

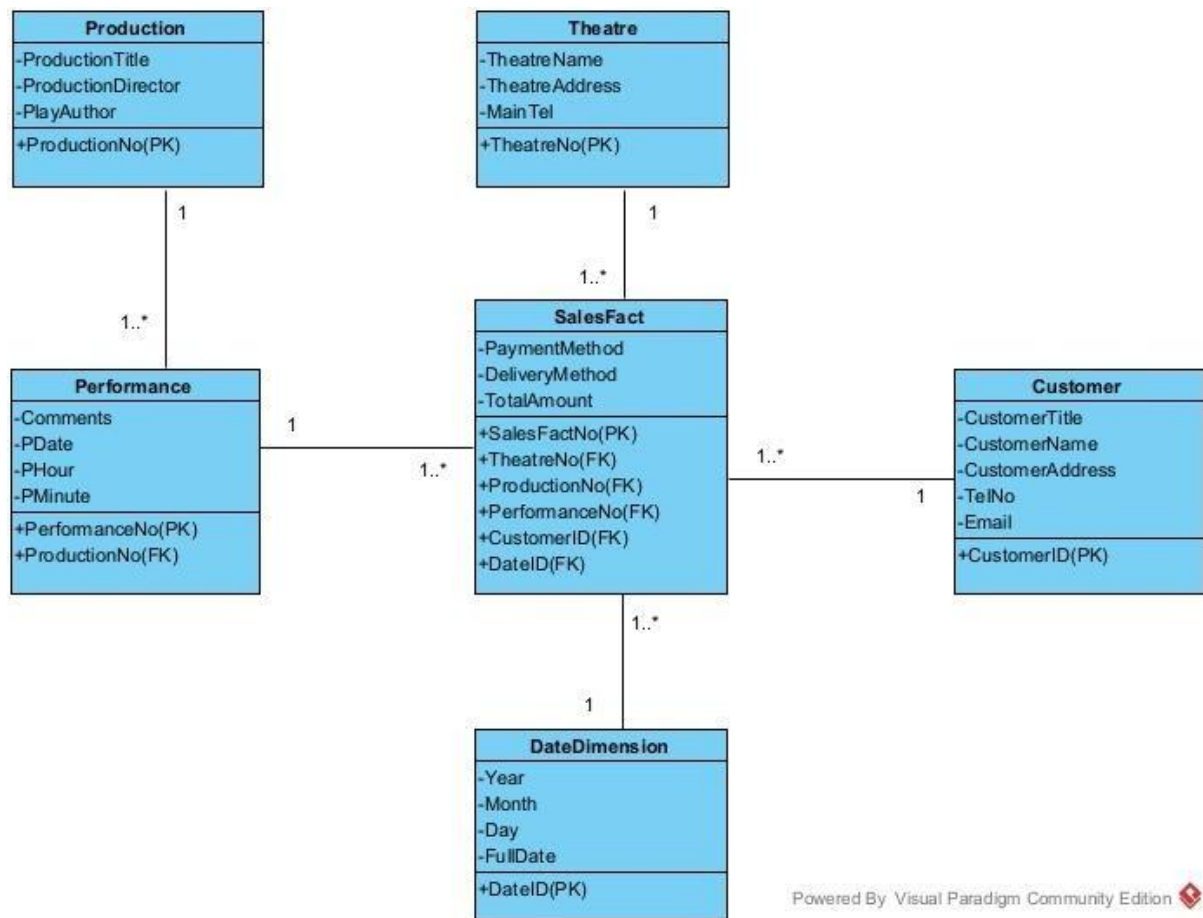
Name: Bo Kwok

Student ID: 22454220

Unit Number: 6G6Z0026_2425_9

Coursework Title: Individual Portfolio: Design and Coding

2a. Snowflake Schema for the LTC Data Mart showing all keys, relationships, attributes, and measures.



2b. Dimension selection and fact identification

The snowflake schema is created for LTC Data Mart which focuses on its ticket sales performance. The Sales Fact table is surrounded by Theatre, Customer, Date and Performance Dimension tables, while Production Dimension table does not directly link to Sales Fact table, it links to Performance Dimension table.

Compared to the ERD for London Theatres' booking system, the snowflake schema has multiple differences with it:

1. The Ticket Purchase table is transformed to a Sales Fact table. The reason is apart from ticket purchase, total value of ticket sales should be the prioritized. The Sales Fact table records all the relevant information about a ticket sale. It aims on reflecting the performance of sales. It would provide convenience for business reporting for the financial performance of LTC.
2. Staff table is excluded from the snowflake schema because its attributes does not relate to ticket sales directly. Including these information to the data mart would increase its complexity, which is not necessary.

3. Date dimension table is included in our snowflake schema, as it provides time-based analysis. It helps normalizing the date-related data, so that it would be more convenient to process sales analysis such as identifying or forecasting sales trends.
4. The Theatre table is not linked to the Performance table directly because the Sales Fact table captures all the necessary information of the performance and theatre by joining those tables by PerformanceNo and TheatreNo. It does not need any direct relationship between Theatre and Performance dimension tables.

2c. Brief design justification (max 200 words)

The design of LTC data mart aims to satisfy developing a prototype of an ORACLE data mart for ticket sales as part of a potential data warehouse for the London Theatre (LTC) Company.

A snowflake schema is created for LTC Data Mart. Sales Fact table stores key metrics and is surrounded by Theatre, Customer, Date and Performance Dimension table. Production Dimension tables does not directly linked to Sales Fact table, it links to Performance Dimension table.

A snowflake schema can store normalized data record as Production dimension table does not directly link to Sales Fact Table, it would avoid duplicating production details for each ticket sales transaction.

In this snowflake schema, surrogate keys are used for every table in order to ensure efficient table joins. The surrogate keys are primary keys that manually created, which are SalesFactNo, TheatreNo, ProductionNo, PerformanceNo, CustomerID, DateID in SalesFact, Theatre, Production, Performance, Customer and Date Dimension table respectively.

The assumptions in this Data mart are: 1. For the ticket sale value/spending, it refers to the value of money rather than number of tickets. 2. A customer purchasing several tickets for the same performance is treated as one sales transaction i.e. 1 row entry. (198 words)

3. List of Logical relations (Tables) and granularity

- Sales Fact Table:
(PK) SalesFactNo ,
(FK) TheatreNo, ProductionNo, PerformanceNo, CustomerID, DateID
(Attributes) PaymentMethod, DeliveryMethod, TotalAmount
- Theatre Dimension Table:
(PK) TheatreNo,
(Attributes) TheatreName, TheatreAddress, MainTel
- Production Dimension Table:
(PK) ProductionNo,
(Attributes) ProductionTitle, ProductionDirector, PlayAuthor
- Performance Dimension Table:
(PK) PerformanceNo,
(FK) ProductionNo
(Attributes) pDate, pHour, pMinute, Comments
- Customer Dimension Table:
(PK) CustomerID,
(Attributes) CustomerTitle, CustomerName, CustomerAddress, TelNo, Email
- Date Dimension Table:
(PK) DateID,
(Attributes) FullDate, Year, Month, Day

Granularity:

In date dimension table, it contains year, month and date to meet the granularity.

