

MOVIE THEATER TICKET

DBMS

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01

Introduction

Features of the DBMS

- 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.
- Ability to order multiple tickets and see receipts for what was purchased
- Payment Feature, for how were the tickets paid(Debit, Credit, Cash)
- Multiple Theater Locations/With their respective room numbers
- No repeated showtimes on a certain date-time unless it's a different room or theater.
- The movie should have a basic description(Name, Genre, Actors, RunTime, AgeRating etc)
- Different movie qualities(Standard, ImaxHD, Dolby3D) for showtimes
- Movies all start at \$10, it will be more costly depending on the Quality.



Literature Survey

(References)

IMBD

- IMBD is a movie data website that contains information almost every movie.
- We used IMBD for looking up information about the movies.
- More specifically the Movie name, genre, actors, director, age rating and when does it come out if it's a new movie.

Atom Tickets

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

Google Maps was also used for obtaining the locations and names for Movie Theaters in/near San Jose.



A hand holding a clapperboard. The clapperboard has a table with three columns and three rows. The top row contains the words 'Scene', 'Take', and 'Director'. The second row contains '1', '1', and 'John Doe'. The third row contains '2', '2', and 'John Doe'.

02

Data Modeling and ER Diagram

A spotlight on a stage, casting a beam of light onto the text.

Relational Database Management System

Website based System:

The Movie Theater Ticket management system is web based and it manages the:

- Customers
- Movie Theaters
- Movies
- ShowTime
- Ticket Orders



Movie Theater Ticket Database System

Entities



**Movie
Theater**

Movie

**Quality
Format**

Receipt

**Theater
Room**

Customer

ShowTime

Ticket



Defining Characteristics for each Entity

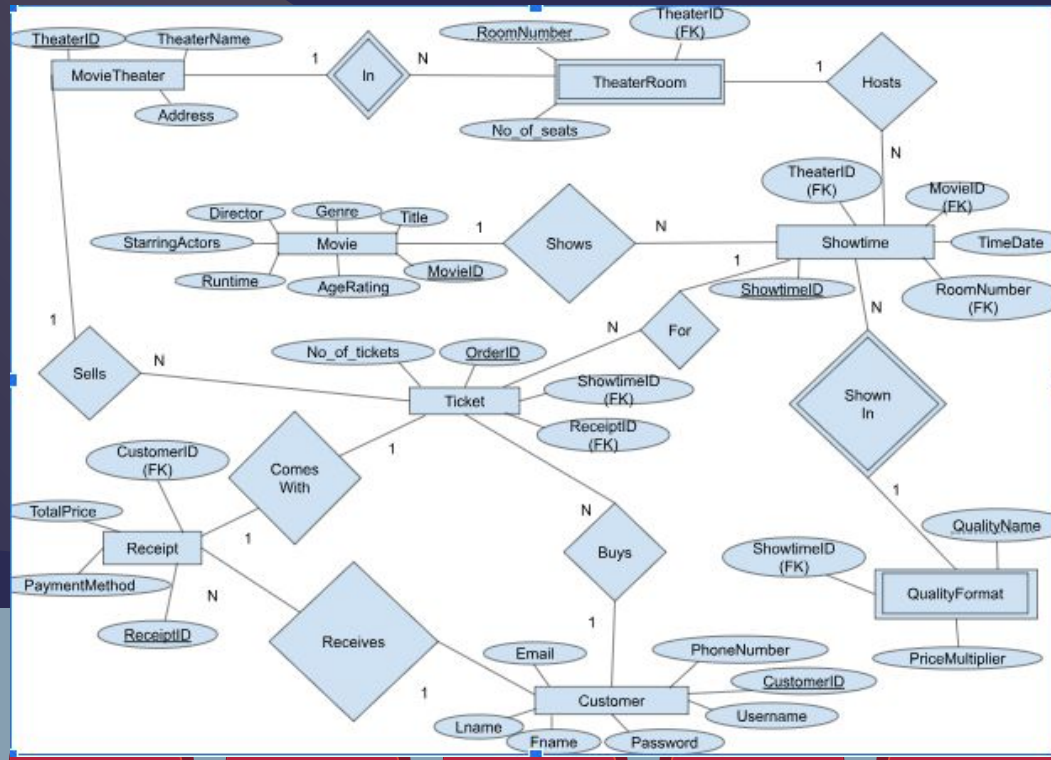
Entities

Attributes

TotalPrice is multiplied depending on how many tickets are sold. Ticket = \$10
 $((\text{Ticket} * \text{quality.PriceMultiplier}) * \text{no_of_tickets}) = \text{TotalPrice}$

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

ER Diagram



The background of the slide is a stylized stage. It features red curtains on the left and right sides. In the center, there is a red podium with two microphones. In front of the podium, there are two sets of yellow stanchions connected by red ropes. A spotlight is visible on the floor, casting a beam of light towards the podium. The overall color scheme is dark blue for the background, red for the curtains and podium, and yellow for the stanchions.

