CMPE 172 Enterprise Software Project Report

Movie Theater
Database Management System

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Table of Contents

1 Introduction

1.1 Problems Addressed

Problems that this database will solve will allow movie theaters to efficiently manage their database records. The group created a Movie Theater Ticket DBMS to simplify recording/searching data for Movie Theaters. Whether it's the record of a movie, customer, ticket order, showtime, or movie theater, all these will be accessible with the DBMS we made for this project. So the DBMS user will be able to get specific information that without a DBMS would take some time to find but with this DBMS all that is needed is a query search. One example is the DBMS operator can now find every movie that a specific user has watched in a movie theater.

1.2 Objective/Features

The DBMS will have to have these features to be fully functional and to be the specific DBMS we have in mind, so these features are the objectives. The user can create an account with their credentials for the Movie Theater Ticket Website. With this account, the user can order tickets for their movie showtime. There is also the ability to order multiple tickets and see receipts for what was purchased, which includes the payment feature, for how the tickets were paid(Debit, Credit, Cash). The database also shows multiple theaters with their locations and their respective room numbers. No repeated showtimes are allowed on a certain date-time unless it's a different room or theater. The movie should have a basic description of the movie's name, actors, director, genre, and more. There are also three different movie qualities we added, standard, ImaxHD, and Dolby3D for showtimes, and movies all start at $10, which will be more costly depending on the Quality.

1.3 Literature Survey

IMDB is a movie data website that contains information about almost every movie. We used IMBD to look up information about the movies. More specifically the Movie name, genre, actors, director, age rating, and when it comes out if it's a new movie. Google Maps was also used for obtaining the locations and names of Movie Theaters in/near San Jose.

Atom Tickets is a service website that sells movie tickets through it. We used Atom Tickets for reference on which entities are must-haves for the Movie Ticket DBMS we're going to create.

2 Data Modeling

2.1 System Description

The system we had in mind for the Movie Theater Ticket DBMS is web-based. Some similar websites like this are Fandango or Atom Tickets. Then the backend would utilize MySQL Workbench, that's what we used for creating this Database System. The management system

manages the customers, movie theaters, movies, showtimes, and ticket orders. The features that the team wanted were turned into entities and attributes.

2.2 Entity and Attributes

Defining Characteristics for each Entity

TotalPrice is multiplied depending on how many tickets are sold. Ticket = $10
$$((Ticket * quality.PriceMultiplier) * no\_of\_tickets = TotalPrice$$

Entities		Attributes					
MovieTheater	TheaterID(PK) INT	TheaterName VARCHAR(60)	Address VARCHAR(60)				
TheaterRoom	RoomNumber INT	TheaterID(FK) INT	No_of_seats INT				
Movie	MovieID(PK) INT	Title VARCHAR(200)	Genre VARCHAR(45)	Director VARCHAR(90)	StarringActor VARCHAR(90)	RunTime INT	AgeRating VARCHAR(5)
Customer	CustomerID(PK) INT	Fname VARCHAR(60)	Lname VARCHAR(60)	Email VARCHAR(100)	Username VARCHAR(50)	Password VARCHAR(50)	PhoneNumber CHAR(9)
ShowTime	ShowTimeID(PK) INT	MovieID(FK) INT	RoomNumber(FK) INT	TimeDate DATETIME			
QualityFormat	QualityName VARCHAR(20)	ShowTimeID(FK) INT	PriceMultiplier DECIMAL(10,2)				
Receipt	ReceiptID(PK) INT	CustomerID(FK) INT	TotalPrice DECIMAL(10,2)	PaymentMethod VARCHAR(45)			
Ticket	OrderID(PK) INT	ShowTimeID(FK) INT	ReceiptID(FK) INT	No_of_tickets INT			

Note: From the figure Entity and Attributes the value for the attribute TotalPrice is acquired by the formula shown on the top right.

2.3 Schemas

MovieTheater:

```
1 ●   SELECT * FROM movietheaterticket.movietheater;
```

Result Grid | Filter Rows: | Edit: | Export/Import:

TheaterID	TheaterName	Address
1	AMC Saratoga 14	700 El Paseo de Saratoga, San Jose, CA 95130
2	AMC Eastridge 15	2190 Eastridge Loop, San Jose, CA 95122
3	AMC Mercado 20	3111 Mission College Blvd, Santa Clara, CA 95054
4	AMC DINE-IN Sunnyvale 12	150 E McKinley Ave, Sunnyvale, CA 94086
5	CineLux Almaden Cafe & Lounge	2306 Almaden Rd, San Jose, CA 95125
6	CineLux Plaza	2501 S Winchester Blvd, Campbell, CA 95008
7	CineLux Los Gatos	43 N Santa Cruz Ave, Los Gatos, CA 95030
8	CineLux Tennant Station	750 Tennant Station, Morgan Hill, CA 95037
9	CineLux Scotts Valley Cafe & Lounge	226 Mt Hermon Rd, Scotts Valley, CA 95066
10	Cinemark Century Oakridge	925 Blossom Hill Rd #2000, San Jose, CA 95123
11	Cinemark CineArts Santana Row	3088 Olsen Dr, San Jose, CA 95128
12	Cinemark Century Great Mall	1010 Great Mall Dr, Milpitas, CA 95035
13	Cinemark Century Mountain View	1500 N Shoreline Blvd, Mountain View, CA 94043

