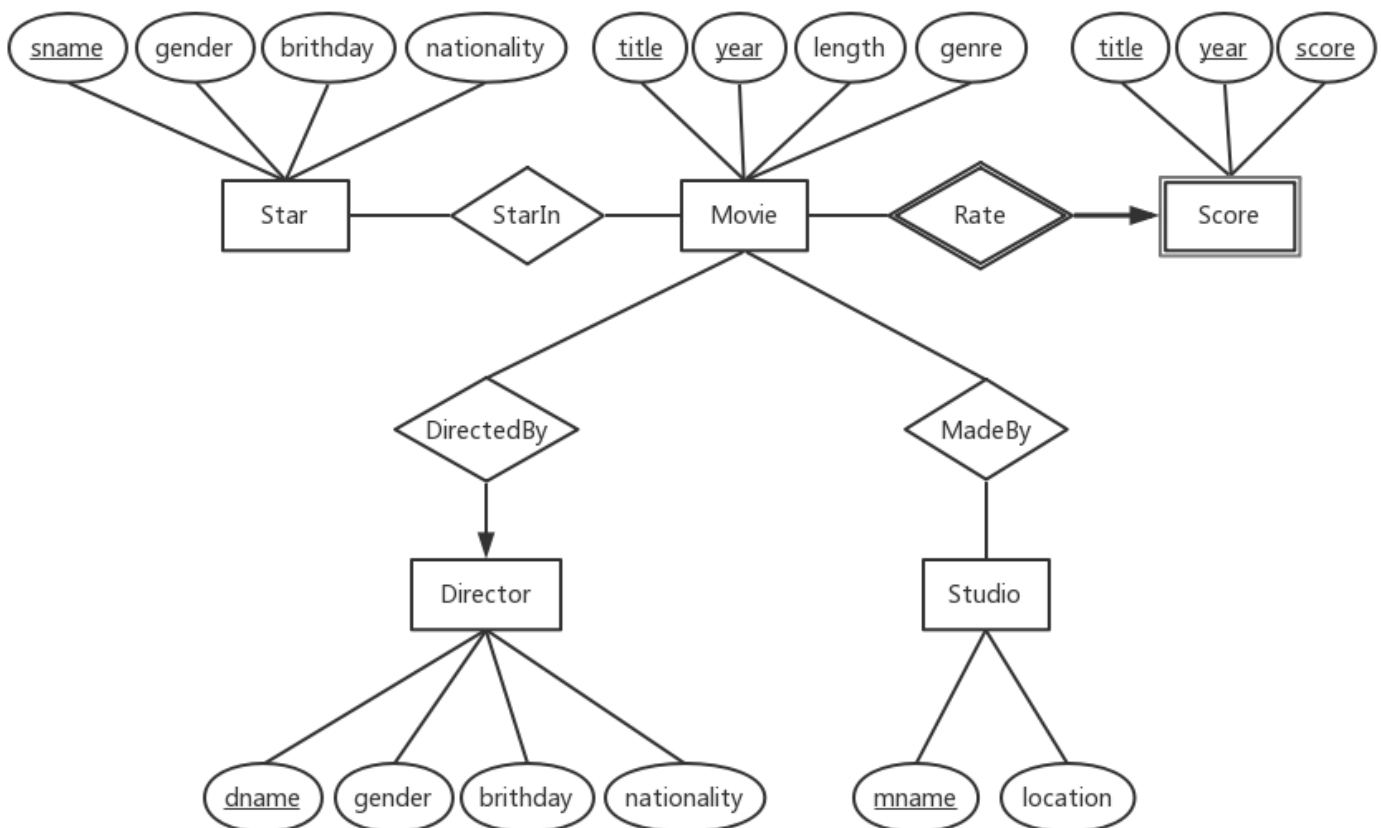# MP2

Group Members: Huiyi Zou, Zelin Han

In MP1, we designed a movie database, but we just assumed it did not have the same movie title.
Therefore, we improve our design. Here is the new version:
We have these entities and relationships:
- Movie: title, year, length, genre
- Star: sname, gender, birthday, nationality
- Director: dname, gender, birthday, nationality
- Studio: mname, location
- Score: title, year, score
- StarIn: title, year, sname
- DirectedBy: title, year, dname
- MadeBy: title, year, mname

-The Movie has attributes title(KEY), year(KEY), length and genre, where the 'title' and 'year' could not be NULL.
-The Star has attributes sname(KEY), gender, birthday and nationality, where the 'sname' could not be NULL.
-The Director has attributes dname(KEY), gender, birthday and nationality, where the 'dname' could not be
    NULL.
-The Studio has attributes mname(KEY) and location, where the 'mname' could not be NULL.
-Each movie has exactly one score of movie rating and exactly one director, but could has many stars and be
made by many studios. Each star could play a role in many movies. Movies can be directed by same director or
made by same studio.
-The gender could only be 'F' or 'M'.

E/R Diagram:

From E/R to Relations:
Movie (<u>title</u>, <u>year</u>, length, genre)
Star (<u>sname</u>, gender, birthday, nationality)
Director (<u>dname</u>, gender, birthday, nationality)
Studio (<u>mname</u>, location)
Score (<u>title</u>$^{FK\text{-}Movie}$, <u>year</u>$^{FK\text{-}Movie}$, <u>score</u>)
StarIn (<u>title</u>$^{FK\text{-}Movie}$, <u>year</u>$^{FK\text{-}Movie}$, <u>sname</u>$^{FK\text{-}Star}$)
DirectedBy (<u>title</u>$^{FK\text{-}Movie}$, <u>year</u>$^{FK\text{-}Movie}$, <u>dname</u>$^{FK\text{-}Director}$)
MadeBy (<u>title</u>$^{FK\text{-}Movie}$, <u>year</u>$^{FK\text{-}Movie}$, <u>mname</u>$^{FK\text{-}Studio}$)

Our design does not allow anomalies.

- In the relation Movie, it has non-trivial functional dependencies:
  title year → length genre, where {title, year} is the key (superkey)
  title year length → genre, where {title, year, length} is a superkey
  title year genre → length, where {title, year, genre} is a superkey

- In the relation Star, it has non-trivial functional dependencies:
  sname → gender birthday nationality, where sname is the key (superkey)
  sname gender → birthday nationality, where {sname, gender} is a superkey
  sname birthday → gender nationality, where {sname, birthday} is a superkey
  sname nationality → gender birthday, where {sname, nationality} is a superkey
  sname gender birthday → nationality, where {sname, gender, birthday} is a superkey
  sname gender nationality → birthday, where {sname, gender, nationality} is a superkey
  sname birthday nationality → gender, where {sname, birthday, nationality} is a superkey

- In the relation Director, it has non-trivial functional dependencies:
  dname → gender birthday nationality, where dname is the key (superkey)
  dname gender → birthday nationality, where {dname, gender} is a superkey
  dname birthday → gender nationality, where {dname, birthday} is a superkey
  dname nationality → gender birthday, where {dname, nationality} is a superkey
  dname gender birthday → nationality, where {dname, gender, birthday} is a superkey
  dname gender nationality → birthday, where {dname, gender, nationality} is a superkey
  dname birthday nationality → gender, where {dname, birthday, nationality} is a superkey

- In the relation Studio, it has non-trivial functional dependencies:
  mname → location, where mname is the key (superkey)

Therefore, the relations Movie, Star, Director and Studio are in BCNF, which means no bad FDs.

In addition, for relations Score, StarIn, DiectedBy, MadeBy, each of them has no functional dependency, since all of their attributes form the primary key for each relation.

