**DBA 240-0001**

**Database Analysis and Design**

**Final Project**

**Spring 2021**

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5. **Requirements:**

The client needs to keep track of over 3000 movies for a small business that rents movies.

Each movie has a VHS or a DVD number

Each movie must have a title and a category

Each movie has a specific id

Each movie has multiple copies

A movie can be in DVD or VHS format

Tracks which dvd or vhs id contains the movie

Always has one DVD or VHS for each movie

DVD or VHS is always a copy of a single movie

No DVD or VHS require multiple movies

Keep track of star actors in each movie

Not all movies contain start actors

Only track actors that are in movies in inventory

Lots of customers.

Only rent videos to customers in video club

Each club member tracks firstname, lastname, id, phone number, and address

Need to keep track of which customers currently have checked out

Customer may check out multiple DVDs or tapes at any given time.

Keeps track of rental history with rental time and return time

All rentals are due next day

1. **Conceptual Design:**
2. **Entities:**

Er diagram for movie store contains 8 entities:

VHS

DVD

RENTAL

MOVIE

COPY

STAR

MEMBER

CATEGORY

1. **ER Diagram:**

VHS

# vhs\_id

COPY

# copy\_num

\*title

O dvd\_id

O vhs\_id

on

medium for

on

DVD

# dvd\_id

medium for

MOVIE

# title

\* genre\_id

O star\_actor

contained on

contain

apart of

CATEGORY

# id

\* genre

have

include

RENTAL

# rent\_id

\* copy\_num

\* rent\_date

\* member\_id

included in

feature

feature in

STAR

# actor\_name

\* real\_first

\* real\_middle

\* real\_last

\* dob

have

belong to

MEMBER

# mem\_id

\* first\_name

\* last\_name

\* phone\_num

\* address

1. **Relationship List**

Each **MOVIE** may feature one **STAR**.

Each **STAR** may feature in one or more **MOVIEs**.

Each **MOVIE** must be contained on one or more **COPYs**.

Each **COPY** must contain one **MOVIE**.

Each **MOVIE** must include one and only one **CATEGORY**.

Each **CATEGORY** may be included in one or many **MOVIES**.

Each **COPY** may be on one or many **DVDs** or **VHS** tapes.

Each **DVD** or **VHS** must be the medium for one and only one **COPY**.

Each **COPY** many be a part of one or many **RENTALs**.

Each **RENTAL** must have one and only one **COPY**.

Each **RENTAL** must belong to one and only one **MEMBER**.

Each **MEMBER** may have one or more **RENTALS**.

1. **Matrix Diagram:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | COPY | MOVIE | RENTAL | MEMBER | VHS | DVD | CATEGORY | STAR |
| COPY |  | Contained on | Apart of | ----------- | on | on | ------------- | ------- |
| MOVIE | contain |  | --------- | ----------- | ----- | ----- | include | Feature |
| RENTAL | have | ------------- |  | Belong to | ----- | ----- | ------------- | ---------- |
| MEMBER | --------- | ------------- | Have |  | ----- | ----- | ------------- | ---------- |
| VHS | Medium for | ------------- | ---------- | ----------- |  | ----- | -------------- | ---------- |
| DVD | Medium for | -------------- | --------- | ----------- | ----- |  | -------------- | ---------- |
| CATEGORY | ----------- | Included in | ---------- | ----------- | ----- | ----- |  | ---------- |
| STAR | ----------- | Featured in | ---------- | ----------- | ----- | ----- | -------------- |  |

**3) Logical Representation:**

**a) Transformation of conceptual design into tables**

Entity: **MOVIE**

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute | title | genre | star\_actor |
| Key Types | PK |  | FK |
| Tags | # | \* | O |
| Sample Data | |  |  |  | | --- | --- | --- | | SHREK | 4 | EDDIE MURPHY | | BRAVE HEART | 1 | MEL GIBSON | | OCEANS ELEVEN | 1 | JULIA ROBERTS | | MAD MAX | 1 | MEL GIBSON | | DADDYS HOME | 4 | MEL GIBSON | | AVA | 9 |  | | HOOK | 3 | JULIA ROBERTS | | RUN | 9 |  | | | |

Entity **CATEGORY**

|  |  |  |
| --- | --- | --- |
| Attribute | id | genre |
| Key Types | PK | UK |
| Tags | #, \* | \* |
| Sample Data | |  |  | | --- | --- | | 1 | ACTION | | 2 | HORROR | | 3 | ADVENTURE | | 4 | COMEDY | | 5 | SUSPENSE | | 6 | DRAMA | | 7 | WAR | | 8 | SCI-FI | | 9 | THRILLER | | |

Entity: **STAR**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute | actor\_name | real\_first | real\_middle | real\_last | dob |
| Key Types | PK |  |  |  |  |
| Tags | # | \* | \* | \* | \* |
| Sample Data | |  |  |  |  |  | | --- | --- | --- | --- | --- | | EDDIE MURPHY | EDDIE | REGAN | MURPHY | 04/3/1961 | | MEL GIBSON | MEL | COLM-CILLE GERARD | GIBSON | 01/3/1956 | | JULIA ROBERTS | JULIA | FIONA | ROBERTS | 10/28/1967 | | | | | |

Entity: **COPY**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Attribute | copy\_num | title | dvd\_id | vhs\_id |
| Key Types | PK | FK | FK | FK |
| Tags | #, \* | \* | O | O |
| Sample Data | |  |  |  |  | | --- | --- | --- | --- | | 1 | SHREK |  | 1445 | | 2 | BRAVE HEART |  | 1993 | | 3 | OCEANS ELEVEN | 4543 |  | | 4 | MAD MAX |  | 6655 | | 5 | DADDYS HOME | 7709 |  | | 6 | AVA | 9009 |  | | 7 | HOOK |  | 8801 | | 8 | RUN | 2202 |  | | | | |

Entity **RENTAL**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Attribute | rent\_id | copy\_num | rent\_date | member\_id |
| Key Types | PK | FK |  | FK |
| Tags | #, \* | \* | \* | \* |
| Sample Data | |  |  |  |  | | --- | --- | --- | --- | | 1112 | 1 | 5/8/2020 | 1221 | | 1113 | 2 | 5/9/2020 | 2112 | | 1114 | 4 | 5/11/2020 | 1111 | | 1115 | 3 | 5/11/2020 | 1221 | | 1116 | 5 | 5/12/2020 | 3344 | | 1117 | 4 | 5/12/2020 | 3344 | | 1118 | 8 | 5/12/2020 | 1111 | | 1119 | 1 | 5/13/2020 | 1221 | | | | |

Entity **MEMBER**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute | mem\_id | first\_name | last\_name | phone\_num | address |
| Key Types | PK |  |  |  |  |
| Tags | #, \* | \* | \* | \* | \* |
| Sample Data | |  |  |  |  |  | | --- | --- | --- | --- | --- | | 1111 | GARY | JOHNSON | 919-442-4444 | 9101 FAYETTEVILLE RD, RALEIGH, NC | | 1221 | JOHN | DOE | 919-555-5532 | 6600 LOUISBURG RD, RALEIGH, NC | | 2112 | MIKE | MYERS | 919-888-9999 | 2901 HOLSTON LN, RALEIGH, NC 27610 | | 3344 | WILL | GERALD | 919-443-2211 | 3200 BUSH ST, RALEIGH, NC 27609 | | | | | |

Entity **DVD**

|  |  |
| --- | --- |
| Attribute | dvd\_id |
| Key Types | PK |
| Tags | #, \* |
| Sample Data | |  | | --- | | 19 | | 29 | | 36 | | 45 | | 54 | | 63 | | 72 | | 81 | | 92 | | 103 | | 115 | | 122 | | 131 | |