TheaterRoom:

```
1 •   SELECT * FROM movietheaterticket.theaterroom;
```

RoomNumber	TheaterID	No_of_Seats
1	1	135
1	2	160
1	3	140
1	4	145
1	5	130
1	6	160
1	7	140
1	8	120
1	9	150
1	10	130
1	11	140
1	12	155
1	13	150
1	14	160
1	15	130
1	16	120
1	17	175
1	18	200
2	1	155
2	2	180
2	3	175
2	4	125

Movie:

```
1 •   SELECT * FROM movietheaterticket.movie;
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

MovieID	Title	Genre	Director	StarringActors	Runtime	AgeRating
22	The Little Mermaid	Animation	Ron Clements, John Musker	Jodi Benson, Samuel E. Wright	83	G
23	Pocahontas	Animation	Mike Gabriel, Eric Goldberg	Irene Bedard, Mel Gibson	81	G
24	Tangled	Animation	Nathan Greno, Byron Howard	Mandy Moore, Zachary Levi	100	PG
25	Beauty and the Beast (2017)	Fantasy	Bill Condon	Emma Watson, Dan Stevens	129	PG
26	The Jungle Book (2016)	Adventure	Jon Favreau	Neel Sethi, Bill Murray	106	PG
27	Black Panther	Action	Ryan Coogler	Chadwick Boseman, Michael B. Jordan	134	PG-13
28	Kill Bill: Volume 1	Action	Quentin Tarantino	Uma Thurman, Lucy Liu	111	R
29	The Notebook	Romance	Nick Cassavetes	Ryan Gosling, Rachel McAdams	123	PG-13
30	Finding Nemo	Animation	Andrew Stanton	Albert Brooks, Ellen DeGeneres	100	G
31	La La Land	Drama	Damien Chazelle	Ryan Gosling, Emma Stone	128	PG-13
32	Aladdin	Animation	Ron Clements, John Musker	Scott Weinger, Robin Williams	90	G
33	Raging Bull	Biography	Martin Scorsese	Robert De Niro, Joe Pesci	129	R
34	Blade Runner 2049	Sci-Fi	Denis Villeneuve	Ryan Gosling, Harrison Ford	164	R
35	God of Cookery	Comedy	Stephen Chow	Stephen Chow, Karen Mok	95	R
36	Kill Bill: Volume 2	Action	Quentin Tarantino	Uma Thurman, David Carradine	137	R
37	Django Unchained	Drama	Quentin Tarantino	Jamie Foxx, Christoph Waltz	165	R
38	Shaolin Soccer	Action	Stephen Chow	Stephen Chow, Vicki Zhao	87	PG-13
39	The Avengers	Action	Joss Whedon	Robert Downey Jr., Chris Evans	143	PG-13
40	The Mermaid	Comedy	Stephen Chow	Deng Chao, Lin Yun	94	R

Showtime:

```
1 •    SELECT * FROM movietheaterticket.showtime;
```

ShowtimeID	MovieID	RoomNumber	TimeDate
1001	44	1	2023-12-01 18:00:00
1002	2	2	2023-12-01 18:30:00
1003	3	3	2023-12-01 17:00:00
1004	4	4	2023-12-01 16:00:00
1005	44	5	2023-12-01 16:00:00
1006	45	6	2023-12-02 16:00:00
1007	46	7	2023-12-01 16:00:00
1008	47	8	2023-12-03 16:00:00
1009	44	9	2023-12-04 15:00:00
1010	48	10	2023-12-04 19:00:00
1011	49	11	2023-12-07 16:00:00
1012	50	12	2023-12-24 12:00:00
1013	51	13	2024-01-04 13:00:00
1014	52	14	2024-01-04 14:00:00
1015	48	15	2023-12-01 16:00:00

QualityFormat:

```
1 •    SELECT * FROM movietheaterticket.qualityformat;
```

Result Grid | Filter Rows:

QualityName	ShowTimeID	PriceMultiplier
Dolby3D	1003	1.60
ImaxHD	1002	1.30
Standard	1001	1.00
Dolby3D	1004	1.60
ImaxHD	1005	1.30
Standard	1006	1.00
ImaxHD	1007	1.30
ImaxHD	1008	1.30
Standard	1009	1.00
Standard	1010	1.00
ImaxHD	1011	1.30
Standard	1012	1.00
Dolby3D	1013	1.60
Dolby3D	1014	1.60
Standard	1015	1.00

Customer:

```
1 •    SELECT * FROM movietheaterticket.customer;
```

Limit to 500 rows

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content: IA

CustomerID	Fname	Lname	Email	Username	Password	PhoneNumber
1	John	Doe	john.doe@example.com	johndoe	hashed_password_1	4234567890
2	Jane	Smith	jane.smith@example.com	janesmith	hashed_password_2	5876543210
3	Bob	Johnson	bob.johnson@example.com	bobjohnson	hashed_password_3	6112223333
4	Alice	Williams	alice.williams@example.com	alicewilliams	hashed_password_4	7445556666
5	Charlie	Brown	charlie.brown@example.com	charliebrown	hashed_password_5	8778889999
6	Eva	Martinez	eva.martinez@example.com	evamartinez	hashed_password_6	9556667777
7	Michael	Nguyen	michael.nguyen@example.com	michaelnguyen	hashed_password_7	2990001111
8	Sophia	Lee	sophia.lee@example.com	sophialee	hashed_password_8	3223334444

Receipt:

```
1 •    SELECT * FROM movietheaterticket.receipt;
```

Result Grid | Filter Rows: | Edit:

ReceiptID	CustomerID	TotalPrice	PaymentMethod
1	4	40	Debit
2	4	30	Cash
3	4	10	Credit
4	3	30	Cash
5	64	10	Debit
6	12	40	Cash
7	44	20	Credit
8	133	10	Cash
9	143	20	Cash
10	133	20	Debit
11	122	20	Credit

Tickets:

