Midlands Theatre (MT) Company

Scenario

Company Overview:

Midlands Theatre (MT) is a chain of small theatres that are found within the suburbs of several cities and towns within the Midlands, including Leicester and Birmingham. It specialises in high quality theatre productions that may be seen to be insufficiently "mainstream" for the general population. The company purchased its first theatre in January 1982, and since then has seen substantial increases in the number of clients that want to visit a local theatre to see a production that is more alternative to those typically found within the city centre theatres and/or large entertainment complexes. In response to the growing client base, MT sometimes offers a matinee (i.e., afternoon) performance of a popular production in addition to the traditional evening performance time.

Alongside the increase in number of theatre goers comes the issue of managing the additional bookings and ticketing requirements. The Managing Director of MT, Ms. Heritage, developed a computerised booking system for MT. Although the ultimate aim is to enable the on-line booking of tickets for any MT productions at any MT theatres, Ms. Heritage has created a simple booking system first. This first version booking system has automated the existing manual booking processes, which are detailed below.

*Information regarding current booking processes at Midlands Theatre (MT):*

Each of the theatres in MT's portfolio has a schedule of productions for a given month in a particular calendar year. For instance, a schedule for a production entitled "Wind Blows", which ran for one week at the Cropston Theatre during March 2019, is provided in Table 1.

Table 1. Example of one week performance at the Cropston Theatre

Name of Production	Day and Date	Afternoon	Evening

"Wind Blows" *Scriptwriters*: William *Director:* Henry	Monday 4/3/2019	No performance	7.30pm
	Tuesday 6/3/2019	No performance	7.30pm
	Wednesday 6/3/2019	2.30pm	7.30pm
	Thursday 7/3/2019	No performance	7.30pm
	Friday 8/3/2019	2.30pm	7.30pm
	Saturday 9/3/2019	2.30pm	7.30pm
	Sunday 10/3/2019	2pm – note earlier start	6.45pm – note earlier start

ER Diagram for MT's first version, computerised booking System
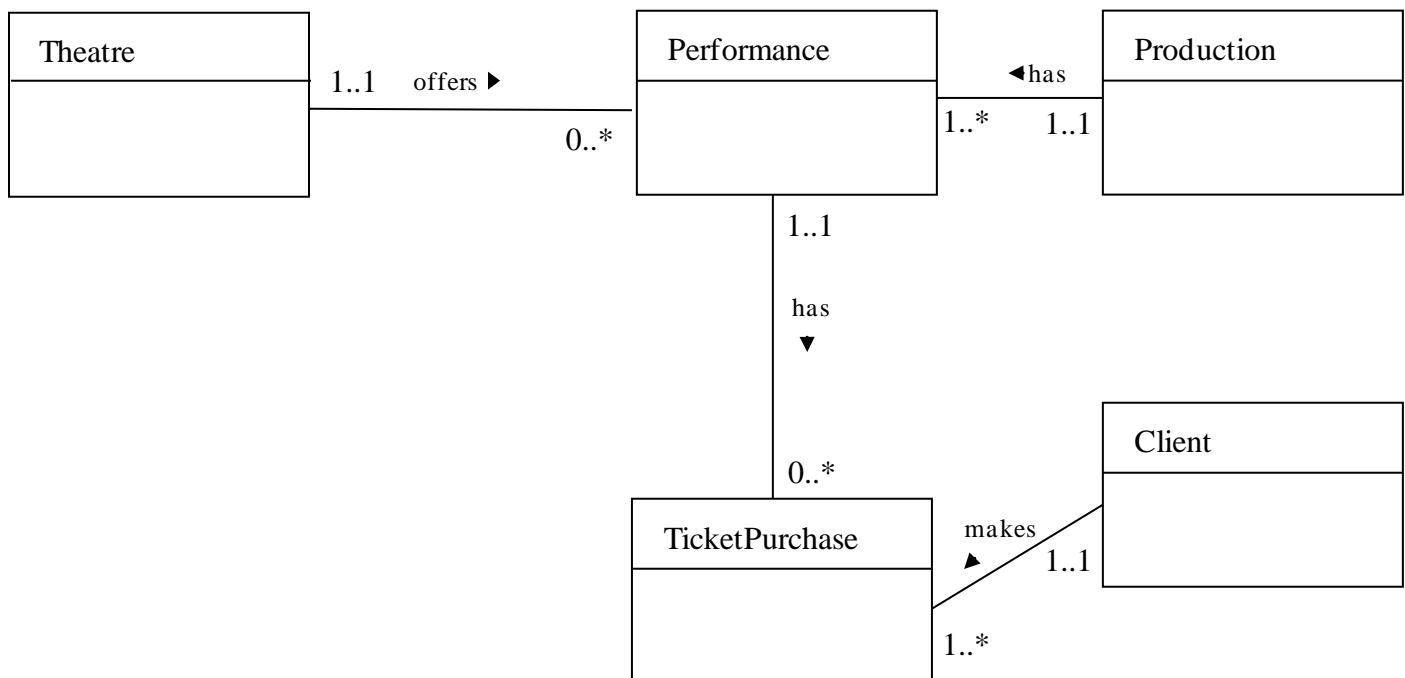
Only one production is shown at a theatre at a time, and some of the more popular productions run both afternoon (matinee) and evening performances. Productions could be at a theatre for several weeks, although the majority of productions run only for a few days over one week. The run of the next production cannot start until the previous production has ended (in other words there is no interleaving of the performance runs of different productions). It is common for the same production to have runs in all of MT's theatres - one theatre after another - so that the widest number of potential clients for a production is reached.