Entity **VHS**

|  |  |
| --- | --- |
| Attribute | vhs\_id |
| Key Types | PK |
| Tags | #, \* |
| Sample Data | |  | | --- | | 167 | | 256 | | 322 | | 423 | | 525 | | 612 | | 732 | | 823 | | 91 | | 102 | | 114 | | 121 | | 133 | |

1. **Creation of the Database**
2. **Table Creation**

DROP TABLE RENTAL;

DROP TABLE MEMBER;

DROP TABLE COPY;

DROP TABLE DVD;

DROP TABLE VHS;

DROP TABLE MOVIE;

DROP TABLE CATEGORY;

DROP TABLE STAR;

CREATE TABLE STAR

( actor\_name VARCHAR(20) NOT NULL,

real\_first VARCHAR(20) NOT NULL,

real\_middle VARCHAR(20) NOT NULL,

real\_last VARCHAR(20) NOT NULL,

dob DATE NOT NULL,

CONSTRAINT pk\_star PRIMARY KEY (actor\_name)

);

CREATE TABLE DVD

( dvd\_id VARCHAR(4) NOT NULL,

CONSTRAINT pk\_dvd\_id PRIMARY KEY(dvd\_id)

);

CREATE TABLE VHS

( vhs\_id VARCHAR(4) NOT NULL,

CONSTRAINT pk\_vhs\_id PRIMARY KEY(vhs\_id)

);

CREATE TABLE CATEGORY

( id VARCHAR(2) NOT NULL,

genre VARCHAR(30) NOT NULL,

CONSTRAINT pk\_id\_category PRIMARY KEY(id),

CONSTRAINT uk\_genre UNIQUE(genre)

);

CREATE TABLE MOVIE

( title VARCHAR(20) NOT NULL,

genre\_id VARCHAR(2) NOT NULL,

star\_actor VARCHAR(30),

CONSTRAINT pk\_movie PRIMARY KEY (title),

CONSTRAINT fk\_genre FOREIGN KEY (genre\_id) REFERENCES CATEGORY(id) on delete cascade,

CONSTRAINT fk\_star FOREIGN KEY (star\_actor) REFERENCES STAR(actor\_name) on delete cascade

);

CREATE TABLE COPY

( copy\_num VARCHAR(2) NOT NULL,

title VARCHAR(20) NOT NULL,

dvd\_id VARCHAR(4),

vhs\_id VARCHAR(4),

CONSTRAINT pk\_copy PRIMARY KEY (copy\_num),

CONSTRAINT fk\_title FOREIGN KEY (title) REFERENCES MOVIE(title) on delete cascade,

CONSTRAINT fk\_dvd FOREIGN KEY (dvd\_id) REFERENCES DVD(dvd\_id) on delete cascade,

CONSTRAINT fk\_vhs FOREIGN KEY (vhs\_id) REFERENCES VHS(vhs\_id) on delete cascade,

CONSTRAINT chk\_dvd\_or\_vhs CHECK ((dvd\_id IS NULL AND vhs\_id IS NOT NULL) OR (dvd\_id IS NOT NULL AND vhs\_id IS NULL))

);

CREATE TABLE MEMBER

( mem\_id VARCHAR(5) NOT NULL,

first\_name VARCHAR(10) NOT NULL,

last\_name VARCHAR(10) NOT NULL,

phone\_num VARCHAR(20) NOT NULL,

address VARCHAR(255) NOT NULL,

CONSTRAINT pk\_member PRIMARY KEY (mem\_id)

);

CREATE TABLE RENTAL

( rent\_id VARCHAR(4) NOT NULL,

copy\_number VARCHAR(4) NOT NULL,

rent\_date DATE NOT NULL,

member\_id VARCHAR(5) NOT NULL,

CONSTRAINT pk\_rental PRIMARY KEY (rent\_id),

CONSTRAINT fk\_copy\_num FOREIGN KEY (copy\_number) REFERENCES COPY(copy\_num) on delete cascade,

CONSTRAINT fk\_mem\_id FOREIGN KEY (member\_id) REFERENCES MEMBER(mem\_id) on delete cascade

);

1. **SQL to load tables**

**STAR TABLE:**

insert into STAR values('EDDIE MURPHY', 'EDDIE', 'REGAN', 'MURPHY', TO\_DATE('04/3/1961', 'MM/DD/YYYY'));

insert into STAR values('MEL GIBSON', 'MEL', 'COLM-CILLE GERALD', 'GIBSON', TO\_DATE('01/3/1956', 'MM/DD/YYYY'));

insert into STAR values('JULIA ROBERTS', 'JULIA', 'FIONA', 'ROBERTS', TO\_DATE('10/28/1967', 'MM/DD/YYYY'));

**CATEGORY TABLE:**

insert into CATEGORY values(1, 'ACTION');

insert into CATEGORY values(2, 'HORROR');

insert into CATEGORY values(3, 'ADVENTURE');

insert into CATEGORY values(4, 'COMEDY');

insert into CATEGORY values(5, 'SUSPENSE');

insert into CATEGORY values(6, 'DRAMA');

insert into CATEGORY values(7, 'WAR');

insert into CATEGORY values(8, 'SCI-FI');

insert into CATEGORY values(9, 'THRILLER');

**MOVIE TABLE:**

insert into MOVIE values('SHREK', 4, 'EDDIE MURPHY');

insert into MOVIE values('BRAVE HEART', 1, 'MEL GIBSON');

insert into MOVIE values('OCEANS ELEVEN', 1, 'JULIA ROBERTS');

insert into MOVIE values('MAD MAX', 1, 'MEL GIBSON');

insert into MOVIE values('DADDYS HOME', 4, 'MEL GIBSON');

insert into MOVIE values('AVA', 9, NULL);

insert into MOVIE values('HOOK', 3, 'JULIA ROBERTS');

insert into MOVIE values('RUN', 9, NULL);

**DVD TABLE:**

insert into DVD values(1883);

insert into DVD values(2202);

insert into DVD values(4543);

insert into DVD values(7709);

insert into DVD values(9009);

**VHS TABLE:**

insert into VHS values(1445);

insert into VHS values(6655);

insert into VHS values(8801);

insert into VHS values(1889);

insert into VHS values(1993);

**COPY TABLE:**

insert into COPY values('1', 'SHREK', NULL, 1445);

insert into COPY values('2', 'BRAVE HEART', NULL, 1993);

insert into COPY values('3', 'OCEANS ELEVEN', 4543, NULL);

insert into COPY values('4', 'MAD MAX', NULL, 6655);

insert into COPY values('5', 'DADDYS HOME', 7709, NULL);

insert into COPY values('6', 'AVA', 9009, NULL);

insert into COPY values('7', 'HOOK', NULL, 8801);

insert into COPY values('8', 'RUN', 2202, NULL);

insert into COPY values('9', 'MAD MAX', NULL, 1889);

**MEMBER TABLE:**

insert into MEMBER values(1111, 'GARY', 'JOHNSON', '919-442-4444', '9101 FAYETTEVILLE RD, RALEIGH, NC');

insert into MEMBER values(1221, 'JOHN', 'DOE', '919-555-5532', '6600 LOUISBURG RD, RALEIGH, NC');

insert into MEMBER values(2112, 'MIKE', 'MYERS', '919-888-9999', '2901 HOLSTON LN, RALEIGH, NC 27610');

insert into MEMBER values(3344, 'WILL', 'GERALD', '919-443-2211', '3200 BUSH ST, RALEIGH, NC 27609');

**RENTAL TABLE:**

insert into RENTAL values(1112, 1, TO\_DATE('05/08/2020', 'MM/DD/YYYY'), 1221);

insert into RENTAL values(1113, 2, TO\_DATE('05/09/2020', 'MM/DD/YYYY'), 2112);

insert into RENTAL values(1114, 4, TO\_DATE('05/11/2020', 'MM/DD/YYYY'), 1111);

insert into RENTAL values(1115, 3, TO\_DATE('05/11/2020', 'MM/DD/YYYY'), 1221);

insert into RENTAL values(1116, 5, TO\_DATE('05/12/2020', 'MM/DD/YYYY'), 3344);

insert into RENTAL values(1117, 4, TO\_DATE('05/12/2020', 'MM/DD/YYYY'), 3344);

insert into RENTAL values(1118, 8, TO\_DATE('05/12/2020', 'MM/DD/YYYY'), 1111);

insert into RENTAL values(1119, 1, TO\_DATE('05/13/2020', 'MM/DD/YYYY'), 1221);

**C) EXAMPLES:**

**SQL>** **select \* from STAR;**

ACTOR\_NAME REAL\_FIRST REAL\_MIDDLE REAL\_LAST DOB

-------------------- -------------------- -------------------- -------------------- ---------

EDDIE MURPHY EDDIE REGAN MURPHY 03-APR-61

MEL GIBSON MEL COLM-CILLE GERALD GIBSON 03-JAN-56

JULIA ROBERTS JULIA FIONA ROBERTS 28-OCT-67

**SQL> select \* from STAR;**

ID GENRE

-- ------------------------------

1 ACTION

2 HORROR

3 ADVENTURE

4 COMEDY

5 SUSPENSE

6 DRAMA

7 WAR

8 SCI-FI

9 THRILLER

9 rows selected.

**SQL> select \* from MOVIE;**

TITLE GE STAR\_ACTOR

-------------------- -- ------------------------------

SHREK 4 EDDIE MURPHY

BRAVE HEART 1 MEL GIBSON

OCEANS ELEVEN 1 JULIA ROBERTS

MAD MAX 1 MEL GIBSON

DADDYS HOME 4 MEL GIBSON

AVA 9

HOOK 3 JULIA ROBERTS

RUN 9

8 rows selected.

**SQL>** **select \* from DVD;**

DVD\_ ----

1883

2202

4543

7709

9009

**SQL> select \* from VHS;**

VHS\_

----

1445

6655

8801

1889

1993

**SQL>** **select \* from COPY;**

CO TITLE DVD\_ VHS\_

-- -------------------- ---- ----

1 SHREK 1445

2 BRAVE HEART 1993

3 OCEANS ELEVEN 4543

4 MAD MAX 6655

5 DADDYS HOME 7709

6 AVA 9009

7 HOOK 8801

8 RUN 2202

9 MAD MAX 1889

9 rows selected.

**SQL> select \* from MEMBER;**

MEM\_I FIRST\_NAME LAST\_NAME PHONE\_NUM ADDRESS

----- ---------- ---------- -------------------- --------------------------------

1111 GARY JOHNSON 919-442-4444 9101 FAYETTEVILLE RD, RALEIGH, NC

1221 JOHN DOE 919-555-5532 6600 LOUISBURG RD, RALEIGH, NC

2112 MIKE MYERS 919-888-9999 2901 HOLSTON LN, RALEIGH, NC

3344 WILL GERALD 919-443-2211 3200 BUSH ST, RALEIGH, NC

**SQL>select \* from RENTAL;**

RENT COPY RENT\_DATE MEMBE

---- ---- --------- -----

1112 1 08-MAY-20 1221

1113 2 09-MAY-20 2112

1114 4 11-MAY-20 1111

1115 3 11-MAY-20 1221

1116 5 12-MAY-20 3344

1117 4 12-MAY-20 3344

1118 8 12-MAY-20 1111

1119 1 13-MAY-20 1221

8 rows selected.