```
1 •    SELECT * FROM movietheaterticket.tickets;
```

Result Grid | Filter Rows: | Edit:

OrderID	ShowTimeID	ReceiptID	No_of_Tickets
101	1004	1	4
102	1003	2	3
103	1001	8	1
104	1002	3	1
105	1005	4	3
106	1005	5	1
107	1005	6	4
108	1008	63	1
109	1005	62	3
110	1010	9	2
111	1011	10	2

2.4 ER Diagram & Explanation
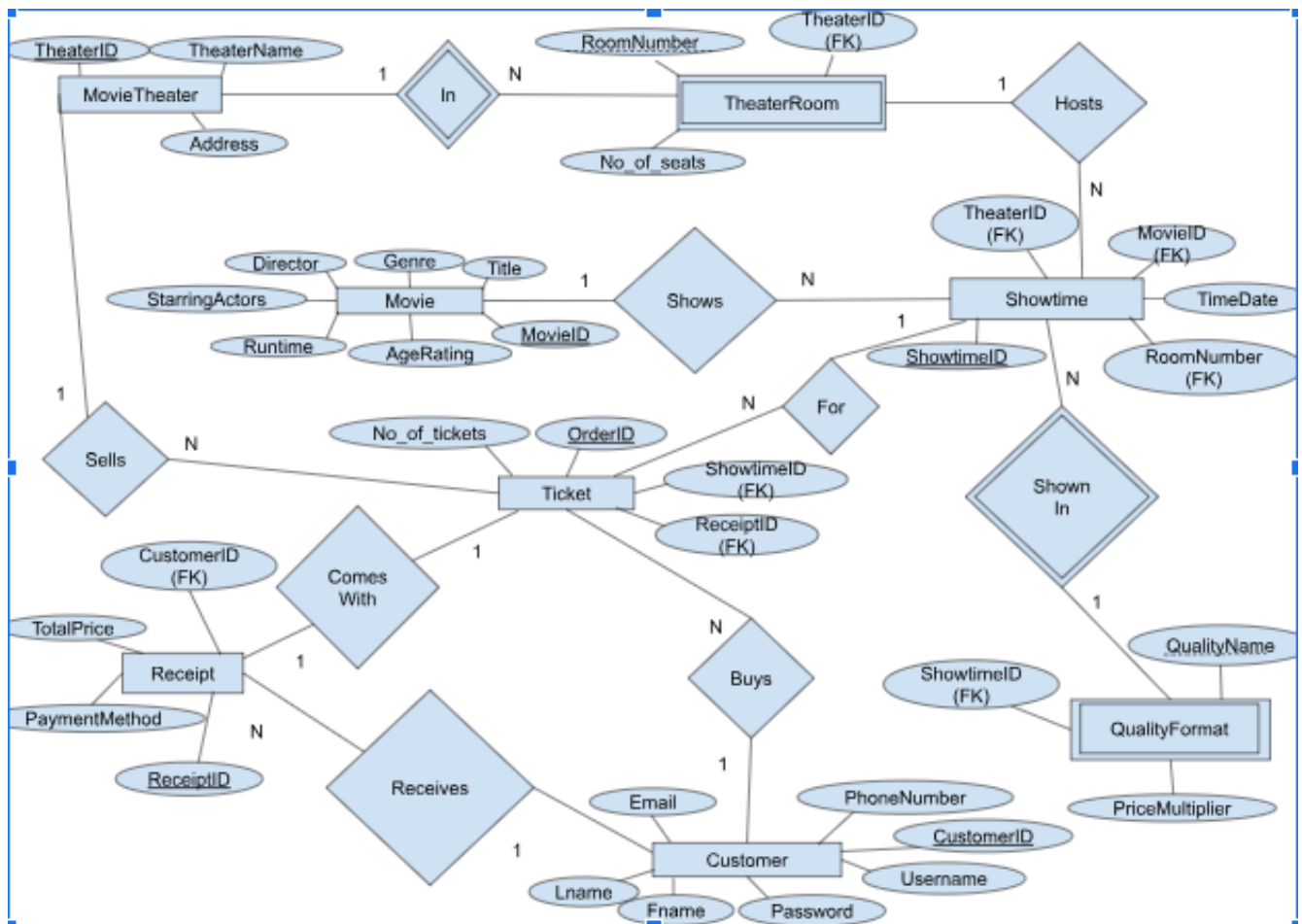
Explanations for the cardinalities in each relationship:

In: Each theater room is in one movie theater, but each movie theater has multiple theater rooms.

Hosts: A showtime is hosted in one theater room, but a theater room hosts multiple showtimes.

Shown In: A showtime is shown in one quality format, but quality formats have multiple showtimes shown in them.

Shows: A showtime shows one movie, but a movie is shown in multiple showtimes.

For: A ticket is for one showtime, but a showtime has multiple tickets.

Sells: A ticket is sold by one movie theater, but a movie theater sells multiple tickets.

Comes With: A ticket comes with one receipt, and a receipt is for one ticket.

Receives: A customer receives multiple receipts, but a receipt is received by one customer.

Buys: A customer buys multiple tickets, but a ticket is only bought by one customer.

3 SQL Queries & Math Notation

3.1 Basic Queries:

3.1.1: Select: Retrieve the movie theater name with their location

