Jurong Pioneer Junior College

2022 H2 Computing (Syllabus 9569) Paper 1

Extended Curriculum (Post Term 2)

Mock Paper 1(A) (Duration: 90 minutes)

2020 A Level Paper 1 Question 1

1. A software company is writing a program for a vehicle business. Both cars and vans are available for hire.

For all vehicles, the data that will be stored include:

Vehicle Registration Number (VRN)
Model
Total distance travelled (km)
Date hired
Date of return
Cost per day
Available for hire

For cars, the additional data stored include:

Number of seats
Fuel type (petrol, diesel, electric, hybrid)

For vans, the additional data stored include:

Load volume (m^3)
Maximum load (kg)

The odometer in the vehicle displays the total distance the vehicle has travelled since manufacture.

When a vehicle is hired:

- total distance travelled is set to the odometer's value
- date hired is set to the current date
- return date is set to the date the vehicle is expected to be returned
- available for hire is set to FALSE.

When a vehicle is returned:

- hire cost is returned as the cost per day multiplied by the number of days the vehicle was hired
- total distance travelled is set to the odometer date
- date returned is set to the current date
- available for hire is set to TRUE.

Object-oriented programming will be used to model vehicles.

(a) Draw a class diagram that shows the following for the situation described above.

- the superclass
- any subclasses
- inheritance
- properties
- appropriate methods [12]

(b) State the purpose of a superclass. Give an example of a superclass from the vehicle hire example. [2]

Objects provide encapsulation of properties and methods.

(c) State the purposes of encapsulation. [2]

The business wants to change the way the hire cost is calculated for a car. As well as charging per day, an additional charge of $0.05 is to be made per km travelled during this hire.

(d) Suggest a change to the class diagram to enable the new charging scheme to be used for cars. [1]

(e) State the purpose of polymorphism. [1]

2020 YIJC Prelim Paper 1 Question 5 (modified)

2. YI restaurant serves a variety of local dishes at reasonable prices and plans to provide food delivery services to its customers via a web application. A customer places an online order and an employee will be assigned by the system to deliver the order to the customer. The customer can choose to pay online when ordering or make cash payment upon delivery. Customers can choose more than one dish in the same online order and each order has a unique ID.

At the time of ordering, the application records the following data:

- Customer name, delivery address and email, if the customer has not made a booking before
- Customer ID
- Order date
- Order time
- Payment mode
- Dish and quantity.

The following shows an example of the order receipt which will be sent to the customer's email address.

ORDER RECEIPT

OrderID:	YI150920123
Customer ID:	C1234
Name:	Annabelle Dallas
Email:	annabelledallas@gmail.com
Address:	5 Yishun Ring Rd, Singapore 768675
Date:	15/09/2020
Time:	14:11:30
Payment Mode:	Online

Dish	**Quantity**	**Unit Price**	**Price**
NASI LEMAK SET	2	4.50	9.00
CURRY CHICKEN SET	1	5.00	5.00
CHICKEN RICE SET	1	4.50	4.50
		Subtotal:	18.50
		Delivery:	4.00
		Total:	22.50

The restaurant assigns a unique ID to each employee and maintains its employees' information, such as their name, contact number and bank account number. The restaurant keeps a record of the employees' delivery assignments, the date and time when the order is successfully delivered to the customer.

(a) The company wants to model this application using a relational database.

(i) The database needs three tables to store the data for the customers' food order: `CUSTOMER`, `ORDER` and `FOOD`.
Draw an Entity-Relationship (E-R) diagram showing the three tables and the relationships between them. [2]

(ii) The database needs three tables to store the data for the employees' delivery assignment: `EMPLOYEE`, `ORDER` and `ASSIGNMENT`.
Draw an Entity-Relationship (E-R) diagram showing the three tables and the relationships between them. [2]

(iii) Draw the overall Entity-Relationship (E-R) diagram showing the five tables and the relationships between them. [1]

(b) A table description can be expressed as:

```
TableName (Attribute1, Attribute2, Attribute3,...)
```

The primary key is indicated by underlining one or more attributes.
Foreign keys are indicated using a dashed underline.

Write table descriptions for the **five** tables. [6]

(c) Describe a method to protect data from loss or corruption. [2]

(d) Explain how Singapore's Personal Data Protection Act (PDPA) protects the customers' and employees' personal data stored in the database. [2]

(e) Describe the impact of such food delivery applications on the society and economy. [4]

2020 ACJC Prelim Paper 1 Q6

3. In a computer game, players' names and scores are stored in a binary search tree, in increasing order of score.
The binary search tree has its data inserted in the following order:

Ryan	18
Bella	25
Joshua	27
Shane	20
Jasmine	17
Alexis	21
Leslie	15

(a) Draw the binary search tree. [4]

(b) The binary search tree is implemented using the two dimensional array shown below. Copy and fill in the entries in the array.

Index	Name	Score	Left Pointer	Right Pointer
0				
1				
2				
3				
4				
5				
6				

[5]

(c) To delete a node from a binary tree, the following cases are considered:

Case	**Action**
Node has no children	• Node is removed from tree
Node has one child	• Node is replaced with its child
Node has two children	• Call the node to be deleted *D*. Do **not** delete *D*. • Look for the node *E* that comes after *D* in an in-order traversal. • Copy the data of *E* into *D*. • Delete *E* using one of the previous two cases.

Draw the tree at each step after the following players are deleted, one after another:

(i) Joshua [1]

(ii) Jasmine [1]

(iii) Ryan [2]

(d) The program has a feature which allows the user to enter an integer. The program then returns a list of players whose score is greater than that integer. Describe how the program can create this list using the binary search tree. [4]

2020 ACJC Prelim Paper 1 Question 1

4. A food delivery app offers promotions to customers based on their usage pattern.

First time customers would receive a $5 discount on their first purchase. If a customer has spent at least $1000 on the app in the last 3 months, the app would upgrade the customer to Gold status and offer 10% discount on all orders.

Gold status customers who have been inactive for 1 month would be offered an additional 5% discount on top of the existing 10% discount. Customers who have made their first purchase and have been inactive for 1 month would receive a $5 discount instead.

(a) Create a decision table to show these conditions and actions. [4]

(b) Simplify your decision table by removing redundancies from the decision table. [2]

End of Mock Paper 1(A)