University of British Columbia, Vancouver
Department of Computer Science

CPSC 304 Project Cover Page

Milestone #: 1

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Group Number: 26

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By typing our names and student numbers in the above table, we certify that the work in the attached assignment was performed solely by those whose names and student IDs are included above. (In the case of Project Milestone 0, the main purpose of this page is for you to let us know your e-mail address, and then let us assign you to a TA for your project supervisor.)

In addition, we indicate that we are fully aware of the rules and consequences of plagiarism, as set forth by the Department of Computer Science and the University of British Columbia

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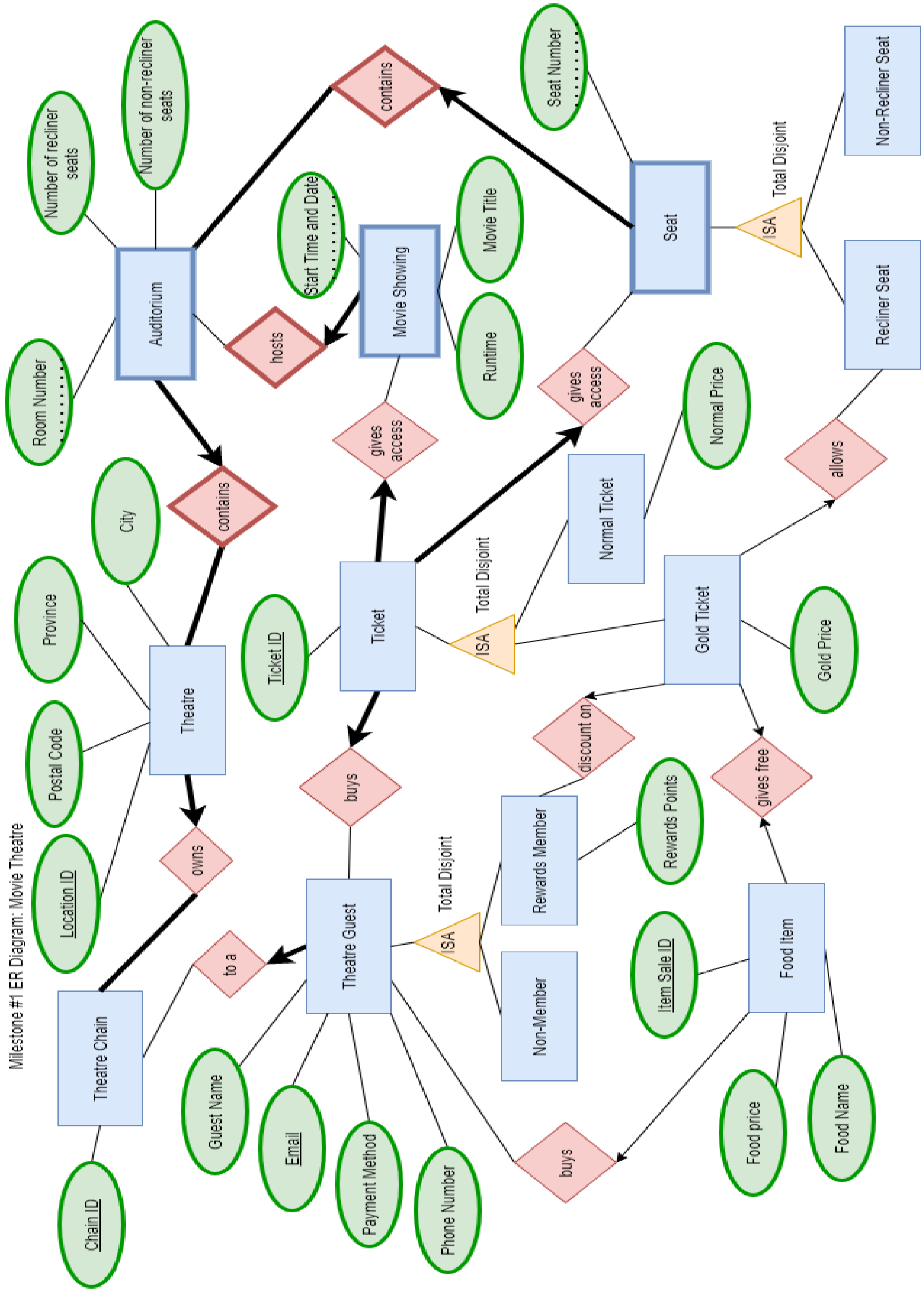
2) ER Diagram



Change in ER Model: Many-to-one relationship between Gold Ticket and Rewards Member.