```
1 •   SELECT * FROM movietheaterticket.movietheater;
```

TheaterID	TheaterName	Address
1	AMC Saratoga 14	700 El Paseo de Saratoga, San Jose, CA 95130
2	AMC Eastridge 15	2190 Eastridge Loop, San Jose, CA 95122
3	AMC Mercado 20	3111 Mission College Blvd, Santa Clara, CA 95054
4	AMC DINE-IN Sunnyvale 12	150 E McKinley Ave, Sunnyvale, CA 94086
5	CineLux Almaden Cafe & Lounge	2306 Almaden Rd, San Jose, CA 95125
6	CineLux Plaza	2501 S Winchester Blvd, Campbell, CA 95008
7	CineLux Los Gatos	43 N Santa Cruz Ave, Los Gatos, CA 95030
8	CineLux Tennant Station	750 Tennant Station, Morgan Hill, CA 95037
9	CineLux Scotts Valley Cafe & Lounge	226 Mt Hermon Rd, Scotts Valley, CA 95066
10	Cinemark Century Oakridge	925 Blossom Hill Rd #2000, San Jose, CA 95123

3.1.2: Where: Retrieve all the movies that are rated pg-13 with the movie name and genre

```
1 •   SELECT MovieID, Title, Genre, AgeRating
2     FROM Movie m
3     WHERE AgeRating = 'PG-13';
4 •   SELECT MovieID, Title
5
```

Result Grid | Filter Rows: | Edit:

MovieID	Title	Genre	AgeRating
3	Inception	Sci-Fi	PG-13
4	Forrest Gump	Drama	PG-13
5	The Dark Knight	Action	PG-13
14	Crazy, Stupid, Love	Comedy	PG-13
15	Avengers: Endgame	Action	PG-13
18	Guardians of the Galaxy	Action	PG-13
27	Black Panther	Action	PG-13
29	The Notebook	Romance	PG-13
31	La La Land	Drama	PG-13
38	Shaolin Soccer	Action	PG-13
39	The Avengers	Action	PG-13
41	Spider-Man: Homecoming	Action	PG-13
42	Journey to the West: C...	Fantasy	PG-13
45	Godzilla Minus One	Adventure	PG-13
51	Mean Girls	Comedy	PG-13

3.1.3: Update: Change Pulp Fiction age rating from rated R to PG

```
1     UPDATE `movie` SET `AgeRating` = 'PG'
2     WHERE (`MovieID` = '6');
```

MovieID	Title	Genre	Director	StarringActors	Runtime	AgeRating
1	The Shawshank Redemption	Drama	Frank Darabont	Tim Robbins, Morgan Freeman	142	R
2	The Godfather	Crime	Francis Ford Coppola	Marlon Brando, Al Pacino	175	R
3	Inception	Sci-Fi	Christopher Nolan	Leonardo DiCaprio, Joseph Gordon-Levitt	148	PG-13
4	Forrest Gump	Drama	Robert Zemeckis	Tom Hanks, Robin Wright	142	PG-13
5	The Dark Knight	Action	Christopher Nolan	Christian Bale, Heath Ledger	152	PG-13
6	Pulp Fiction	Crime	Quentin Tarantino	John Travolta, Uma Thurman	154	PG
7	Goodfellas	Crime	Martin Scorsese	Robert De Niro, Ray Liotta	146	R
8	Kung Fu Hustle	Action	Stephen Chow	Stephen Chow, Yuen Wah	99	R
9	Cinderella	Animation	Clyde Geronimi, Hamilton Luske	Ilene Woods, James MacDonald	74	G
10	Taxi Driver	Drama	Martin Scorsese	Robert De Niro, Jodie Foster	113	R

3.1.4: Order By: Retrieve all the movies by their name in alphabetical order

```
1    SELECT MovieID, Title
2    FROM Movie
3    ORDER BY Title ASC;
4
```

MovieID	Title
32	Aladdin
15	Avengers: Endgame
25	Beauty and the Beast (2017)
27	Black Panther
34	Blade Runner 2049
9	Cinderella
14	Crazy, Stupid, Love
37	Django Unchained
20	Drive
50	Ferrari
30	Finding Nemo
4	Forrest Gump
13	Frozen
35	God of Cookery
45	Godzilla Minus One
7	Goodfellas
18	Guardians of the Galaxy
49	Hard Boiled
3	Inception
42	Journey to the West: Conq...
28	Kill Bill: Volume 1
36	Kill Bill: Volume 2
8	Kung Fu Hustle

3.1.5: Insert: Insert a new movie into the Movie Table

```
1    INSERT INTO Movie (MovieID, Title, Genre, StarringActors, Director, Runtime, AgeRating)
2    VALUES
3        (53, 'The Wrestler', 'Sport', 'Mickey Rourke, Marisa Tomei', 'Darren Aronofsky', 109, 'R');
4
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

MovieID	Title	Genre	Director	StarringActors	Runtime	AgeRating
53	The Wrestler	Sport	Darren Aronofsky	Mickey Rourke, Marisa Tomei	109	R
52	The Beekeeper	Action	David Ayer	Josh Hutcherson, Jason Statham	101	R
51	Mean Girls	Comedy	Samantha Jayne, Arturo Pere...	Angourie Rice, Renee Rapp	150	PG-13
50	Ferrari	Biography	Michael Mann	Adam Driver, Shailene Woodley	130	R
49	Hard Boiled	Crime	John Woo	Chow Yun-fat, Tony Leung	128	R
48	Wonka	Adventure	Paul King	Timothee Chalamet, Olivia Colman	112	PG

3.2: Intermediate Queries:

