

# CASE STUDY

## ArtWorld Theatres

ArtWorld Theatres is a chain of art theatres located in Singapore. ArtWorld Theatres present small budget Theater performances which are usually not able to find market in the bigger commercial theatres.

Over time, ArtWorld Theatres have developed popularity with the niche audience who like to watch Theater performances in less commercial settings.

Each theatre hosts a number of performances each day. Performances are scheduled in advance and the details are published in local newspapers and on ArtWorld website.

In order to keep the company financially viable and performances affordable for its customers, the theatre chain has a number of members who pay annual fees. The theatre accepts bookings in advance only from members.

Once the theatre performance has been scheduled, members are able to book particular seats for any session. Members need to pay for their bookings in advance and are entitled to 5% discount. They can make payment via cash (if booking is done in person) or by using credit card (if booking is done on the phone or in person).

The general public are able to purchase tickets only on the day of the performance at the venue.

To make it more convenient for its customers and expand its client base, ArtWorld Theatres is looking to develop a computer system to accept the Advance ticket booking from members and also to enable the general public to purchase tickets. It intends to offer an online booking facility to its members as well as non-members.

Members will need to register to the website and will be issued a unique member-id. Using the member id, the users will be able to make booking for the performance and to make payment using credit card and be entitled to 5% discount.

Non-members will be able to make the booking via website only on the day of the performance. However, they are not entitled to the 5% discount.

Senior Citizens get a discount of 25% on the ticket price. Children below the age of 12 enjoy a 50% discount on the performances where the age limit allows them to enter the theatre.

Tickets for Weekend and Public Holidays carry a surcharge of \$1.

## ANSWER ANY TWO QUESTIONS

All Questions are based on the *ArtWorldTheatres* case study attached to this paper. Students will be given the case study to read about a week before the examination. But they are required to leave the case study at home, and will be given a fresh one during the examination.

### QUESTION 1

Analyse *ArtWorldTheatres* case study and provide the answers to the following questions:

- (a) Identify the use cases of the system described in *ArtWorldTheatres* and draw the use case diagram. Clearly indicate the actors and the links – labelling whether the link should be <<extend>> or <<include>>. Provide the reason for choice of the link <<extend>> and/or <<include>>.

[Marks will be allocated as follows:

**23 marks for a complete use case diagram showing excellent understanding of the process.**

**Allocate**

**6 marks for the identification of use cases,  
12 marks for use case diagram, and  
5 marks for reasons.]**

- (b) Write a Detailed Description for the use case “**Book a Ticket**” providing
- The characteristics information (such as primary actor, level and goal of the use case, precondition and the trigger for the use case),
  - All the actions steps required to be performed for the use case,
  - Extensions including the recovery steps, and
  - Variations in the Technology and Data Variation List.

Provide at least **TWO** extensions and **THREE** variations.

[Marks will be allocated as follows:

**17 marks for a complete detailed use case description showing excellent understanding of the process.**

**Allocate**

**5 marks for characteristic information,  
5 marks for typical course of events section,  
4 marks for extensions, and  
3 marks for the variations.]**

- (c) Name the **SIX** techniques that you can use to identify the classes / objects of the *ArtWorldTheatres* case study. Briefly discuss **ANY TWO** of these techniques supporting your answer with examples from the *ArtWorldTheatres* case study.

**[Marks will be allocated as follows:**

**10 marks for a complete answer showing excellent understanding of the topic.**

**Allocate**

**6 marks for identifying the six techniques,**

**4 marks for the discussion and example from the *ArtWorldTheatres* case study for any two techniques.]**

**[TOTAL FOR QUESTION 1: 50 MARKS]**

## QUESTION 2

- (a) Draw a class diagram for *ArtWorldTheatres System* using the UML notation. Show the entity classes along with their attributes, methods and the relationships among these entity classes.  
(If you believe that you have to make additional assumptions, state them clearly.)

**Note:** You should include **FIVE** Gen-Spec, any / all Whole-Part and association links amongst your relationships, and Whole-Part and associations **MUST** be shown with the appropriate cardinality.

[Marks will be allocated as follows:

**32 marks for a complete class diagram showing excellent understanding of the process.**

**Allocate**

**8 marks for the identification of classes,  
3 marks for the attributes,  
3 marks for the methods,  
8 marks for the identifying and representing the relationships and cardinality that demonstrate understanding of the problem,  
10 marks for the five Gen-Spec relationships.]**

- (b) Briefly explain the purpose of drawing an Interaction diagram. Identify the types of Interaction diagram that exist and explain when in the analysis and design of a software system they should be produced.

[Marks will be allocated as follows:

**6 marks for a complete answer showing excellent understanding of the subject.]**

- (c) The *ArtWorldTheatres* company wants to proceed with the use of prototyping method to achieve a “speedy, but low risk” systems development, but knows very little about the approach. Discuss the prototyping approach along with the **THREE** options for prototyping that the Project Manager could use in the development of the *ArtWorldTheatres System*. Give your recommendation with justification for the option that can be used for *ArtWorldTheatres System*.

[Marks will be allocated as follows:

**12 marks for a complete answer showing excellent understanding of the prototype approach.**

**Allocate**

**4 marks for discussing the prototype approach,  
6 marks for the three options for prototyping,  
2 marks for the recommendation with justification.]**

**[TOTAL FOR QUESTION 2: 50 MARKS]**

### QUESTION 3

- (a) During the development of *ArtWorldTheatres System*, there are two approaches to requirements definition. These two approaches are SSM (Soft Systems Methodology) and purely hard systems. Differentiate between the **TWO** approaches to requirements definition explaining **ONE** advantage and **ONE** disadvantage of each.

[Marks will be allocated as follows:

**6 marks for differentiating between the two approaches (Soft Systems Methodology and purely hard systems),**

**4 marks for explaining one advantage and one disadvantage of each approach.]**

- (b) During the development of the *ArtWorldTheatres System*, problems may occur either in terms of quality and / or productivity. You are required to alert the Project Manager regarding these two categories of problems that may occur during the development of the system for the *ArtWorldTheatres* operations. Give reasons / justifications for these alerts.

[Marks will be allocated as follows:

**8 marks for the discussions of the problems under each category**

**(for a total of  $2 \times 8 = 16$  marks) showing excellent understanding of the process / problems allocating**

**5 marks for alerts under each category for a subtotal of  $2 \times 5 = 10$  marks**

**3 marks for providing the reasons/justifications under each category for a subtotal of  $2 \times 3 = 6$  marks.]**

- (c) Differentiate among association, aggregation and composition, relationships that may exist between the classes / objects of a system. Support your answer with examples (from the *ArtWorldTheatres* case study) for each of the above **THREE** relationships.

[Marks will be allocated as follows:

**6 marks for differentiating among association, aggregation and composition,**

**6 marks for the example (from *ArtWorldTheatres* case study) of each of the three relationships.]**

- (d) There are several features that tend to characterize the *ArtWorldTheatres System*. 'Environment' and 'Interfaces' are two examples of such features. You are required to identify and discuss **FOUR** other features that tend to characterize the *ArtWorldTheatres System*. You are required to support your discussion with example(s) from the *ArtWorldTheatres System*.

[Marks will be allocated as follows:

**12 marks for a complete answer showing excellent understanding of the subject.**

**Allocate**

**3 marks for each feature (1 mark for identification, 1 mark for discussion, 1 mark for supporting the discussion with example) for a total of  $3 \times 4 = 12$  marks]**

**[TOTAL FOR QUESTION 3: 50 MARKS]**

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