Expanding into a data warehouse in the future:

If the data mart aims to expand into a data warehouse, we should expand the data model with more numerical attributes and dimension tables to perform more complex data analysis.

1. Sales Fact Table

Service Charge and Discount Amount can be added to Sales Fact Table to analyze revenue channels and measure the effectiveness of promotions. Including **Total number of tickets** into Sales Fact Table can help LTC set and allocate the optimum value of price and seating respectively.

2. Theatre table

Seats capacity can also be added as an attribute for calculating attendance rate, in order to optimize the quantity of performance in the future. Attributes such as **Maintenance and Utilities cost** can also be added into Theatre Table to calculate operational costs.

3. Production Table

Duration in Minutes can be added into Production Table as an attribute as it can help to schedule the performances.

4. Customer Table

Total spendings can be added as attributes for identifying target audience, so that marketing department can organize marketing promotions to them.

5. Date Dimension Table

Both **Fiscal Year and Fiscal Month** can be added as attributes for producing financial reports conveniently. **Quarter** can be added as attribute in order to help generate quarterly performance data analysis.

6. Adding a Staff Dimension Table

Adding a **Staff Dimension** Table into the existing snowflake schema is feasible, with attributes of **StaffID, StaffName, StaffContactNumber, StaffEmail, StaffRole, StaffWorkingHours and StaffWagePerHour**. This help analysing individual contributions and wage expenses of staff.

4. Screenshots of your CREATE and INSERT commands per table including the successful output of each.

SQL Code:

-- Bo Kwok 22454220

-- Oracle Apex version 22.21

-- Drop tables if exist

DROP TABLE SalesFact;

DROP TABLE Theatre;

DROP TABLE Production;

DROP TABLE Performance;

DROP TABLE Customer;

DROP TABLE DateDimension;

-- Create sales fact table to record sales transactions

CREATE TABLE SalesFact(

-- Unique identifier for each sale transaction, auto generated values when each row of data is inserted.

SalesFactNo INT GENERATED ALWAYS AS IDENTITY PRIMARY KEY,

-- Check to make sure TheatreNo are positive non-zero integers

TheatreNo INT NOT NULL CHECK (TheatreNo > 0),

-- Check to make sure ProductionNo are positive non-zero integers

ProductionNo INT NOT NULL CHECK (ProductionNo > 0),

-- Check to make sure PerformanceNo are positive non-zero integers

PerformanceNo INT NOT NULL CHECK (PerformanceNo > 0),

-- Check to make sure CustomerID are positive non-zero integers

CustomerID INT NOT NULL CHECK (CustomerID > 0),

-- Check to make sure DateID are positive non-zero integers

DateID INT NOT NULL CHECK (DateID > 0),

-- Check to make sure payment method are among the listed options

PaymentMethod VARCHAR(50) NOT NULL CHECK (PaymentMethod in ('Cash', 'PayPal', 'Debit Card', 'Credit Card')),

-- Check to make sure delivery method are among the listed options

DeliveryMethod VARCHAR(50) NOT NULL CHECK (DeliveryMethod IN ('Mail', 'Email', 'Box Office')),

-- Check to make sure total amount paid is non-negative

TotalAmount DECIMAL(10,2) NOT NULL CHECK (TotalAmount > 0)

);

-- Create theatre table to record theatre information

CREATE TABLE Theatre (

-- Unique identifier for each theatre, check to make sure TheatreNo are positive non-zero integers

TheatreNo INT PRIMARY KEY CHECK (TheatreNo > 0),

-- Theatre name must not be empty

TheatreName VARCHAR (255) NOT NULL,

-- Theatre address

TheatreAddress VARCHAR (255),

-- Theatre main telephone number must be unique

MainTel VARCHAR (20) UNIQUE

);

-- Create production table to record production information

CREATE TABLE Production (

-- Unique identifier for each production, check to make sure ProductionNo are positive non-zero integers

ProductionNo INT PRIMARY KEY CHECK (ProductionNo > 0),

-- Production name must not be empty

ProductionTitle VARCHAR(255) NOT NULL,

-- name of production director

ProductionDirector VARCHAR(255),

```

-- name of play author
PlayAuthor VARCHAR(255)
);

-- Create performance table to record performance information
CREATE TABLE Performance(
    -- Unique identifier for each performance, check to make sure PerformanceNo are positive
    non-zero integers
    PerformanceNo INT PRIMARY KEY CHECK (PerformanceNo > 0),
    -- Unique identifier for each production, check to make sure ProductionNo are positive
    non-zero integers
    ProductionNo INT NOT NULL CHECK (ProductionNo > 0),
    -- Performance date must not be empty
    pDate DATE NOT NULL,
    -- Performance hour must not be empty, check to make sure performance hour is between 0
    to 23
    pHour INT NOT NULL CHECK (pHour between 0 and 23),
    -- Performance minute must not be empty, check to make sure performance minute is
    between 0 to 59
    pMinute INT NOT NULL CHECK (pMinute between 0 and 59),
    -- Comments about the performance
    Comments VARCHAR(255)
);

-- Create customer table to record customer information
CREATE TABLE Customer(
    -- Unique identifier for each customer, check to make sure CustomerID are positive non-
    zero integers
    CustomerID INT PRIMARY KEY CHECK (CustomerID > 0),
    -- Title of customer
    CustomerTitle VARCHAR(10),
    -- Customer name must not be empty
    CustomerName VARCHAR(255) NOT NULL,

```



```

-- Address of customer
CustomerAddress VARCHAR(255),
-- Telephone number of customer
TelNo VARCHAR(20),
-- Customer email must be unique for validation
Email VARCHAR(255) UNIQUE
);

-- Create date dimension table to record date information
CREATE TABLE DateDimension (
    -- Unique identifier for each date, check to make sure DateID are positive non-zero
    integers
    DateID INT PRIMARY KEY CHECK (DateID > 0),
    -- Full date must not be empty
    FullDate DATE NOT NULL,
    -- Year must not be empty
    Year INT NOT NULL,
    -- Month must not be empty, check to make sure month is between 1 to 12
    Month INT NOT NULL CHECK (Month Between 1 and 12),
    -- Day must not be empty, check to make sure day is between 1 to 31
    Day INT NOT NULL CHECK (Day Between 1 and 31)
);

-- Insert data to various tables

INSERT INTO SalesFact(TheatreNo, ProductionNo, PerformanceNo, CustomerID, DateID,
PaymentMethod, DeliveryMethod, TotalAmount) Values (2, 1, 4, 2, 1, 'PayPal', 'Box Office',
300);

INSERT INTO SalesFact(TheatreNo, ProductionNo, PerformanceNo, CustomerID, DateID,
PaymentMethod, DeliveryMethod, TotalAmount) Values (1, 3, 2, 1, 2, 'Debit Card', 'Mail',
200);