3.2.1: Join: Retrieve the Movie Theaters with all the rooms they have and how many seats there are. Order them by highest seat Count

```
1    SELECT
2        mt.TheaterID,
3        mt.TheaterName,
4        mt.Address,
5        tr.RoomNumber,
6        tr.No_of_Seats
7    FROM
8        MovieTheater mt
9        JOIN TheaterRoom tr ON mt.TheaterID = tr.TheaterID
10       ORDER BY No_of_Seats DESC;
11
```

TheaterID	TheaterName	Address	RoomNumber	No_of_Seats
18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	1	200
18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	7	200
18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	14	200
18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	15	200
18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	4	195
18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	10	195
18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	12	195
18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	2	190
18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	3	190
18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	5	190
18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	11	190
18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	13	190
8	CineLux Tennant Station	750 Tennant Station, Morgan Hill, CA…	10	185
9	CineLux Scotts Valley Caf…	226 Mt Hermon Rd, Scotts Valley, CA…	7	185
13	Cinemark Century Mountai…	1500 N Shoreline Blvd, Mountain View…	6	185
18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	6	185
18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	8	185
2	AMC Eastridge 15	2190 Eastridge Loop, San Jose, CA 9…	2	180

3.2.2: Three Way Join: Retrieve Customer with their receipt and how much tickets they purchased
(Customer, Receipt, Tickets)

```
1    SELECT
2        ca.Fname,
3        ca.Lname,
4        r.ReceiptID,
5        t.No_of_Tickets
6    FROM
7        Customer ca
8    JOIN
9        Receipt r ON ca.CustomerID = r.CustomerID
10   JOIN
11       Tickets t ON r.ReceiptID = t.ReceiptID;
```

Fname	Lname	ReceiptID	No_of_Tickets
Alice	Williams	1	4
Alice	Williams	2	3
Colton	Wright	8	1
Alice	Williams	3	1
Bob	Johnson	4	3
Luke	Evans	5	1
Emma	Anderson	6	4
Liam	Johnson	63	1
Ava	Wright	62	3
Nolan	Morris	9	2
Colton	Wright	10	2
Mia	Clark	11	2

3.2.3: Natural Join: Retrieve all the showtimes with the respective movie by joining their common columns

```
1 •  SELECT *
2    FROM ShowTime
3    NATURAL JOIN Movie;
```

	MovieID	ShowtimeID	RoomNumber	TimeDate	Title	Genre	Director	StarringActors	Runtime	AgeRating
▶	44	1001	1	2023-12-01 18:00:00	Silent Night	Action	John Woo	Joel Kinnaman, Catalina Sandino	104	R
	2	1002	2	2023-12-01 18:30:00	The Godfather	Crime	Francis Ford Coppola	Marlon Brando, Al Pacino	175	R
	3	1003	3	2023-12-01 17:00:00	Inception	Sci-Fi	Christopher Nolan	Leonardo DiCaprio, Joseph Gordon-Levitt	148	PG-13
	4	1004	4	2023-12-01 16:00:00	Forrest Gump	Drama	Robert Zemeckis	Tom Hanks, Robin Wright	142	PG-13
	44	1005	5	2023-12-01 16:00:00	Silent Night	Action	John Woo	Joel Kinnaman, Catalina Sandino	104	R
	45	1006	6	2023-12-02 16:00:00	Godzilla Minus One	Adventure	Takashi Yamazaki	Minami Hamabe, Ryunosuke Kamiki	125	PG-13
	46	1007	7	2023-12-01 16:00:00	The Killer	Action	John Woo	Chow Yun-fat, Danny Lee	104	R
	47	1008	8	2023-12-03 16:00:00	The Iron Claw	Drama	Sean Durkin	Zac Efron, Jeremy Allen White	130	R
	44	1009	9	2023-12-04 15:00:00	Silent Night	Action	John Woo	Joel Kinnaman, Catalina Sandino	104	R
	48	1010	10	2023-12-04 19:00:00	Wonka	Adventure	Paul King	Timothee Chalamet, Olivia Colman	112	PG
	49	1011	11	2023-12-07 16:00:00	Hard Boiled	Crime	John Woo	Chow Yun-fat, Tony Leung	128	R
	50	1012	12	2023-12-24 12:00:00	Ferrari	Biography	Michael Mann	Adam Driver, Shailene Woodley	130	R
	51	1013	13	2024-01-04 13:00:00	Mean Girls	Comedy	Samantha Jayne, Ar...	Angourie Rice, Renee Rapp	150	PG-13
	52	1014	14	2024-01-04 14:00:00	The Beekeeper	Action	David Ayer	Josh Hutcherson, Jason Statham	101	R
	48	1015	15	2023-12-01 16:00:00	Wonka	Adventure	Paul King	Timothee Chalamet, Olivia Colman	112	PG

3.2.4: Inner Join: Retrieve customers with their respective receipts with how much was the total purchase and how did they pay

```
1 •  SELECT
2        C.CustomerID,
3        C.Fname,
4        C.Lname,
5        R.ReceiptID,
6        R.TotalPrice,
7        R.PaymentMethod
8    FROM
9        Customer AS C
10   INNER JOIN
11       Receipt AS R ON C.CustomerID = R.CustomerID;
```

	CustomerID	Fname	Lname	ReceiptID	TotalPrice	PaymentMethod
▶	4	Alice	Williams	1	40	Debit
	4	Alice	Williams	2	30	Cash
	4	Alice	Williams	3	10	Credit
	3	Bob	Johnson	4	30	Cash
	64	Luke	Evans	5	10	Debit
	12	Emma	Anderson	6	40	Cash
	44	Noah	Smith	7	20	Credit
	133	Colton	Wright	8	10	Cash
	143	Nolan	Morris	9	20	Cash
	133	Colton	Wright	10	20	Debit
	122	Mia	Clark	11	20	Credit
	55	Ava	Harrison	12	20	Credit
	1	John	Doe	13	10	Cash