3) Relation Model

1. NonMember
    a. NonMember(Email: Char(20), Name: Char(20), PayMethod: Char(20),
       PhoneNum: Char(11), ChainID: Char(20))
    b. Specifications
        i. Primary Key: Email
        ii. Candidate Key(s): Email, PhoneNum
        iii. Foreign Keys: ChainID
        iv. Other Constraints:
            1. TheaterChain NOT NULL
            2. PhoneNum UNIQUE

2. RewMember
    a. RewMember(Email: Char(20), Name: Char(20), PayMethod: Char(20),
       PhoneNum: Char(11), ChainID: Char(20),
       RewPoints: Integer)
    b. Specifications
        i. Primary Key: Email
        ii. Candidate Key(s): Email, PhoneNum
        iii. Foreign Keys: ChainID
        iv. Other Constraints:
            1. TheaterChain NOT NULL
            2. PhoneNum UNIQUE

3. FoodItem
    a. FoodItem(ItemSaleID: Integer, Price: Integer, Name: Integer, MemberEmail: Char(20), TicketID: Integer)
    b. Specifications
        i. Primary Key: ItemSaleID
        ii. Candidate Key(s): ItemSaleID
        iii. Foreign Keys: MemberEmail, TicketID
        iv. Other Constraints:
            1. TicketID UNIQUE
4. NonRecSeat
    a. NonRecSeat(SeatNum: Integer, RoomNum: Integer, LocID: Integer)
    b. Specifications
        i. Primary Key: SeatNum, RoomNum, LocID
        ii. Candidate Key(s): {SeatNum, RoomNum, LocID}
        iii. Foreign Keys: RoomNum, LocID
        iv. Other Constraints: none

5. RecSeat
    - a. RecSeat(SeatNum: Integer, RoomNum: Integer, LocID: Integer)
    - b. Specifications
        - i. Primary Key: SeatNum, RoomNum, LocID
        - ii. Candidate Key(s): {SeatNum, RoomNum, LocID}
        - iii. Foreign Keys: RoomNum, LocID
        - iv. Other Constraints: none
6. Auditorium
    - a. Auditorium(RoomNum: Integer, LocID: Integer, NumRecSeats: Integer, NumNonRecSeats: Integer)
    - b. Specifications
        - i. Primary Key: RoomNum, LocID
        - ii. Candidate Key(s): none
        - iii. Foreign Keys: LocID
        - iv. Other Constraints:
            1. NumRecSeats NOT NULL
            2. NumNonRecSeats NOT NULL
7. Theater
    - a. Theater(LocID: Integer, PostalCode: Char(6), Province: Char(20), City: Char(20), ChainID: Integer)
    - b. Specifications
        - i. Primary Key: LocID
        - ii. Candidate Key(s): LocID
        - iii. Foreign Keys: ChainID
        - iv. Other Constraints:
            1. ChainID NOT NULL
8. TheaterChain
    - a. TheaterChain(ChainID: Integer)
    - b. Specifications
        - i. Primary Key: ChainID
        - ii. Candidate Key(s): ChainID
        - iii. Foreign Keys: none
        - iv. Other Constraints: none

9. NormalTicket
    - a. NormalTicket(TicketID: Integer, NPrice: Integer, STimeDate: Char(20), RoomNum: Integer, LocID: Integer, SeatNum: Integer, Email: Char(20))
    - b. Specifications
        - i. Primary Key: TicketID
        - ii. Candidate Key(s): TicketID
        - iii. Foreign Keys: Email, STimeDate, RoomNum, LocID, SeatNum
        - iv. Other Constraints:

1. Email NOT NULL
2. STimeDate NOT NULL
3. RoomNum NOT NULL
4. LocID NOT NULL
5. SeatNum NOT NULL

10. GoldTicket
    a. GoldTicket(TicketID: Integer, GPrice: Integer, STimeDate: Char(20),
    RoomNum: Integer, LocID: Integer, SeatNum: Integer,
    Email: Char(20), ItemSaleID: Integer)
    b. Specifications
        i. Primary Key: TicketID
        ii. Candidate Key(s): TicketID
        iii. Foreign Keys: STimeDate, RoomNum, LocID, SeatNum, ItemSaleID
        iv. Other Constraints:
            1. Email NOT NULL
            2. STimeDate NOT NULL
            3. RoomNum NOT NULL
            4. LocID NOT NULL
            5. SeatNum NOT NULL

4) Functional Dependencies

NonMember:
R(Email,Name,PayMethod,PhoneNum,ChainID)
FDs:
Email -> Name, PayMethod, PhoneNum, ChainID
PhoneNum -> Email,Name,PayMethod,ChainID

RewMember:
R(Email,Name,PayMethod,PhoneNum,ChainID, RewPoints)
FDs:
Email -> Name, PayMethod, PhoneNum, ChainID, RewPoints
PhoneNum -> Email,Name,PayMethod,ChainID, RewPoints

FoodItem:
R(ItemSaleId, Price, Name, MemberEmail, TicketID)
FDs:
ItemSaleId -> Price, Name, MemberEmail, TicketID
Name -> Price

Decomposition:

R(ItemSaleID, Price, Name, MemberEmail, TicketID)
Name->Price violates 3NF
R1(Name, Price)   R2(Name, ItemSaleID, MemberEmail, TicketID)

NonRecSeat:
R(SeatNum, RoomNum, LocID)
FDs: none

RecSeat:
R(SeatNum, RoomNum, LocID)
FDs: None

Auditorium:
R(RoomNum, LocID, NumRecSeats, NumNonRecSeats)
FDs: None

Theater:
R(LocID,PostalCode, Province, City, ChainID)
FDs:
LocID -> PostalCode, Province, City, ChainID
PostalCode -> Province, city

Decomposition:

R(LocID,PostalCode, Province, City, ChainID)
PostalCode -> Province, City violates 3NF
R1(PostalCode,Province, City)   R2(LocID, PostalCode, ChainID)

TheaterChain:
R(ChainID)
FDs: None

NormalTicket:
R(TicketID, NPrice, STimeDate, RoomNum, LocID, SeatNum, Email)
FDs:
TicketID -> NPrice, STimeDate, RoomNum, LocID, SeatNum, Email

GoldTicket:
R(TicketID, GPrice, STimeDate, RoomNum, LocID, SeatNum, Email, ItemSaleID)
FDs:
TicketID -> NPrice, STimeDate, RoomNum, LocID, SeatNum, Email, ItemSaleID

5) Normalization

11. NonMember
    a. NonMember(Email: Char(20), Name: Char(20), PayMethod: Char(20),
    PhoneNum: Char(11), ChainID: Char(20))
    b. Specifications
        i. Primary Key: Email
        ii. Candidate Key(s): Email, PhoneNum
        iii. Foreign Keys: ChainID
        iv. Other Constraints:
            1. TheaterChain NOT NULL
            2. PhoneNum UNIQUE

12. RewMember
    a. RewMember(Email: Char(20), Name: Char(20), PayMethod: Char(20),
    PhoneNum: Char(11), ChainID: Char(20),
    RewPoints: Integer)
    b. Specifications
        i. Primary Key: Email
        ii. Candidate Key(s): Email, PhoneNum
        iii. Foreign Keys: ChainID
        iv. Other Constraints:
            1. TheaterChain NOT NULL
            2. PhoneNum UNIQUE

13. FoodPrice
    a. FoodPrice(Price: Integer, Name: Integer)
    b. Specifications
        i. Primary Key: Name
        ii. Candidate Key(s): Name
        iii. Foreign Keys: none
        iv. Other Constraints: none

14. FoodItem
    a. FoodItem(ItemSaleID: Integer, Name: Integer, MemberEmail: Char(20), TicketID: Integer)
    b. Specifications
        i. Primary Key: ItemSaleID
        ii. Candidate Key(s): ItemSaleID

        iii. Foreign Keys: MemberEmail, TicketID
        iv. Other Constraints:
            1. TicketID UNIQUE