```

INSERT INTO SalesFact(TheatreNo, ProductionNo, PerformanceNo, CustomerID, DateID, PaymentMethod, DeliveryMethod, TotalAmount) Values (3, 3, 2, 2, 3, 'Credit Card', 'Email', 400);

INSERT INTO SalesFact(TheatreNo, ProductionNo, PerformanceNo, CustomerID, DateID, PaymentMethod, DeliveryMethod, TotalAmount) Values (2, 2, 3, 2, 4, 'Credit Card', 'Box Office', 400);

INSERT INTO SalesFact(TheatreNo, ProductionNo, PerformanceNo, CustomerID, DateID, PaymentMethod, DeliveryMethod, TotalAmount) Values (2, 4, 1, 2, 5, 'Debit Card', 'Email', 600);

INSERT INTO Theatre (TheatreNo, TheatreName, TheatreAddress, MainTel) VALUES (1, 'Craven Cottage', '6 Stevenage Rd', 02210252147);

INSERT INTO Theatre (TheatreNo, TheatreName, TheatreAddress, MainTel) VALUES (2, 'Emirates Stadium', '10 Emile Smith Rd', 02223584222);

INSERT INTO Theatre (TheatreNo, TheatreName, TheatreAddress, MainTel) VALUES (3, 'Old Trafford', '10 Hag Eric Street', 01614204899);

INSERT INTO Theatre (TheatreNo, TheatreName, TheatreAddress, MainTel) VALUES (4, 'Stamford Bridge', '443 Bohely Street', 01249467897);

INSERT INTO Theatre (TheatreNo, TheatreName, TheatreAddress, MainTel) VALUES (5, 'White Hart Lane', '1 Trophless Road', 01245671432);

INSERT INTO Production (ProductionNo, ProductionTitle, ProductionDirector, PlayAuthor) VALUES (1, 'Titanic', 'James Cameron', 'James Cameron');

INSERT INTO Production (ProductionNo, ProductionTitle, ProductionDirector, PlayAuthor) VALUES (2, 'Avengers: Endgame', 'Anthony Russo', 'Stan Lee');

INSERT INTO Production (ProductionNo, ProductionTitle, ProductionDirector, PlayAuthor) VALUES (3, 'The Matrix', 'The Wachowskis', 'The Wachowskis');

INSERT INTO Production (ProductionNo, ProductionTitle, ProductionDirector, PlayAuthor) VALUES (4, 'Top Gun', 'Tony Scott', 'Jim Cash');

INSERT INTO Production (ProductionNo, ProductionTitle, ProductionDirector, PlayAuthor) VALUES (5, 'First Blood', 'Ted Kotcheff', 'David Morrell');

INSERT INTO Performance (PerformanceNo, ProductionNo, pDate, pHour, pMinute, Comments) Values (1, 4, '24-JAN-2024', 3, 15, 'Romantic film');

INSERT INTO Performance (PerformanceNo, ProductionNo, pDate, pHour, pMinute, Comments) Values (2, 3, '4-MAR-2024', 3, 1, 'Superhero film');

INSERT INTO Performance (PerformanceNo, ProductionNo, pDate, pHour, pMinute, Comments) VALUES (3, 2, '20-MAY-2024', 1, 49, 'Action Drama film');

INSERT INTO Performance (PerformanceNo, ProductionNo, pDate, pHour, pMinute, Comments) VALUES (4, 1, '24-JUN-2024', 3, 15, 'Science fiction action film');

INSERT INTO Performance (PerformanceNo, ProductionNo, pDate, pHour, pMinute, Comments) VALUES (5, 5, '24-DEC-2024', 3, 15, 'Action film');

INSERT INTO Customer (CustomerID, CustomerTitle, CustomerName, CustomerAddress, TelNo, Email) VALUES (1, 'Ms', 'Erling Haaland', '6 Gabriel Road', '01152385414', 'StayHumble@gmail.com');

INSERT INTO Customer (CustomerID, CustomerTitle, CustomerName, CustomerAddress, TelNo, Email) VALUES (2, 'Mr', 'Christiano Ronaldo', '7 Trafford Road', '01552001469', 'Ronalodosiu@gmail.com');

INSERT INTO Customer (CustomerID, CustomerTitle, CustomerName, CustomerAddress, TelNo, Email) VALUES (3, 'Mr', 'Jose Mourinho', '1 Porto St', '01146521345', 'TheSpecialOne@hotmail.com');

INSERT INTO Customer (CustomerID, CustomerTitle, CustomerName, CustomerAddress, TelNo, Email) VALUES (4, 'Ms', 'Mikel Arteta', '12 Hornsey Rd', '07998458712', 'MikelArteta@hotmail.com');

INSERT INTO Customer (CustomerID, CustomerTitle, CustomerName, CustomerAddress, TelNo, Email) VALUES (5, 'Ms', 'Eric Ten Hag', '14 Manchester Rd', '03321456987', 'WeNeverLose@gmail.com');

INSERT INTO DateDimension(DateID, FullDate, Year, Month, Day) VALUES (1, '1-DEC-2024', 2024, 12, 1);

INSERT INTO DateDimension(DateID, FullDate, Year, Month, Day) VALUES (2, '2-DEC-2024', 2024, 12, 2);

INSERT INTO DateDimension(DateID, FullDate, Year, Month, Day) VALUES (3, '24-NOV-2024', 2024, 11, 24);

INSERT INTO DateDimension(DateID, FullDate, Year, Month, Day) VALUES (4, '7-FEB-2024', 2024, 2, 7);

INSERT INTO DateDimension(DateID, FullDate, Year, Month, Day) VALUES (5, '6-APR-2024', 2024, 4, 6);

INSERT INTO DateDimension(DateID, FullDate, Year, Month, Day) VALUES (6, '16-MAY-2024', 2024, 5, 16);

INSERT INTO DateDimension(DateID, FullDate, Year, Month, Day) VALUES (7, '19-AUG-2024', 2024, 8, 19);