3.2.5: Outer Join (Left): Retrieve every movie that has a showtime assigned to it, if it doesn't have one assigned return null for it.

```
1 •  SELECT Movie.Title, ShowTime.TimeDate
2    FROM Movie
3    LEFT JOIN ShowTime ON Movie.MovieID = ShowTime.MovieID;
4
```

Title	TimeDate
Shaolin Soccer	NULL
Silent Night	2023-12-04 15:00:00
Silent Night	2023-12-01 16:00:00
Silent Night	2023-12-01 18:00:00
Spider-Man: Homecoming	NULL
Tangled	NULL
Taxi Driver	NULL
The Avengers	NULL
The Beekeeper	2024-01-04 14:00:00
The Dark Knight	NULL
The Departed	NULL
The Godfather	2023-12-01 18:30:00
The Iron Claw	2023-12-03 16:00:00

3.3: Advanced Queries

3.3.1: Nested Join: Retrieve every customer by their first and last name who watched a movie directed by John Woo

```
1   SELECT DISTINCT CustomerID, Fname, Lname
2   FROM Customer
3   WHERE CustomerID IN (
4       SELECT DISTINCT C.CustomerID
5       FROM Customer C
6       JOIN Receipt R ON C.CustomerID = R.CustomerID
7       JOIN Tickets T ON R.ReceiptID = T.ReceiptID
8       JOIN ShowTime S ON T.ShowTimeID = S.ShowTimeID
9       JOIN Movie M ON S.MovieID = M.MovieID
10      WHERE M.Director = 'John Woo'
11  );
```

CustomerID	Fname	Lname
133	Colton	Wright
12	Emma	Anderson
3	Bob	Johnson
64	Luke	Evans
41	Ava	Wright
1	John	Doe
22	Avery	Ward
23	Scarlett	Wright
25	Zoe	Harrison
26	Madison	Barnes
27	Liam	Fisher
33	Gabriel	Ross
37	Jackson	Lopez

3.3.2: Nested Join: Retrieve all the movies that are being shown in a specific theater

```
1   SELECT *
2   FROM Movie
3   WHERE MovieID IN (
4       SELECT MovieID
5       FROM ShowTime
6       WHERE RoomNumber IN (
7           SELECT RoomNumber
8           FROM TheaterRoom
9           WHERE TheaterID = '1'
10      )
11  );
```

MovieID	Title	Genre	Director	StarringActors	Runtime	AgeRating
44	Silent Night	Action	John Woo	Joel Kinnaman, Catalina Sandino	104	R
2	The Godfather	Crime	Francis Ford Coppola	Marlon Brando, Al Pacino	175	R
3	Inception	Sci-Fi	Christopher Nolan	Leonardo DiCaprio, Joseph Gordon-Levitt	148	PG-13
4	Forrest Gump	Drama	Robert Zemeckis	Tom Hanks, Robin Wright	142	PG-13
45	Godzilla Minus...	Adventure	Takashi Yamazaki	Minami Hamabe, Ryunosuke Kamiki	125	PG-13
46	The Killer	Action	John Woo	Chow Yun-fat, Danny Lee	104	R
47	The Iron Claw	Drama	Sean Durkin	Zac Efron, Jeremy Allen White	130	R
48	Wonka	Adventure	Paul King	Timothee Chalamet, Olivia Colman	112	PG
49	Hard Boiled	Crime	John Woo	Chow Yun-fat, Tony Leung	128	R
50	Ferrari	Biography	Michael Mann	Adam Driver, Shailene Woodley	130	R
51	Mean Girls	Comedy	Samantha Jayne, Ar...	Angourie Rice, Renee Rapp	150	PG-13
52	The Beekeeper	Action	David Ayer	Josh Hutcherson, Jason Statham	101	R

3.3.3: Nested Join: Retrieve every movie by title that John Doe watched

```
1   select distinct movieid, title from movie where movieid in
2   (select distinct movieid from showtime s join tickets t on
3   s.showtimeid = t.showtimeid join receipt r on t.receiptid =
4   r.receiptid join customer c on r.customerid = c.customerid
5   where c.fname = 'John' and c.lname = 'Doe')
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content: IA

movieid	title
44	Silent Night

3.3.4: Nested Join: Retrieve every customer by their first and last name who watched a sci-fi movie

```
1       SELECT DISTINCT CustomerID, Fname, Lname
2       FROM Customer
3     ⊖ WHERE CustomerID IN (
4           SELECT DISTINCT C.CustomerID
5           FROM Customer C
6           JOIN Receipt R ON C.CustomerID = R.CustomerID
7           JOIN Tickets T ON R.ReceiptID = T.ReceiptID
8           JOIN ShowTime S ON T.ShowTimeID = S.ShowTimeID
9           JOIN Movie M ON S.MovieID = M.MovieID
10          WHERE M.Genre = 'Sci-Fi'
11      );
12
```

Result Grid | Filter Rows: | Export: | Wrap Cell C

CustomerID	Fname	Lname
4	Alice	Williams
11	Liam	Taylor

3.3.5: Nested Join: Find all customers who watched the movie Silent Night

```
1  ●   SELECT *
2      FROM Customer
3    ⊖ WHERE CustomerID IN (
4          SELECT CustomerID
5          FROM Receipt
6        ⊖ WHERE ReceiptID IN (
7              SELECT ReceiptID
8              FROM Tickets
9            ⊖ WHERE ShowTimeID IN (
10                 SELECT ShowTimeID
11                 FROM ShowTime
12                 WHERE MovieID = '44'
13             )
14         )
15     );
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content: ‡A