15. NonRecSeat
    a. NonRecSeat(SeatNum: Integer, RoomNum: Integer, LocID: Integer)
    b. Specifications
        i. Primary Key: SeatNum, RoomNum, LocID
        ii. Candidate Key(s): {SeatNum, RoomNum, LocID}
        iii. Foreign Keys: RoomNum, LocID
        iv. Other Constraints: none
16. RecSeat
    a. RecSeat(SeatNum: Integer, RoomNum: Integer, LocID: Integer)
    b. Specifications
        i. Primary Key: SeatNum, RoomNum, LocID
        ii. Candidate Key(s): {SeatNum, RoomNum, LocID}
        iii. Foreign Keys: RoomNum, LocID
        iv. Other Constraints: none
17. Auditorium
    a. Auditorium(RoomNum: Integer, LocID: Integer, NumRecSeats: Integer, NumNonRecSeats: Integer)
    b. Specifications
        i. Primary Key: RoomNum, LocID
        ii. Candidate Key(s): none
        iii. Foreign Keys: LocID
        iv. Other Constraints:
            1. NumRecSeats NOT NULL
            2. NumNonRecSeats NOT NULL
18. TheaterProCity
    a. Theater(PostalCode: Char(6), Province: Char(20), City: Char(20))
    b. Specifications
        i. Primary Key: PostalCode
        ii. Candidate Key(s): PostalCode
        iii. Foreign Keys: none
        iv. Other Constraints: none
19. TheaterLocId
    a. Theater(LocID: Integer, PostalCode: Char(6),ChainID: Integer)
    b. Specifications
        i. Primary Key: LocID
        ii. Candidate Key(s): LocID
        iii. Foreign Keys: ChainID
        iv. Other Constraints:
            1. ChainID NOT NULL
20. TheaterChain

- a. TheaterChain(ChainID: Integer)
- b. Specifications
    - i. Primary Key: ChainID
    - ii. Candidate Key(s): ChainID
    - iii. Foreign Keys: none
    - iv. Other Constraints: none

21. NormalTicket
    - a. NormalTicket(TicketID: Integer, NPrice: Integer, STimeDate: Char(20),
      RoomNum: Integer, LocID: Integer, SeatNum: Integer,
      Email: Char(20))
    - b. Specifications
        - i. Primary Key: TicketID
        - ii. Candidate Key(s): TicketID
        - iii. Foreign Keys: Email, STimeDate, RoomNum, LocID, SeatNum
        - iv. Other Constraints:
            1. Email NOT NULL
            2. STimeDate NOT NULL
            3. RoomNum NOT NULL
            4. LocID NOT NULL
            5. SeatNum NOT NULL

22. GoldTicket
    - a. GoldTicket(TicketID: Integer, GPrice: Integer, STimeDate: Char(20),
      RoomNum: Integer, LocID: Integer, SeatNum: Integer,
      Email: Char(20), ItemSaleID: Integer)
    - b. Specifications
        - i. Primary Key: TicketID
        - ii. Candidate Key(s): TicketID
        - iii. Foreign Keys: STimeDate, RoomNum, LocID, SeatNum, ItemSaleID
        - iv. Other Constraints:
            1. Email NOT NULL
            2. STimeDate NOT NULL
            3. RoomNum NOT NULL
            4. LocID NOT NULL
            5. SeatNum NOT NULL

6) SQL tables

```
CREATE TABLE Customer_NonMember (
        Email CHAR(20),
        Name CHAR(20),
        PaymentMethod CHAR(20),
        PhoneNum CHAR(20),
        TheatreChainID CHAR(20) NOT NULL,
        UNIQUE (PhoneNum),
        PRIMARY KEY (Email),
        FOREIGN KEY (TheatreChainID) REFERENCES TheatreChain
);

CREATE TABLE Customer_Member (
        Email CHAR(20),
        Name CHAR(20),
        PaymentMethod CHAR(20),
        PhoneNum CHAR(20),
        TheatreChainID CHAR(20) NOT NULL,
        RewardsPoints INTEGER,
        UNIQUE (PhoneNum),
        PRIMARY KEY (Email),
        FOREIGN KEY (TheatreChainID) REFERENCES TheatreChain
);

CREATE TABLE FoodItem (
        ItemSaleID INTEGER,
        Name            INTEGER,
        MemberEmail CHAR(20),
        TicketID INTEGER,
        PRIMARY KEY (ItemSaleID),
        FOREIGN KEY (MemberEmail) REFERENCES Customer
        FOREIGN KEY (TicketID) REFERENCES GoldTicket
)

CREATE TABLE FoodPrice (
        Name CHAR(20),
        Price INTEGER,
        PRIMARY KEY (Name),
)

CREATE TABLE NonRecSeat (
        SeatNum INTEGER,
        RoomNum INTEGER,
        LocID INTEGER,
        PRIMARY KEY (SeatNum, RoomNum, LocID),
        FOREIGN KEY (RoomNum, LocID) REFERENCES (Auditorium, Theatre)
)
```

```
CREATE TABLE RecSeat (
        SeatNum INTEGER,
        RoomNum INTEGER,
        LocID INTEGER,
        PRIMARY KEY (SeatNum, RoomNum, LocID),
        FOREIGN KEY (RoomNum, LocID) REFERENCES (Auditorium, Theatre)
)

CREATE TABLE MovieShowing (
        MovieTitle CHAR(20) NOT NULL,
        STimeDate CHAR(20) NOT NULL,
        Runtime CHAR(20),
        RoomNum INTEGER,
        LocID INTEGER,
        PRIMARY KEY (STimeDate, RoomNum, LocID),
        FOREIGN KEY (RoomNum, LocID) REFERENCES (Auditorium, Theatre)


CREATE TABLE Auditorium (
        RoomNum INTEGER,
        LocID INTEGER,
        NumRecSeats INTEGER NOT NULL,
        NumNonRecSeats INTEGER NOT NULL,
        PRIMARY KEY (RoomNum, LocID),
        FOREIGN KEY (LocID) REFERENCES Theatre
)

CREATE TABLE TheaterProCity (
        PostalCode CHAR(6),
        City CHAR(20),
        Province CHAR(20),
        PRIMARY KEY (PostalCode)
)

CREATE TABLE Theater (
        LocID INTEGER,
        PostalCode CHAR(6),
        ChainID INTEGER NOT NULL,
        PRIMARY KEY (LocID)
        FOREIGN KEY (ChainID) REFERENCES TheatreChain
)

CREATE TABLE TheatreChain (
        ChainID INTEGER,
        PRIMARY KEY (ChainID),
)

CREATE TABLE NormalTicket (
        TicketID INTEGER,
        NPrice INTEGER,
        STimeDate CHAR(20) NOT NULL,
        RoomNum INTEGER NOT NULL,
        LocID INTEGER NOT NULL,
        SeatNum INTEGER NOT NULL,
        Email CHAR(20) NOT NULL,
        PRIMARY KEY (TicketID)
        FOREIGN KEY (Email, STimeDate, RoomNum, LocID, SeatNum)
)

CREATE TABLE GoldTicket (
        TicketID INTEGER,
        NPrice INTEGER,
        STimeDate CHAR(20) NOT NULL,
        RoomNum INTEGER NOT NULL,
        LocID INTEGER NOT NULL,
        SeatNum INTEGER NOT NULL,
        Email CHAR(20) NOT NULL,
        PRIMARY KEY (TicketID)
        FOREIGN KEY (Email, STimeDate, RoomNum, LocID, SeatNum)
)
```

7) TABLE EXAMPLE

Customer Non-Member						
Email	Name	TheatreChainID	Phone	PaymentMethod		
customer1@mail.com	Customer1 Lastname	AMC	1111111	MasterCard		
customer2@mail.com	Customer2 Lastname	IMAX	2222222	VISA		

customer3@mail.com	Customer3 Lastname	AMC	3333333	MasterCard		
customer4@mail.com	Customer4 Lastname	IMAX	4444444	VISA		
customer5@mail.com	Customer5 Lastname	AMC	5555555	MasterCard		
Customer Rewards Member						
Email	Name	TheatreChainID	Phone	PaymentMethod	Rewards Points	
customer1@mail.com	Customer1 Lastname	AMC	1111111	MasterCard	3	
customer2@mail.com	Customer2 Lastname	IMAX	2222222	VISA	4	
customer3@mail.com	Customer3 Lastname	AMC	3333333	MasterCard	3	
customer4@mail.com	Customer4 Lastname	IMAX	4444444	VISA	2	
customer5@mail.com	Customer5 Lastname	AMC	5555555	MasterCard	3	
Food Item						
ItemSaleID	MemberEmail					
1	custmer1@mail.com					
2	custmer2@mail.com					
3	custmer3@mail.com					
4	custmer4@mail.com					
5	custmer5@mail.com					
FoodPrice						

Name	Price ($)					
Burger	1					
Fries	2					
Chips	3					
Potatoes	4					
Popcorn	5					
Non-Recliner Seat						
SeatNum	RoomNum	LocID				
1	1	1				
2	2	2				
3	3	3				
4	4	4				
5	5	5				
Recliner Seat						
SeatNum	RoomNum	LocID				
6	1	1				
7	2	2				
8	3	3				
9	4	4				
10	5	5				
MovieShowing						
Title	Date and Time	Runtime	RoomNum	LocID		
Movie 1	April 1, 2021 2:00 PM	120 min	1	1		
Movie 2	April 1, 2021 3:00 PM	120 min	3	2		
Movie 3	April 1, 2021 4:00 PM	120 min	4	2		
Movie 4	April 1, 2021 5:00 PM	120 min	1	2		

Movie 5	April 1, 2021 6:00 PM	120 min	2	1		
Auditorium						
RoomNum	LocID	NumRecSeats	NumNormal Seat			
1	1	30	120			
2	1	30	300			
3	1	30	300			
1	3	30	300			
1	2	30	300			
Theatre						
LocID	Postal Code	ChainID				
1	YVR AR1	AMC				
2	YVR AR2	AMC				
3	YVR AR3	IMAX				
4	YVR AR4	IMAX				
5	YVR AR5	AMC				
Theatre Chain						
ChainID						
AMC1						
AMC2						
AMC3						
IMAX1						
IMAX2						
Normal Ticket						
TicketID	Price	Showing Time	RoomNum	LocID	SeatNum	Email
1	$4	April 1, 2021 2:00 PM	1	1	1	customer1@mail.com

2	$4	April 1, 2021 3:00 PM	2	2	2	customer2@mail.com
3	$4	April 1, 2021 4:00 PM	3	3	3	customer3@mail.com
4	$4	April 1, 2021 5:00 PM	4	4	4	customer4@mail.com
5	$4	April 1, 2021 6:00 PM	5	5	5	customer5@mail.com
Gold Ticket						
TicketID	Price	Showing Time	RoomNum	LocID	SeatNum	Email
1	$7	April 1, 2021 2:00 PM	1	1	1	customer1@mail.com
2	$7	April 1, 2021 3:00 PM	2	2	2	customer2@mail.com
3	$7	April 1, 2021 4:00 PM	3	3	3	customer3@mail.com
4	$7	April 1, 2021 5:00 PM	4	4	4	customer4@mail.com
5	$7	April 1, 2021 6:00 PM	5	5	5	customer5@mail.com

8) List of queries

- “Insertion: Add movie showings to the table list of movie showings.”
- “Insertion: Add customer to list of rewards members.”
- “Insertion: Add food item purchase.”
- “Insertion: Add ticket purchase.”
- “Update: The number of rewards a rewards member has.”
- “Delete: Movie showing that has already been played is deleted.”
- “Select: Movie showing to attend.”

- "Select: Auditorium seat (recliner or non-recliner)."
- "Projection: Ticket and movie showing. Movie date, title and runtime in the projection condition."
- "Join: Movie ticket and movie showtime."
- "Aggregation Group by: Number of movie seats in theatre auditorium, recliner and non-recliner, and availability for gold and normal tickets."
- "Aggregation with Having: HAVING clause selects from group. Select movie showing from the theatre location."
- "Nested Aggregation with Group By: Find popularity of movie showing and of seats within a theatre auditorium by finding the average number of customers that purchase that seat or a ticket to that movie showing."
- "Division: Find all customers who attended a movie showing."