INSERT INTO DateDimension(DateID, FullDate, Year, Month, Day) VALUES (8, '23-SEP-2024', 2024, 9, 23);

```
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1 -- Do Kwok Z2454220
2 -- Oracle Apex version 22.21
3
4 -- Drop tables if exist
5 DROP TABLE SalesFact;
6 DROP TABLE Theatre;
7 DROP TABLE Production;
8 DROP TABLE Performance;
9 DROP TABLE Customer;
10 DROP TABLE DateDimension;
11
12 -- Create sales fact table to record sales transactions
13 CREATE TABLE SalesFact(
14     -- Unique identifier for each sale transaction, auto generated values when each row of data is inserted.
15     SalesFactNo INT GENERATED ALWAYS AS IDENTITY PRIMARY KEY,
16     -- Check to make sure TheatreNo are positive non-zero integers
17     TheatreNo INT NOT NULL CHECK (TheatreNo > 0),
18     -- Check to make sure ProductionNo are positive non-zero integers
19     ProductionNo INT NOT NULL CHECK (ProductionNo > 0),
20     -- Check to make sure PerformanceNo are positive non-zero integers
21     PerformanceNo INT NOT NULL CHECK (PerformanceNo > 0),
22     -- Check to make sure CustomerID are positive non-zero integers
23     CustomerID INT NOT NULL CHECK (CustomerID > 0),
24     -- Check to make sure DateID are positive non-zero integers
25     DateID INT NOT NULL CHECK (DateID > 0),
26     -- Check to make sure payment method are among the listed options
27     PaymentMethod VARCHAR(50) NOT NULL CHECK (PaymentMethod IN ('Cash', 'Paypal', 'Debit Card', 'Credit Card')),
28     -- Check to make sure delivery method are among the listed options
29     DeliveryMethod VARCHAR(50) NOT NULL CHECK (DeliveryMethod IN ('Mail', 'Email', 'Box Office')),
30     -- Check to make sure total amount paid is non-negative
31     TotalAmount DECIMAL(10,2) NOT NULL CHECK (TotalAmount > 0)
32 );
33
34 -- Create theatre table to record theatre information
35 CREATE TABLE Theatre (
36     -- Unique identifier for each theatre, check to make sure TheatreNo are positive non-zero integers
37     TheatreNo INT PRIMARY KEY CHECK (TheatreNo > 0),
38     -- Theatre name must not be empty
39     TheatreName VARCHAR(255) NOT NULL,
40     -- Theatre address
41     TheatreAddress VARCHAR(255),
42     -- Theatre main telephone number must be unique
43     MainTel VARCHAR(20) UNIQUE
44 );
```

```
Script Name: Z2454220 Do Kwok 6G6Z0026 Data Goves
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21 PerformanceNo INT NOT NULL CHECK (PerformanceNo > 0),
22 -- Check to make sure CustomerID are positive non-zero integers
23 CustomerID INT NOT NULL CHECK (CustomerID > 0),
24 -- Check to make sure DateID are positive non-zero integers
25 DateID INT NOT NULL CHECK (DateID > 0),
26 -- Check to make sure payment method are among the listed options
27 PaymentMethod VARCHAR(50) NOT NULL CHECK (PaymentMethod IN ('Cash', 'Paypal', 'Debit Card', 'Credit Card')),
28 -- Check to make sure delivery method are among the listed options
29 DeliveryMethod VARCHAR(50) NOT NULL CHECK (DeliveryMethod IN ('Mail', 'Email', 'Box Office')),
30 -- Check to make sure total amount paid is non-negative
31 TotalAmount DECIMAL(10,2) NOT NULL CHECK (TotalAmount > 0)
32 );
33
34 -- Create theatre table to record theatre information
35 CREATE TABLE Theatre (
36     -- Unique identifier for each theatre, check to make sure TheatreNo are positive non-zero integers
37     TheatreNo INT PRIMARY KEY CHECK (TheatreNo > 0),
38     -- Theatre name must not be empty
39     TheatreName VARCHAR(255) NOT NULL,
40     -- Theatre address
41     TheatreAddress VARCHAR(255),
42     -- Theatre main telephone number must be unique
43     MainTel VARCHAR(20) UNIQUE
44 );
```

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40 TheatreAddress VARCHAR(255),
41 -- Theatre main telephone number must be unique
42 MainTel VARCHAR(20) UNIQUE
43 );
44
45 -- Create production table to record production information
46 CREATE TABLE Production (
47     -- Unique identifier for each production, check to make sure ProductionNo are positive non-zero integers
48     ProductionNo INT PRIMARY KEY CHECK (ProductionNo > 0),
49     -- Production name must not be empty
50     ProductionTitle VARCHAR(255) NOT NULL,
51     -- name of production director
52     ProductionDirector VARCHAR(255),
53     -- name of play author
54     PlayAuthor VARCHAR(255)
55 );
56
57 -- Create performance table to record performance information
58 CREATE TABLE Performance(
59     -- Unique identifier for each performance, check to make sure PerformanceNo are positive non-zero integers
60     PerformanceNo INT PRIMARY KEY CHECK (PerformanceNo > 0),
61     -- Unique identifier for each production, check to make sure ProductionNo are positive non-zero integers
62     ProductionNo INT NOT NULL CHECK (ProductionNo > 0),
63     -- Performance date must not be empty
64     pDate DATE NOT NULL,
65     -- Performance hour must not be empty, check to make sure performance hour is between 0 to 23
66     pHour INT NOT NULL CHECK (pHour > 0 AND pHour < 24)
67 );
```

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60

ProductionNo INT NOT NULL CHECK (ProductionNo > 0),

61

-- Performance date must not be empty

62

pDate DATE NOT NULL,

63

-- Performance hour must not be empty, check to make sure performance hour is between 0 to 23

64

phour INT NOT NULL CHECK (phour between 0 and 23),

65

-- Performance minute must not be empty, check to make sure performance minute is between 0 to 59

66

pMinute INT NOT NULL CHECK (pMinute between 0 and 59),

67

-- Comments about the performance

68

Comments VARCHAR(255)

69

);

70

-- Create customer table to record customer information

71

CREATE TABLE Customer(

72

-- Unique identifier for each customer, check to make sure CustomerID are positive non-zero integers

73

CustomerID INT PRIMARY KEY CHECK (CustomerID > 0),

74

-- Title of customer

75

CustomerTitle VARCHAR(10),

76

-- Customer name must not be empty

77

CustomerName VARCHAR(255) NOT NULL,

78

-- Address of customer

79

CustomerAddress VARCHAR(255),

80

-- Telephone number of customer

81

TelNo VARCHAR(20),

82

-- Customer email must be unique for validation

83

Email VARCHAR(255) UNIQUE

84

);

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101

INSERT INTO SalesFact(TheatreNo, ProductionNo, PerformanceNo, CustomerID, DateID, PaymentMethod, DeliveryMethod, TotalAmount) Values (2, 1, 4, 2, 1, 'PayPal', 'Box Office', 300);

102

INSERT INTO SalesFact(TheatreNo, ProductionNo, PerformanceNo, CustomerID, DateID, PaymentMethod, DeliveryMethod, TotalAmount) Values (1, 3, 2, 1, 2, 'Debit Card', 'Mail', 200);

103

INSERT INTO SalesFact(TheatreNo, ProductionNo, PerformanceNo, CustomerID, DateID, PaymentMethod, DeliveryMethod, TotalAmount) Values (3, 3, 2, 2, 3, 'Credit Card', 'Email', 400);

104

INSERT INTO SalesFact(TheatreNo, ProductionNo, PerformanceNo, CustomerID, DateID, PaymentMethod, DeliveryMethod, TotalAmount) Values (2, 2, 3, 2, 4, 'Credit Card', 'Box Office', 400);

105

INSERT INTO SalesFact(TheatreNo, ProductionNo, PerformanceNo, CustomerID, DateID, PaymentMethod, DeliveryMethod, TotalAmount) Values (2, 4, 1, 2, 5, 'Debit Card', 'Email', 600);

106

107

INSERT INTO Theatre (TheatreNo, TheatreName, TheatreAddress, MainTel) VALUES (1, 'Craven Cottage', '6 Stevenage Rd', '02210252147');

108

INSERT INTO Theatre (TheatreNo, TheatreName, TheatreAddress, MainTel) VALUES (2, 'Emirates Stadium', '10 Emile Smith Rd', '02223584222');

109

INSERT INTO Theatre (TheatreNo, TheatreName, TheatreAddress, MainTel) VALUES (3, 'Old Trafford', '10 Hag Eric Street', '01614204899');

110

INSERT INTO Theatre (TheatreNo, TheatreName, TheatreAddress, MainTel) VALUES (4, 'Stamford Bridge', '443 Bohely Street', '01249467897');

111

INSERT INTO Theatre (TheatreNo, TheatreName, TheatreAddress, MainTel) VALUES (5, 'White Hart Lane', '1 Trophless Road', '01245671432');

112

INSERT INTO Production (ProductionNo, ProductionTitle, ProductionDirector, PlayAuthor) VALUES (1, 'Itininc', 'James Cameron', 'James Cameron');

113

INSERT INTO Production (ProductionNo, ProductionTitle, ProductionDirector, PlayAuthor) VALUES (2, 'Avengers: Endgame', 'Anthony Russo', 'Stan Lee');

114

INSERT INTO Production (ProductionNo, ProductionTitle, ProductionDirector, PlayAuthor) VALUES (3, 'The Matrix', 'The Wachowskis', 'The Wachowskis');

115

INSERT INTO Production (ProductionNo, ProductionTitle, ProductionDirector, PlayAuthor) VALUES (4, 'Top Gun', 'Tony Scott', 'Jim Cash');

116

INSERT INTO Production (ProductionNo, ProductionTitle, ProductionDirector, PlayAuthor) VALUES (5, 'First Blood', 'Ted Kotcheff', 'David Morrell');

117

INSERT INTO Performance (PerformanceNo, ProductionNo, pDate, phour, pMinute, Comments) Values (1, 4, '24-JAN-2024', 3, 15, 'Romantic film');

118

INSERT INTO Performance (PerformanceNo, ProductionNo, pDate, phour, pMinute, Comments) Values (2, 3, '4-MAR-2024', 3, 1, 'Superhero film');

119

INSERT INTO Performance (PerformanceNo, ProductionNo, pDate, phour, pMinute, Comments) Values (3, 2, '20-MAY-2024', 1, 49, 'Action Drama film');

120

INSERT INTO Performance (PerformanceNo, ProductionNo, pDate, phour, pMinute, Comments) Values (4, 1, '24-JUN-2024', 3, 15, 'Science fiction action film');

121

INSERT INTO Performance (PerformanceNo, ProductionNo, pDate, phour, pMinute, Comments) Values (5, 5, '24-DEC-2024', 3, 15, 'Action film');

122

INSERT INTO Customer (CustomerID, CustomerTitle, CustomerName, CustomerAddress, TelNo, Email) VALUES (1, 'Ms', 'Erling Haaland', '6 Gabriel Road', '01152385414', 'StayHumble@gmail.com');

123

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INSERT INTO Production (ProductionNo, ProductionTitle, ProductionDirector, PlayAuthor) Values (4, 'Top Gun', 'Tony Scott', 'Jim Cash');

128

INSERT INTO Production (ProductionNo, ProductionTitle, ProductionDirector, PlayAuthor) VALUES (5, 'First Blood', 'Ted Kotcheff', 'David Morrell');

129

INSERT INTO Performance (PerformanceNo, ProductionNo, pDate, phour, pMinute, Comments) Values (1, 4, '24-JAN-2024', 3, 15, 'Romantic film');

130

INSERT INTO Performance (PerformanceNo, ProductionNo, pDate, phour, pMinute, Comments) Values (2, 3, '4-MAR-2024', 3, 1, 'Superhero film');

131

INSERT INTO Performance (PerformanceNo, ProductionNo, pDate, phour, pMinute, Comments) Values (3, 2, '20-MAY-2024', 1, 49, 'Action Drama film');

132

INSERT INTO Performance (PerformanceNo, ProductionNo, pDate, phour, pMinute, Comments) Values (4, 1, '24-JUN-2024', 3, 15, 'Science fiction action film');

133

INSERT INTO Performance (PerformanceNo, ProductionNo, pDate, phour, pMinute, Comments) Values (5, 5, '24-DEC-2024', 3, 15, 'Action film');

134

INSERT INTO Customer (CustomerID, CustomerTitle, CustomerName, CustomerAddress, TelNo, Email) VALUES (1, 'Ms', 'Erling Haaland', '6 Gabriel Road', '01152385414', 'StayHumble@gmail.com');

135

INSERT INTO Customer (CustomerID, CustomerTitle, CustomerName, CustomerAddress, TelNo, Email) Values (2, 'Mr', 'Christiano Ronaldo', '7 Trafford Road', '01552001469', 'Ronaldoslu@gmail.com');

136

INSERT INTO Customer (CustomerID, CustomerTitle, CustomerName, CustomerAddress, TelNo, Email) Values (3, 'Mr', 'Jose Mourinho', '1 Porto St', '01146521345', 'TheSpecialOne@hotmail.com');

137

INSERT INTO Customer (CustomerID, CustomerTitle, CustomerName, CustomerAddress, TelNo, Email) Values (4, 'Ms', 'Mikel Arteta', '12 Hornsey Rd', '07998458712', 'MikelArteta@hotmail.com');

138

INSERT INTO Customer (CustomerID, CustomerTitle, CustomerName, CustomerAddress, TelNo, Email) Values (5, 'Ms', 'Eric Ten Hag', '14 Manchester Rd', '03321456987', 'WenEverLove@gmail.com');

139

140

INSERT INTO DateDimension(DateID, FullDate, Year, Month, Day) VALUES (1, '1-DEC-2024', 2024, 12, 1);

141

INSERT INTO DateDimension(DateID, FullDate, Year, Month, Day) VALUES (2, '2-DEC-2024', 2024, 12, 2);

142

INSERT INTO DateDimension(DateID, FullDate, Year, Month, Day) VALUES (3, '24-NOV-2024', 2024, 11, 24);

143

INSERT INTO DateDimension(DateID, FullDate, Year, Month, Day) VALUES (4, '7-FEB-2024', 2024, 2, 7);

144

INSERT INTO DateDimension(DateID, FullDate, Year, Month, Day) VALUES (5, '6-APR-2024', 2024, 4, 6);

145

INSERT INTO DateDimension(DateID, FullDate, Year, Month, Day) VALUES (6, '16-MAY-2024', 2024, 5, 16);

146

INSERT INTO DateDimension(DateID, FullDate, Year, Month, Day) VALUES (7, '19-AUG-2024', 2024, 8, 19);

147

INSERT INTO DateDimension(DateID, FullDate, Year, Month, Day) VALUES (8, '23-SEP-2024', 2024, 9, 23);

148

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SQL Commands

SchemaGB_B908_SQL_S17

LanguageSQLRows10Clear CommandFind TablesSaveRun

```
1 Select *
2 From SalesFact
```

Results

ExplainDescribeSaved SQLHistory

SALESFACTNO	THEATRENO	PRODUCTIONNO	PERFORMANCENO	CUSTOMERID	DATEID	PAYMENTMETHOD	DELIVERYMETHOD	TOTALAMOUNT
1	2	1	4	2	1	PayPal	Box Office	300
2	1	3	2	1	2	Debit Card	Mail	200
3	3	3	2	2	3	Credit Card	Email	400
4	2	2	3	2	4	Credit Card	Box Office	400
5	2	4	1	2	5	Debit Card	Email	600

5 rows returned in 0.01 secondsDownload

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Search

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SQL Commands

SchemaGB_B908_SQL_S17

LanguageSQLRows10Clear CommandFind TablesSaveRun

```
1 Select *
2 From Theatre
```

Results

ExplainDescribeSaved SQLHistory

THEATRENO	THEATRENAME	THEATREADDRESS	MAINTEL
1	Craven Cottage	6 Stevenage Rd	2210252147
2	Emirates Stadium	10 Emile Smith Rd	2223584222
3	Old Trafford	10 Hag Eric Street	1614204899
4	Stamford Bridge	443 Bohely Street	1249467897
5	White Hart Lane	1 Trophess Road	1243671432

5 rows returned in 0.00 secondsDownload

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Search

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SQL Commands

SchemaGB_B908_SQL_S17

LanguageSQLRows10Clear CommandFind TablesSaveRun

```
1 Select *
2 From Production
```

Results

ExplainDescribeSaved SQLHistory

PRODUCTIONNO	PRODUCTIONTITLE	PRODUCTIONDIRECTOR	PLAYAUTHOR
1	Titanic	James Cameron	James Cameron
2	Avengers: Endgame	Anthony Russo	Stan Lee
3	The Matrix	The Wachowskis	The Wachowskis
4	Top Gun	Tony Scott	Jim Cash
5	First Blood	Ted Kotcheff	David Morrell

5 rows returned in 0.01 secondsDownload

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Search

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SQL Commands

SchemaGB_B908_SQL_S17

LanguageSQL

Rows10

Clear Command

Find Tables

Save

Run

SQL

1Select *

2From Performance

Results

Explain

Describe

Saved SQL

History

PERFORMANCENO	PRODUCTIONNO	PDATE	PHOUR	PMINUTE	COMMENTS
1	4	24-Jan-2024	3	15	Romantic film
2	3	04-Mar-2024	3	1	Superhero film
3	2	20-May-2024	1	49	Action Drama film
4	1	24-Jun-2024	3	15	Science fiction action film
5	5	24-Dec-2024	3	15	Action film

5 rows returned in 0.01 secondsDownload

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SQL Commands

SchemaGB_B908_SQL_S17

LanguageSQL

Rows10

Clear Command

Find Tables

Save

Run

SQL

1Select *

2From Customer

Results

Explain

Describe

Saved SQL

History

CUSTOMERID	CUSTOMERTITLE	CUSTOMERNAME	CUSTOMERADDRESS	TELNO	EMAIL
1	Ms	Erling Haaland	6 Gabriel Road	01152385414	StayHumble@gmail.com
2	Mr	Christiano Ronaldo	7 Trafford Road	01652001469	Ronaldosau@gmail.com
3	Mr	Jose Mourinho	1 Porto St	01146521345	TheSpecialOne@hotmail.com
4	Ms	Mikel Arteta	12 Hornsey Rd	07998458712	MikelArteta@hotmail.com
5	Ms	Eric Ten Hag	14 Manchester Rd	03321456987	WeNeverLose@gmail.com

5 rows returned in 0.01 secondsDownload

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Team Development

Gallery

Search

GB

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SQL Commands

SchemaGB_B908_SQL_S17

LanguageSQL

Rows10

Clear Command

Find Tables

Save

Run

SQL

1Select *

2From DateDimension

Results

Explain

Describe

Saved SQL

History

DATEID	FULLDATE	YEAR	MONTH	DAY
1	01-Dec-2024	2024	12	1
2	02-Dec-2024	2024	12	2
3	24-Nov-2024	2024	11	24
4	07-Feb-2024	2024	2	7
5	06-Apr-2024	2024	4	6
6	16-May-2024	2024	5	16
7	19-Aug-2024	2024	8	19
8	25-Sep-2024	2024	9	23

8 rows returned in 0.01 secondsDownload

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5. Screenshots of the SQL code of your **all four** analytical queries, a brief description of what the aim of each query is, a justification and screen shots showing successful execution of your queries.

1. Yearly total sale for each theatre.

SQL Code:

-- Select theatre name, extract the year from performance date in performance table and name it as year, sum of sales total amount and name it as TotalSales