CustomerID	Fname	Lname	Email	Username	Password	PhoneNumber
133	Colton	Wright	colton.wright@example.com	coltoght	942a1b90	3223334444
12	Emma	Anderson	emma.anderson@example.com	emmaanderson	hashed_password_12	5879879876
3	Bob	Johnson	bob.johnson@example.com	bobjohnson	hashed_password_3	6112223333
64	Luke	Evans	luke.evans@example.com	lukeevans	hashed_password_64	4345556666
41	Ava	Wright	ava.wright@example.com	avawright	hashed_password_41	3231231234
1	John	Doe	john.doe@example.com	johndoe	hashed_password_1	4234567890
22	Avery	Ward	avery.ward@example.com	averyward	hashed_password_22	8879879876
23	Scarlett	Wright	scarlett.wright@example.com	scarlettwright	hashed_password_23	8112223333
25	Zoe	Harrison	zoe.harrison@example.com	zoeharrison	hashed_password_25	4778889999
26	Madison	Barnes	madison.barnes@example.com	madisonbarnes	hashed_password_26	3556667777
27	Liam	Fisher	liam.fisher@example.com	liamfisher	hashed_password_27	2990001111
33	Gabriel	Ross	gabriel.ross@example.com	gabrielross	hashed_password_33	8112223333
37	Jackson	Lopez	jackson.lopez@example.com	jacksonlopez	hashed_password_37	1190001111

3.4: Mathematical Notation

3.4.1: Basic: Retrieve the movie theater name with their location

```
1 •    SELECT * FROM movietheaterticket.movietheater;
```

TheaterID	TheaterName	Address
1	AMC Saratoga 14	700 El Paseo de Saratoga, San Jose, CA 95130
2	AMC Eastridge 15	2190 Eastridge Loop, San Jose, CA 95122
3	AMC Mercado 20	3111 Mission College Blvd, Santa Clara, CA 95054
4	AMC DINE-IN Sunnyvale 12	150 E McKinley Ave, Sunnyvale, CA 94086
5	CineLux Almaden Cafe & Lounge	2306 Almaden Rd, San Jose, CA 95125
6	CineLux Plaza	2501 S Winchester Blvd, Campbell, CA 95008
7	CineLux Los Gatos	43 N Santa Cruz Ave, Los Gatos, CA 95030
8	CineLux Tennant Station	750 Tennant Station, Morgan Hill, CA 95037
9	CineLux Scotts Valley Cafe & Lounge	226 Mt Hermon Rd, Scotts Valley, CA 95066
10	Cinemark Century Oakridge	925 Blossom Hill Rd #2000, San Jose, CA 95123

Result <- $\pi_{TheaterID,TheaterName, Address}$(MovieTheater)

3.4.2: Basic: Retrieve all the movies that are rated pg-13 with the movie name and genre

```
1    SELECT MovieID, Title, Genre, AgeRating
2    FROM Movie m
3    WHERE AgeRating = 'PG-13';
```

MovieID	Title	Genre	AgeRating
3	Inception	Sci-Fi	PG-13
4	Forrest Gump	Drama	PG-13
5	The Dark Knight	Action	PG-13
14	Crazy, Stupid...	Comedy	PG-13
15	Avengers: En...	Action	PG-13
18	Guardians of ...	Action	PG-13
27	Black Panther	Action	PG-13
29	The Notebook	Romance	PG-13
31	La La Land	Drama	PG-13
38	Shaolin Soccer	Action	PG-13
39	The Avengers	Action	PG-13
41	Spider-Man: ...	Action	PG-13
42	Journey to th...	Fantasy	PG-13
45	Godzilla Minus...	Adventure	PG-13
51	Mean Girls	Comedy	PG-13

Movie<- $\sigma_{AgeRating='PG-13'}$(Movie)

Result <- $\pi_{MovieID, Title, Genre, AgeRating}$(Movie)

3.4.3: Basic: Retrieve all the movies by their name in alphabetical order

```
1    SELECT MovieID, Title
2    FROM Movie
3    ORDER BY Title ASC;
```

MovieID	Title
32	Aladdin
15	Avengers: Endgame
25	Beauty and the Beast (2017)
27	Black Panther
34	Blade Runner 2049
9	Cinderella
14	Crazy, Stupid, Love
37	Django Unchained
20	Drive
50	Ferrari
30	Finding Nemo
4	Forrest Gump
13	Frozen
35	God of Cookery
45	Godzilla Minus One
7	Goodfellas
18	Guardians of the Galaxy
49	Hard Boiled
3	Inception
42	Journey to the West: Conq...
28	Kill Bill: Volume 1
36	Kill Bill: Volume 2
8	Kung Fu Hustle

Movie$\leftarrow \pi_{\text{MovieID, Title}}$(Movie)
Result$\leftarrow \tau_{\text{Title}}$(Movie)

3.4.4: Basic: Insert a new movie into the Movie Table

```
1    INSERT INTO Movie (MovieID, Title, Genre, StarringActors, Director, Runtime, AgeRating)
2    VALUES
3        (53, 'The Wrestler',  'Sport', 'Mickey Rourke, Marisa Tomei', 'Darren Aronofsky', 109, 'R');
4
```