03

Schemas, Queries, and Mathematical Notation

Schemas

MovieTheater:

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

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:

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
2	5	150
2	6	130
2	7	155
2	8	175
2	9	165
2	10	150
2	11	155
2	12	160
2	13	170
2	14	135
2	15	170

Movie:

1 • SELECT * FROM movietheaterticket.movies;

<

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	Enma 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

Schemas

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

Quality Format:

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

	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

Schemas

Customer:

1 • `SELECT * FROM movietheaterticket.customer;`

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	jan smith	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	michaelsinguyen	hashed_password_7	2990001111
8	Sophia	Lee	sophia.lee@example.com	sophialee	hashed_password_8	3223334444

Receipt:

1 • `SELECT * FROM movietheaterticket.receipt;`

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
12	55	20	Credit
13	1	10	Cash
14	6	10	Cash
15	3	10	Debit
16	7	30	Debit
17	9	30	Cash
18	10	40	Cash
19	11	60	Credit
20	13	60	Debit
21	15	70	Cash
22	13	30	Credit
23	11	40	Cash
24	11	20	Debit
25	14	50	Credit

Tickets:

1 • `SELECT * FROM movietheaterticket.tickets;`

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
112	1012	11	2
113	1013	12	2
114	1005	13	1
115	1015	14	1
116	1005	15	1
117	1006	16	3
118	1007	17	3
119	1004	18	4
120	1003	19	6
121	1009	20	6
122	1010	21	7

Basic Queries

Select

Retrieve the movie theater name with their location

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

Result Grid			
Filter Rows:			
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	

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:			
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

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	Jane Woods, James MacDonald	74	G
10	Taxi Driver	Drama	Martin Scorsese	Robert De Niro, Jodie Foster	113	R

35 14:06:57 UPDATE movie SET `AgeRating` = 'PG' WHERE `MovieID` = '6'

1 row(s) affected Rows matched: 1 Changed: 1 Warnings: 0

Basic Queries

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

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
```

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	Timothée Chalamet, Olivia Colman	112	PG

5 12:52:16 INSERT INTO Movie (MovieID, Title, Genre, StarringActors, Director, Runtime, AgeRating) VALUES (53, 'The Wrestler', 'Sport...' 1 row(s) affected

Intermediate Queries:

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

```

Result Grid

Filter Rows:

Exports

Wrap Cell Contents: ☒

	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

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;

```

<

Result Grid   Filter Rows: Export:  Wrap Cell

	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

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 Effron, 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	Timothée 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	Timothée Chalamet, Olivia Colman	112	PG

Intermediate Queries:

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

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

Advanced Queries:

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

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, Shalene 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

Nested Join

Retrieve every movie by title that was watched by John Doe

```
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 Contents:
movieid	title		
44	Silent Night		

Advanced Queries:

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
```

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

CustomerID	Fname	Lname	Email	Username	Password	PhoneNumber
133	Colton	Wright	colton.wright@example.com	coltoight	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

Mathematical Notations

Select Query

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 $\leftarrow \pi_{\text{TheaterID, TheaterName, Address}}(\text{MovieTheater})$

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';
```

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

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

ORDER BY

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
	0	Mean Girls

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

Mathematical Notations

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
```

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

Update

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	Irene Woods, James MacDonald	74	G
10	Taxi Driver	Drama	Martin Scorsese	Robert De Niro, Jodie Foster	113	R

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

Mathematical Notations

```

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

$MT \leftarrow \rho_{MT}(\text{MovieTheater})$
 $TR \leftarrow \rho_{TR}(\text{TheaterRoom})$
 $MTR \leftarrow MT \bowtie_{TR.TheaterID=MT.TheaterID} TR$
 $Result \leftarrow \tau_{No_of_Seats}(MTR)$

```

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

$C \leftarrow \rho_C(\text{Customer})$
 $R \leftarrow \rho_R(\text{Receipt})$
 $T \leftarrow \rho_T(\text{Tickets})$
 $S \leftarrow \rho_S(\text{Showtime})$
 $Transaction \leftarrow S \bowtie_{S.ShowtimeID=T.ShowtimeID} T \bowtie_{T.ReceiptID=R.ReceiptID} R \bowtie_{R.CustomerID=C.CustomerID} C$
 $Transaction \leftarrow \pi_{MovieID, Title}(Transaction)$
 $Result \leftarrow \sigma_{Fname='John', Lname='Doe'}(Transaction)$

Conclusion

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.

Thank you!



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