```
SELECT the.TheatreName,EXTRACT(YEAR FROM per.pDate) AS Year,  
SUM(sf.TotalAmount) AS TotalSales
```

-- from SalesFact table with sf in short form

FROM SalesFact sf

-- Join Performance table by PerformanceNo

JOIN Performance per on sf.PerformanceNo = per.PerformanceNo

-- Join Theatre table by TheatreNo

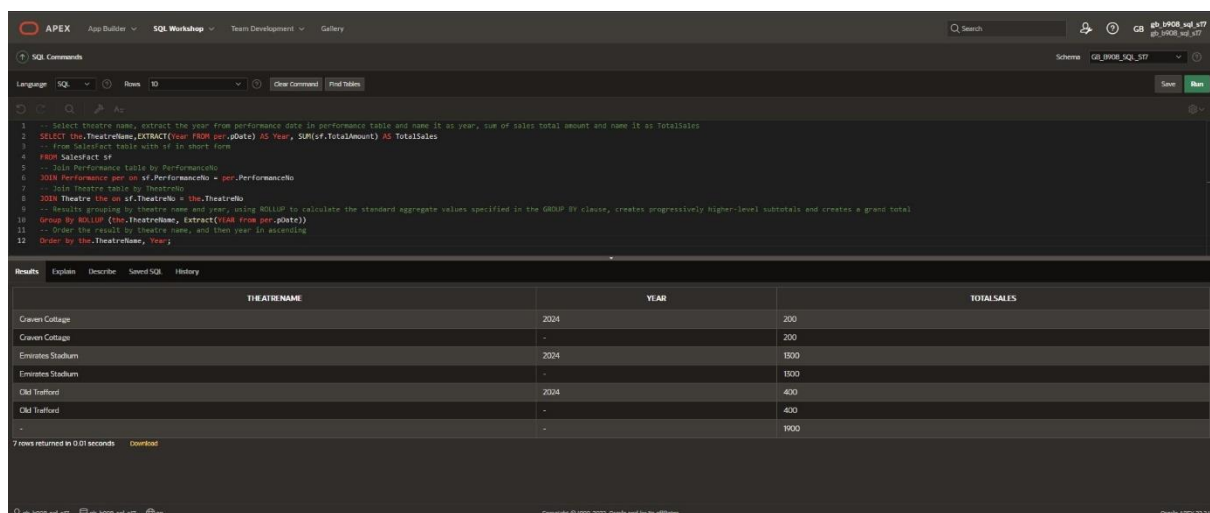
JOIN Theatre the on sf.TheatreNo = the.TheatreNo

-- Results grouping by theatre name and year, using ROLLUP to calculate the standard aggregate values specified in the GROUP BY clause, creates progressively higher-level subtotals and creates a grand total

Group By ROLLUP (the.TheatreName, Extract(YEAR from per.pDate))

-- Order the result by theatre name, and then year in ascending

Order by the.TheatreName, Year;



```
1 -- Select theatre name, extract the year from performance date in performance table and name it as year, sum of sales total amount and name it as TotalSales  
2 SELECT the.TheatreName,EXTRACT(YEAR FROM per.pDate) AS Year, SUM(sf.TotalAmount) AS TotalSales  
3 -- from SalesFact table with sf in short form  
4 FROM SalesFact sf  
5 -- Join Performance table by PerformanceNo  
6 JOIN Performance per on sf.PerformanceNo = per.PerformanceNo  
7 -- Join Theatre table by TheatreNo  
8 JOIN Theatre the on sf.TheatreNo = the.TheatreNo  
9 -- Results grouping by theatre name and year, using ROLLUP to calculate the standard aggregate values specified in the GROUP BY clause, creates progressively higher-level subtotals and creates a grand total  
10 GROUP BY ROLLUP (the.TheatreName, Extract(YEAR from per.pDate))  
11 -- Order the result by theatre name, and then year in ascending  
12 Order by the.TheatreName, Year;
```

THEATRENAME	YEAR	TOTALSALES
Craven Cottage	2024	200
Craven Cottage	-	200
Emirates Stadium	2024	1500
Emirates Stadium	-	1500
Old Trafford	2024	400
Old Trafford	-	400
-	-	1900

7 rows returned in 0.01 seconds Download

This query used ROLLUP function to calculate the yearly total sale for each theatre, it helps evaluating the performance of theatres so that it can identify which theatre generates high revenue. It could also help allocating resources and comparing performances between theatres.

2. Average sales across each month for each theatre.

SQL Code:

-- select theatre name, change the format to 'YYYY-MM' from pDate and named as month, average total amount

SELECT TheatreName, TO_CHAR(per.pDate, 'YYYY-MM') as Month, avg(TotalAmount)

-- from SalesFact table with sf in short form

from SalesFact sf

-- Join Performance table by PerformanceNo

join Performance per on sf.PerformanceNo = per.PerformanceNo

-- Join Theatre table by TheatreNo

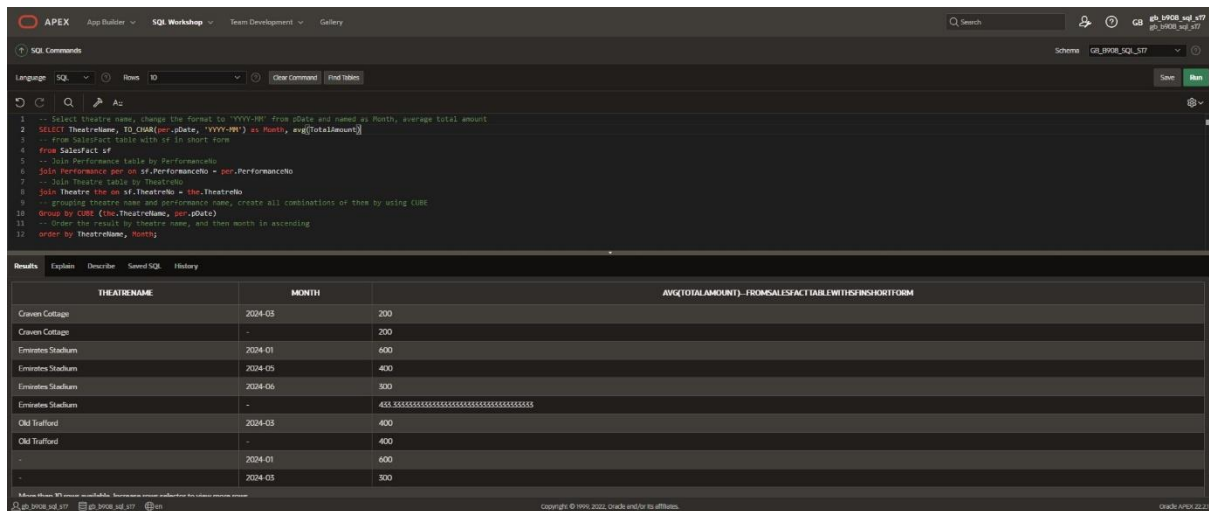
join Theatre the on sf.TheatreNo = the.TheatreNo

-- grouping theatre name and performance name, create all combinations of them by using CUBE

Group by CUBE (the.TheatreName, per.pDate)

-- Order the result by theatre name, and then month in ascending

order by TheatreName, Month;



This query used CUBE function to display average sales across each month for each theatre. It helps identifying which months are high demand so that LTC could plan to allocate resources well for each month. It can also schedule productions with high demand in peak months.

3. All clients who visited LTC theatres in at least 4 different months in a year.

SQL Code:

```
-- select distinct customerID and their name
```

```
select distinct CustomerID, CustomerName
```

```
-- subquery to calculate visit year, month and rankings for customers
```

from (

```
-- select customerID and name, extract year from performance date and name as visited Year,
format the performance date and extract Month as string,
```

```
-- Using DENSE_RANK to rank over each unique month in a year, partition by customerID
and visit year from performance date, ordered by month
```

```
SELECT cu.CustomerID, cu.CustomerName, extract(YEAR from per.pDate) as VisitedYear,
TO_Char(per.pDate, 'MM') AS Month, DENSE_RANK() over (Partition by cu.CustomerID,
extract (year from per.pDate) order by to_char (per.pDate, 'MM')) as MonthRanking
```

```
-- from SalesFact table with sf in short form
```

From SalesFact sf

```
-- Join Performance table by PerformanceNo
```

```
join Performance per on sf.PerformanceNo = per.PerformanceNo
```

```
-- Join Theatre table by TheatreNo

join Theatre the on sf.TheatreNo = the.TheatreNo

-- Join Customer table by CustomerID

join Customer cu on sf.CustomerID = cu.CustomerID)

-- Group by CustomerID, after that Customer Name and visited year

Group by CustomerID, CustomerName, VisitedYear

-- only display 4 or above distinct months

having COUNT (Distinct Month)>=4
```

The screenshot shows the Oracle APEX SQL Workshop interface. The top navigation bar includes 'APEX', 'App Builder', 'SQL Workshop', 'Team Development', and 'Gallery'. The main area displays a SQL query in the 'SQL Commands' tab. The query is a complex join and aggregation query. Below the query, the 'Results' tab shows a single row of data for 'Christiano Ronaldo'. The bottom status bar indicates '1 rows returned in 0.01 seconds'.

```
1 -- select distinct customerID and their name
2 select distinct CustomerID, CustomerName
3 -- subquery to calculate visit year, month and rankings for customers
4 from (
5 -- select customerID and name, extract year from performance date and name as visited Year, format the performance date and extract Month as string,
6 -- Using DENSE_RANK to rank over each unique month in a year, partition by customerID and visit year from performance date, ordered by month
7 SELECT cu.CustomerID, cu.CustomerName, extract(YEAR from per.pDate) as VisitedYear, TO_Char(per.pDate, 'MM') AS Month, DENSE_RANK() over (Partition by cu.CustomerID, extract (year from per.pDate) order by t
8 -- from SalesFact table with sf in short form
9 From SalesFact sf
10 -- Join Performance table by PerformanceNo
11 join Performance per on sf.PerformanceNo = per.PerformanceNo
12 -- Join Theatre table by TheatreNo
13 join Theatre the on sf.TheatreNo = the.TheatreNo
14 -- Join Customer table by CustomerID
15 join Customer cu on sf.CustomerID = cu.CustomerID
16 -- Group by CustomerID, after that Customer Name and visited year
17 Group by CustomerID, CustomerName, VisitedYear
18 -- only display 4 or above distinct months
19 having COUNT (Distinct Month)>=4
```

Results: 2 rows returned in 0.01 seconds. Download. Christiano Ronaldo

This query used RANK function and PARTITIONING method to display all clients who visited LTC theatres in at least 4 different months in a year. This query helps to find loyal customers, attracting them to visit LTC Theatres by providing benefits and loyalty programs.

4. List of the titles, production directors and play authors of all products with the highest total sale.

SQL Code:

```
-- Select production title, director and play author
```

```
SELECT ProductionTitle, ProductionDirector, PlayAuthor
```

```
-- subquery to calculate the sum of total sales, and to rank productions by total sales
```

```
from (
```

-- Select production title, director and play author, calculate total sale of each production, rank over productions by total sales and named as SalesRanking

select pro.ProductionTitle, pro.ProductionDirector, pro.PlayAuthor, SUM(sf.TotalAmount) as TotalSale, RANK() OVER (Order by SUM(sf.TotalAmount)DESC) AS SalesRanking

-- from SalesFact table with sf in short form

From SalesFact sf

-- Join Performance table by PerformanceNo

Join Performance per on sf.PerformanceNo = per.PerformanceNo

-- Join Production table by ProductionNo

join Production pro on per.ProductionNo = pro.ProductionNo

-- group by production title, then director and play author

group by pro.ProductionTitle, pro.ProductionDirector, pro.PlayAuthor)

-- find the highest total sales of production

where SalesRanking = 1;

The screenshot shows the APEX SQL Workshop interface. The top bar includes the APEX logo, navigation tabs (App Builder, SQL Workshop, Team Development, Gallery), a search bar, and user information (GB, ID: b908_sql_s17, gb_b908_sql_s17). The main area is titled 'SQL Commands' and shows a SQL query with line numbers 1 through 16. The query is as follows:

```
1 -- Select production title, director and play author
2 SELECT ProductionTitle, ProductionDirector, PlayAuthor
3 -- subquery to calculate the sum of total sales, and to rank productions by total sales
4 FROM (
5 -- Select production title, director and play author, calculate total sale of each production, rank over productions by total sales and named as SalesRanking
6 select pro.ProductionTitle, pro.ProductionDirector, pro.PlayAuthor, SUM(sf.TotalAmount) as TotalSale, RANK() OVER (Order by SUM(sf.TotalAmount)DESC) AS SalesRanking
7 -- from SalesFact table with sf in short form
8 From SalesFact sf
9 -- Join Performance table by PerformanceNo
10 Join Performance per on sf.PerformanceNo = per.PerformanceNo
11 -- Join Production table by ProductionNo
12 join Production pro on per.ProductionNo = pro.ProductionNo
13 -- group by production title, then director and play author
14 group by pro.ProductionTitle, pro.ProductionDirector, pro.PlayAuthor)
15 -- find the highest total sales of production
16 where SalesRanking = 1;
```

Below the query editor, the 'Results' tab is active, displaying a table with three columns: PRODUCTIONTITLE, PRODUCTIONDIRECTOR, and PLAYAUTHOR. The table contains two rows of data:

PRODUCTIONTITLE	PRODUCTIONDIRECTOR	PLAYAUTHOR
The Matrix	The Wachowskis	The Wachowskis
Top Gun	Tony Scott	Jim Cash

The bottom of the interface shows a footer with 'Copyright © 1999, 2022, Oracle and/or its affiliates' and 'Oracle APEX 22.2.1'.

This query used RANK function to display the list of the titles, production directors and play authors of all products with the highest total sale. LTC may forecast which future movies that produced or written by directors and authors could have a high total sale, they could allocate more performances for these movies in order to generate a high profit.