When a potential theatre goer wants to purchase a ticket for a particular performance of a production at a MT theatre in advance, s/he contacts the central booking service via the website, telephone or an App. Whenever a ticket is purchased, a unique purchase number is allocated, the performance to be attended, the theatre, the client details (such as name, postcode and house number, and telephone), the total amount paid and the method of payment (cash, Paypal, debit card or credit card) and the method of ticket delivery (either by mail/email or by client pick up from the local theatre box office) are recorded. If several tickets are bought at the same time by the same person, each ticket is recorded as if it were bought separately.

Table 2. Further Information about each Entity (Type) on the EER Diagram

Entity Type	Entity Instance
Theatre	A particular MT theatre e.g., Cropston
Production	A particular production e.g., How the Wind Blows
Performance	A particular performance of a production run, e.g., a performance of Wind Blows at Cropston Theatre on Monday 4/3/19 at 7.30pm
Client	A particular client of a theatre e.g., Mr Eric Charles
TicketPurchase	A particular ticket bought for a particular performance e.g., Ticket Purchase No. 29, which is for Cropston Theatre for the 9/3/19 performance at 7.30pm of Wind Blows and is bought by Ms Helen w2544.

Any remaining tickets for a performance are available to buy on the day from the local theatre box office. The same details are recorded, although clearly in this case the ticket will always be collected from the local theatre box office!

A relational database has been created according to the ERD. The tables are as follows:

- Theatre(**Theatre#**, Name, Address, MainTel);
- Production(**P#**, Title, ProductionDirector, PlayAuthor);

- Performance(**Per#**, *P#, Theatre#,* pDate, pHour, pMinute, Comments);
- Client(**Client#**, title, name, address, telNo, e-mail);
- TicketPurchase(**Purchase#**, *Client#, Per#,* PaymentMethod, DeliveryMethod, TotalAmount).

Having established the online transaction processing database, Ms. Heritage wants more intelligence information from the available data and she is looking for a potential data warehouse for MT. As the first step in this process, she expects to setup a data mart for ticket sales as the first step. The data mart should satisfy the following analysis requirements:

- List the names of each client and his/her total spending in MT theatres

- List the names of all clients who visited MT theatres in July

- List the production directors of all productions with the highest total sale

Here, by ticket sale value/spending, we refer to the value of money rather than number of tickets. For this data mart, only the data involved in ticket sales are stored, and any data not involved in at least one ticket sale should not be included.

You can access the OLTP database in my database schema: ops$yyang00. For example, you can access the data for Theatres using the following SQL statement:

select * from ops$yyang00.theatre;

Your Tasks

You are to develop a prototype of ORACLE data mart for ticket sales as a part of a potential data warehouse for MT. For this assignment you are required to work individually.

You have been given the MT company scenario, together with an Entity Relationship (ER) Diagram and corresponding tables for the existing relational database.

Task 1: Analyse the given database design and the requirement for data mart, identify the dimensions and fact for your data mart. Here for this assignment, only the essential (minimum) dimensions for the required queries need to be included.