MovieID	Title	Genre	Director	StarringActors	Runtime	AgeRating
53	The Wrestler	Sport	Darren Aronofsky	Mickey Rourke, Marisa Tomei	109	R
52	The Beekeeper	Action	David Ayer	Josh Hutcherson, Jason Statham	101	R
51	Mean Girls	Comedy	Samantha Jayne, Arturo Pere...	Angourie Rice, Renee Rapp	150	PG-13
50	Ferrari	Biography	Michael Mann	Adam Driver, Shailene Woodley	130	R
49	Hard Boiled	Crime	John Woo	Chow Yun-fat, Tony Leung	128	R
48	Wonka	Adventure	Paul King	Timothee Chalamet, Olivia Colman	112	PG

Movie$\leftarrow$ Movie $- \pi_{\text{MovieID,Title, Genre, AgeRating}}(\sigma_{\text{MovieID='6'}}$(Movie))
Movie $\leftarrow$ Movie $\cup \pi_{\text{MovieID,Title, Genre, 'R' AS AgeRating}}(\sigma_{\text{MovieID='6'}}$(Movie))

3.4.5: Basic: Change Pulp Fiction age rating from rated R to PG.

```
1    UPDATE movie SET `AgeRating` = 'R'
2    WHERE `MovieID` = '6';
```

MovieID	Title	Genre	Director	StarringActors	Runtime	AgeRating
1	The Shawshank Redemption	Drama	Frank Darabont	Tim Robbins, Morgan Freeman	142	R
2	The Godfather	Crime	Francis Ford Coppola	Marlon Brando, Al Pacino	175	R
3	Inception	Sci-Fi	Christopher Nolan	Leonardo DiCaprio, Joseph Gordon-Levitt	148	PG-13
4	Forrest Gump	Drama	Robert Zemeckis	Tom Hanks, Robin Wright	142	PG-13
5	The Dark Knight	Action	Christopher Nolan	Christian Bale, Heath Ledger	152	PG-13
6	Pulp Fiction	Crime	Quentin Tarantino	John Travolta, Uma Thurman	154	PG
7	Goodfellas	Crime	Martin Scorsese	Robert De Niro, Ray Liotta	146	R
8	Kung Fu Hustle	Action	Stephen Chow	Stephen Chow, Yuen Wah	99	R
9	Cinderella	Animation	Clyde Geronimi, Hamilton Luske	Ilene Woods, James MacDonald	74	G
10	Taxi Driver	Drama	Martin Scorsese	Robert De Niro, Jodie Foster	113	R

Movie<- Movie $\cup$ {(53, 'The Wrestler', 'Sport', 'Mickey Rourke, Marisa Tomei', 'Darren Aronofsky', 109, 'R')}

3.4.6: Intermediate: Order each room in each movie theater by number of seats

```
1    SELECT
2        mt.TheaterID,
3        mt.TheaterName,
4        mt.Address,
5        tr.RoomNumber,
6        tr.No_of_Seats
7    FROM
8        MovieTheater mt
9        JOIN TheaterRoom tr ON mt.TheaterID = tr.TheaterID
10       ORDER BY No_of_Seats DESC;
11
```

	TheaterID	TheaterName	Address	RoomNumber	No_of_Seats
▶	18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	1	200
	18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	7	200
	18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	14	200
	18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	15	200
	18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	4	195
	18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	10	195
	18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	12	195
	18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	2	190
	18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	3	190
	18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	5	190
	18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	11	190
	18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	13	190
	8	CineLux Tennant Station	750 Tennant Station, Morgan Hill, CA...	10	185
	9	CineLux Scotts Valley Caf...	226 Mt Hermon Rd, Scotts Valley, CA...	7	185
	13	Cinemark Century Mountai...	1500 N Shoreline Blvd, Mountain View...	6	185
	18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	6	185
	18	West Wind Capitol Drive-In	3630 Hillcap Ave, San Jose, CA 95136	8	185
	2	AMC Eastridge 15	2190 Eastridge Loop, San Jose, CA 9...	2	180

MT<-ρ_{MT}(MovieTheater)
TR<-ρ_{TR}(TheaterRoom)
MTR<-MT$\bowtie_{TR.TheaterID=MT.TheaterID}$TR
Result<-$\tau_{No\_of\_Seats}$(MTR)

3.4.7: Advanced: List of distinct movies that John Doe has watched

```
1    select distinct movieid, title from movie where movieid in
2  ⊖ (select distinct movieid from showtime s join tickets t on
3    s.showtimeid = t.showtimeid join receipt r on t.receiptid =
4    r.receiptid join customer c on r.customerid = c.customerid
5    where c.fname = 'John' and c.lname = 'Doe')
```

movieid	title
44	Silent Night

C<-ρ_C(Customer)
R<-ρ_R(Receipt)
T<-ρ_T(Tickets)
S<-ρ_S(Showtime)
Transaction<-$S \bowtie_{S.ShowtimeID=T.ShowtimeID} T \bowtie_{T.ReceiptID=R.ReceiptID} R \bowtie_{R.CustomerID=C.CustomerID} C$
Transaction<-$\pi_{MovieID, Title}$(Transaction)
Result<-$\sigma_{Fname="John", Name="Doe"}$(Transaction)

4 Conclusion

The team learned a great deal of new lessons from working on this DBMS project. The main lesson we learned from this project was that due to the complexity of any type of software project, it is important to understand the concept of an ER Diagram when working in any software field. This will simplify the process of designing the product. We also got a deeper understanding of MySQL, especially when it came to the algebraic math notations. Building this project of a Movie Theater Ticket DBMS involves not only technical skills but also gives a better understanding of the end-users needs. The software developed aims to enhance the ticketing experience for both customers and theater administrators, emphasizing user-friendliness, efficiency, and data integrity.