SQL Schema:

```sql
CREATE TABLE Movie (
    title CHAR(100) NOT NULL,
    year INT NOT NULL,
    length INT,
    genre CHAR(30),
    PRIMARY KEY (title,year)
);

CREATE TABLE Score (
    title CHAR(100) NOT NULL,
    year INT NOT NULL,
    score FLOAT NOT NULL,
    PRIMARY KEY (title, year, score),
    FOREIGN KEY ('title','year') REFERENCES Movie('title','year') ON DELETE CASCADE ON UPDATE CASCADE
);

CREATE TABLE Star (
    sname CHAR(30) NOT NULL PRIMARY KEY,
    gender CHAR(1) CHECK (gender IN ('F', 'M')),
    birthday DATE,
    nationality CHAR(20)
);

CREATE TABLE StarIn (
    title CHAR(100) NOT NULL,
    year INT NOT NULL,
    sname CHAR(30) NOT NULL,
    PRIMARY KEY (title, year, sname),
    FOREIGN KEY ('title','year') REFERENCES Movie('title','year') ON DELETE CASCADE ON UPDATE CASCADE,
    FOREIGN KEY (sname) REFERENCES Star(sname) ON DELETE CASCADE ON UPDATE CASCADE
);

CREATE TABLE Director (
    dname CHAR(30) NOT NULL PRIMARY KEY,
    gender CHAR(1) CHECK (gender IN ('F', 'M')),
    birthday DATE,
    nationality CHAR(20)
);

CREATE TABLE DirectedBy (
    title CHAR(100) NOT NULL,
    year INT NOT NULL,
    dname CHAR(30) NOT NULL,
    PRIMARY KEY (title, year, dname),
    FOREIGN KEY ('title','year') REFERENCES Movie('title','year') ON DELETE CASCADE ON UPDATE CASCADE,
    FOREIGN KEY (dname) REFERENCES Director(dname) ON DELETE CASCADE ON UPDATE CASCADE
);
```

```sql
CREATE TABLE Studio (
    mname CHAR(30) NOT NULL PRIMARY KEY,
    location CHAR(200)
);

CREATE TABLE MadeBy (
    title CHAR(100) NOT NULL,
    year INT NOT NULL,
    mname CHAR(30) NOT NULL,
    PRIMARY KEY (title, year, mname),
    FOREIGN KEY ('title','year') REFERENCES Movie('title','year') ON DELETE CASCADE ON UPDATE CASCADE,
    FOREIGN KEY (mname) REFERENCES Studio(mname) ON DELETE CASCADE ON UPDATE CASCADE
);
```

Populate Table:

```sql
INSERT INTO Movie
VALUES ('The Prestige', 2006, 130, 'thriller'),
('The Conjuring', 2013, 112, 'horror'),
('Insidious', 2010, 102, 'horror'),
('The Shining', 1980, 144, 'horror'),
('Les Misérables', 2012, 158,'musical drama'),
('Interstellar', 2014, 169, 'sci-fi'),
('The Notebook', 2004, 124, 'drama'),
('Doctor Strange', 2016, 115,'sci-fi'),
('Ready Player One', 2018, 140,'sci-fi'),
('Silent Hill', 2006, 125, 'horror'),
('Les Misérables', 1998, 134, 'drama');

INSERT INTO Star
VALUES ('Hugh Jackman', 'M', '1968-10-12', 'Australian'),
('Christian Bale', 'M', '1974-01-30', 'American'),
('Vera Farmiga', 'F', '1973-08-06', 'American'),
('Shelley Duvall', 'F', '1949-07-07', 'American'),
('Anne Hathaway', 'F', '1982-11-12', 'American'),
('Jessica Chastain', 'F', '1977-03-24', 'American'),
('Radha Mitchell', 'F', '1973-11-12', 'Australian'),
('Rachel McAdams', 'F', '1978-11-17', 'Canadian'),
('Patrick Wilson', 'M', '1973-07-03', 'American'),
('Jack Nicholson', 'M', '1937-04-22', 'American'),
('Matthew McConaughey', 'M', '1969-11-04', 'American'),
('Tye Sheridan', 'M', '1996-11-11', 'American'),
('Russell Crowe', 'M', '1964-04-07', 'Australian'),
('Ryan Gosling', 'M', '1980-11-12', 'Canadian'),
('Benedict Cumberbatch', 'M', '1976-07-19', 'English'),
('Liam Neeson', 'M', '1952-06-07', 'American'),
('Geoffrey Rush', 'M', '1951-07-06', 'Australian');
```

```sql
INSERT INTO Director
VALUES ('Christopher Nolan', 'M', '1970-07-30', 'English'),
('Stanley Kubrick', 'M', '1928-07-26', 'American'),
('Nick Cassavetes', 'M', '1959-05-21', 'American'),
('Scott Derrickson', 'M', '1966-07-16', 'American'),
('Steven Spielberg', 'M', '1946-12-18', 'American'),
('David Lynch', 'M', '1946-01-20', 'American'),
('Martin Scorsese', 'M', '1942-11-17', 'American'),
('Tom Hopper', 'M', '1977-02-26', 'Australian'),
('James Wan', 'M', '1972-10-05', 'Australian'),
('Christophe Gans', 'M', '1960-03-11', 'French'),
('Bille August', 'M', '1948-11-09', 'Dane');

INSERT INTO Studio
VALUES ('Working Title Films', 'England'),
('Syncopy', 'England'),
('Hawk Films', 'England'),
('Warner Bros.', 'U.S.'),
('Blumhouse Productions', 'U.S.'),
('Legendary Pictures', 'U.S.'),
('Gran Via', 'U.S.'),
('Marvel Studios', 'U.S.'),
('Amblin Partners', 'U.S.'),
('Konami', 'Japan'),
('Mandalay Entertainment', 'U.S.');

INSERT INTO Score
VALUES ('The Prestige', 2006, 8.5),
('The Conjuring', 2013, 7.5),
('Insidious', 2010, 6.9),
('The Shining', 1980, 8.4),
('Les Misérables', 2012, 7.6),
('Interstellar', 2014, 8.6),
('The Notebook', 2004, 7.9),
('Doctor Strange', 2016, 7.5),
('Ready Player One', 2018, 7.5),
('Silent Hill', 2006, 6.6),
('Les Misérables', 1998, 7.4);

INSERT INTO DirectedBy
VALUES ('The Prestige', 2006, 'Christopher Nolan'),
('The Conjuring', 2013, 'James Wan'),
('Insidious', 2010, 'James Wan'),
('The Shining', 1980, 'Stanley Kubrick'),
('Les Misérables', 2012, 'Tom Hopper'),
('Interstellar', 2014, 'Christopher Nolan'),
('The Notebook', 2004,'Nick Cassavetes'),
('Doctor Strange', 2016, 'Scott Derrickson'),
('Ready Player One', 2018, 'Steven Spielberg'),
```

('Silent Hill', 2006, 'Christophe Gans'),
('Les Misérables', 1998, 'Bille August');

INSERT INTO MadeBy
VALUES ('The Prestige', 2006, 'Warner Bros.'),
('The Prestige', 2006, 'Syncopy'),
('The Conjuring', 2013,'Warner Bros.'),
('Insidious', 2010, 'Blumhouse Productions'),
('The Shining',1980, 'Hawk Films'),
('Les Misérables', 2012, 'Working Title Films'),
('Interstellar', 2014, 'Syncopy'),
('Interstellar', 2014, 'Legendary Pictures'),
('The Notebook', 2004, 'Gran Via'),
('Doctor Strange', 2016, 'Marvel Studios'),
('Ready Player One', 2018, 'Warner Bros.'),
('Ready Player One', 2018, 'Amblin Partners'),
('Silent Hill', 2006, 'Konami'),
('Les Misérables', 1998, 'Mandalay Entertainment');

INSERT INTO StarIn
VALUES ('The Prestige', 2006, 'Hugh Jackman'),
('The Prestige', 2006, 'Christian Bale'),
('The Conjuring', 2013, 'Vera Farmiga'),
('The Conjuring', 2013, 'Patrick Wilson'),
('Insidious', 2010, 'Patrick Wilson'),
('The Shining',1980, 'Jack Nicholson'),
('The Shining',1980, 'Shelley Duvall'),
('Les Misérables', 2012, 'Hugh Jackman'),
('Les Misérables', 2012, 'Russell Crowe'),
('Les Misérables', 2012, 'Anne Hathaway'),
('Interstellar', 2014, 'Matthew McConaughey'),
('Interstellar', 2014, 'Jessica Chastain'),
('Interstellar', 2014, 'Anne Hathaway'),
('The Notebook', 2004, 'Ryan Gosling'),
('The Notebook', 2004, 'Rachel McAdams'),
('Doctor Strange', 2016, 'Benedict Cumberbatch'),
('Doctor Strange', 2016, 'Rachel McAdams'),
('Ready Player One',2018, 'Tye Sheridan'),
('Silent Hill', 2006, 'Radha Mitchell'),
('Les Misérables', 1998, 'Liam Neeson'),
('Les Misérables', 1998, 'Geoffrey Rush');

Result:

Movie

title	year	length	genre
The Prestige	2006	130	thriller
The Conjuring	2013	112	horror
Insidious	2010	102	horror
The Shining	1980	144	horror
Les Misérables	2012	158	musical drama
Interstellar	2014	169	sci-fi
The Notebook	2004	124	drama
Doctor Strange	2016	115	sci-fi
Ready Player One	2018	140	sci-fi
Silent Hill	2006	125	horror
Les Misérables	1998	134	musical drama

Star

sname	gender	birthday	nationality
Hugh Jackman	M	1968-10-12	Australian
Christian Bale	M	1974-01-30	American
Vera Farmiga	F	1973-08-06	American
Shelley Duvall	F	1949-07-07	American
Anne Hathaway	F	1982-11-12	American
Jessica Chastain	F	1977-03-24	American
Radha Mitchell	F	1973-11-12	Australian
Rachel McAdams	F	1978-11-17	Canadian
Patrick Wilson	M	1973-07-03	American
Jack Nicholson	M	1937-04-22	American
Matthew McConaughey	M	1969-11-04	American
Tye Sheridan	M	1996-11-11	American
Russell Crowe	M	1964-04-07	Australian
Ryan Gosling	M	1980-11-12	Canadian
Benedict Cumberbatch	M	1976-07-19	English
Liam Neeson	M	1952-06-07	American
Geoffrey Rush	M	1951-07-06	Australian

Director

dname	gender	birthday	nationality
Christopher Nolan	M	1970-07-30	English
Stanley Kubrick	M	1928-07-26	American
Nick Cassavetes	M	1959-05-21	American
Scott Derrickson	M	1966-07-16	American
Steven Spielberg	M	1946-12-18	American
David Lynch	M	1946-01-20	American
Martin Scorsese	M	1942-11-17	American
Tom Hopper	M	1977-02-26	Australian
James Wan	M	1972-10-05	Australian
Christophe Gans	M	1960-03-11	French
Bille August	M	1948-11-09	Dane

Studio

mname	location
Working Title Films	England
Syncopy	England
Hawk Films	England
Warner Bros.	U.S.
Blumhouse Productions	U.S.
Legendary Pictures	U.S.
Gran Via	U.S.
Marvel Studios	U.S.
Amblin Partners	U.S.
Konami	Japan
Mandalay Entertainment	U.S.

StarIn

title	year	sname
The Prestige	2006	Hugh Jackman
The Prestige	2006	Christian Bale
The Conjuring	2013	Vera Farmiga
The Conjuring	2013	Patrick Wilson
Insidious	2010	Patrick Wilson
The Shining	1980	Jack Nicholson
The Shining	1980	Shelley Duvall
Les Misérables	2012	Hugh Jackman
Les Misérables	2012	Russell Crowe
Les Misérables	2012	Anne Hathaway
Interstellar	2014	Matthew McConaughey
Interstellar	2014	Jessica Chastain
Interstellar	2014	Anne Hathaway
The Notebook	2004	Ryan Gosling
The Notebook	2004	Rachel McAdams
Doctor Strange	2016	Benedict Cumberbatch
Doctor Strange	2016	Rachel McAdams
Ready Player One	2018	Tye Sheridan
Silent Hill	2006	Radha Mitchell
Les Misérables	1998	Liam Neeson
Les Misérables	1998	Geoffrey Rush

DirectedBy

title	year	dname
The Prestige	2006	Christopher Nolan
The Conjuring	2013	James Wan
Insidious	2010	James Wan
The Shining	1980	Stanley Kubrick
Les Misérables	2012	Tom Hopper
Interstellar	2014	Christopher Nolan
The Notebook	2004	Nick Cassavetes
Doctor Strange	2016	Scott Derrickson
Ready Player One	2018	Steven Spielberg
Silent Hill	2006	Christophe Gans
Les Misérables	1998	Bille August

MadeBy

title	year	mname
The Prestige	2006	Warner Bros.
The Prestige	2006	Syncopy
The Conjuring	2013	Warner Bros.
Insidious	2010	Blumhouse Productions
The Shining	1980	Hawk Films
Les Misérables	2012	Working Title Films
Interstellar	2014	Syncopy
Interstellar	2014	Legendary Pictures
The Notebook	2004	Gran Via
Doctor Strange	2016	Marvel Studios
Ready Player One	2018	Warner Bros.
Ready Player One	2018	Amblin Partners
Silent Hill	2006	Konami
Les Misérables	1998	Mandalay Entertainment

Score

title	year	score
The Prestige	2006	8.5
The Conjuring	2013	7.5
Insidious	2010	6.9
The Shining	1980	8.4
Les Misérables	2012	7.6
Interstellar	2014	8.6
The Notebook	2004	7.9
Doctor Strange	2016	7.5
Ready Player One	2018	7.5
Silent Hill	2006	6.6
Les Misérables	1998	7.4