Task 2: Design the star schema for the data mart and identify the corresponding PKs and FKs

Task 3: According to given data and requirements, determine the relevant attributes and suitable granularity in your data mart

Task 4: Map your star schema to logical relations

Task 5: Create the corresponding tables in Oracle using SQL

Task 6: Identify your source data from the OLTP database and design your data extraction rules. You need to give a detailed mapping and transformation list from the source to the destination.

Task 7: Implement your data extraction, transformation and loading through Oracle SQL. The number of rows extracted into each dimension or fact table in your data mart should be printed from Oracle query.

Task 8: Comment on how your data mart satisfies the requirements of MT. Implement the required data analysis requirements for both data mart and the original OLTP database. Compare your queries and comments on the advantages of data mart in analysis operations. Test results from Oracle query should be included.

- Evidence of the successful execution of your queries is required. For large outputs, you need to provide only the last page of outputs with the number of rows in the end.

Deliverables:

The deliverable is a report that summarises your work and justifies your design decisions, it includes the following sections

1. Dimension selection and fact identification
2. Star Schema
3. Logical relations (Tables) and granularity
4. SQL for table creation and constraints
5. Data Sources Mapping (using diagrams)
6. SQL for ETL
7. SQL for required queries (both Data Mart and the relational model)
8. Comparison between Data Mart and relational models

Each part should be associated with a concise explanation, and the execution results from your SQL code should be provided as well. Everything should be put into one MSWord document in your submission.

IMAT5167 DW&OLAP Criteria Marking Grid for DW Design Assignment

TASK	No work 0-10%	Little attempt 10-19%	Poor attempt 20-29%	Fail attempt 30-39%	Marginal fail 40-49%	Pass 50-59%	Merit 60-69%	Distinction 70-79%	Excellent 80-89%	Outstanding 90-100%
Star schema design	No work	Attempted, but No idea on star schema	Poor attempt, inappropriate choice of dimensions and fact	Some effort insufficient granularity, dimensions and fact quality	Serious errors, but some evidence of understanding star schema	Satisfactory but with some significant errors/ limitations	As for Distinction level but with some minor errors/ limitations	All dimensions and the fact identified, correct granularity	Same as previous, and correct multiplicity, no unjustified redundancy	As excellent. Minimum set of dimensions and facts in fact table. Perfect granularity
Derivation of logical relations	No work	Attempted but No idea on logical relations	Poor attempt, inappropriate choice of tables & attributes	Some effort but insufficient table/PK/FK quality overall.	Serious errors, but some evidence of understanding logical relations	Satisfactory but with some significant errors/ limitations	As for Distinction level but with some minor errors/ limitations	Correct choice of tables, and attributes, primary & foreign keys correct.	Excellent choice of tables, and attributes, primary & foreign keys	Same as excellent. Clear explanation on the map from star schema to logical relations.
Creation of tables with integrity rules	No work	Attempted, but No idea on how to create a table with integrity	Poor tables and attempt at integrity rules	Some effort but tables and integrity is not as reasonable quality	Some tables and associated integrity rules created but serious errors exist	Satisfactory but with some significant errors/ limitations	As for Distinction level but with some minor errors/ limitations	Tables created correctly. Appropriate implementation of integrity rules	All tables created correctly. Appropriate implementation of integrity rules	Same as excellent. Optimised table creation with minimum code and full set of constraints
Data source identification, data extraction, transformation and loading	No work	Attempted, but No idea on data source and ETL	Poor data sources, wrong or no transformation	Some effort but data source is not sufficient and transformation has significant errors	Some data sources are identified, and attempts are made for transformation	Satisfactory but with some significant errors/ limitations	As for Distinction level but with some minor errors/ limitations	Data sources are correctly identified, good transformation rules are set and data are loaded correctly	All data sources are correctly identified, efficient transformation rules are set and all data are loaded correctly	Same as excellent. Minimum data sources and optimised ETL code produced, any potential problems discussed
Justification of the data mart design and comparison	No work	Attempted, but No idea on data sources and queries	Little or no evidence of justification	Some effort insufficient understanding of data mart and weak	Some incomplete explanation are provided.	Satisfactory but with some significant errors/ limitations	As for Distinction level but with some minor errors/	Correct justification for requirements with a good comparison	Excellent justification for all requirements with excellent comparison	Same as excellent. More than one solutions are presented and

of data mart and OLTP			justifications provided.			limitations	between OLTP and DM queries	between most OLTP and DM queries	difference discussed.

Overall Mark:

Overall Comments: