SKIP1013

INTRODUCION TO PROGRAMMING AND PROBLEM SOLVING

(SEMESTER A211)

ASSIGNMENT 1

Theme :

Problem Solving for Auto / Vehicles

Lecturer :

PROF. MADYA DR. AZMAN B YASIN

Prepared by :

GROUP 1 (A)

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SKIP1013:

INTRODUCTION TO PROGRAMMING

AND PROBLEM SOLVING

(SEMESTER A211)

INDIVIDUAL ASSIGNMENT 1

Topic:
Problem Solving for Vehicle

Subtopic:
Motorcycle

System:
System to Calculate Estimated Service Charge

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Class: A
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Submission Date: 20 December 2021

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1. Identify the problem

Motorcycles are often used by people for many reasons may it be for fast transportation, a more affordable option or high maneuverability. It is also often being the choice of youngsters as the age requirement to get a motorcycle license is lower which is at 16 years old in Malaysia compared to the license for other transportation. However, the parts of a motorcycle are more exposed to the environment which causes damage to the parts pretty quickly. Problems such as poorly braking problems, bad throttle response, vibrations and high fuel consumption may happen after a while. Motorcycles also generally provide less protection as the user is more exposed compared to being in a car which could lead to severe injuries if involved in an accident. Motorcycle users should always be up to date about the maintenance of their motorcycle to ensure a safe ride always.

There are a few common problems that motorcycle users always face such as braking problems. This is the most important component of any moving vehicle. It is not about how fast you can go, but how smoothly you can brake even when driving at a high pace. There are two types of brakes. Drum brakes and disc brakes, both operated by hydraulic fuel, are available. Let's start with drum brakes. If your braking system is malfunctioning, the first thing you should check is the brake cord. Replace it if it is outdated. It may rust within and tangle during braking, resulting in inadequate support. You should keep an eye on the brake pads on a regular basis. If you have drum brakes, it is advisable you not to ride aggressively if you are riding for an extended period. With greater braking, the pads will become hotter and expand more, resulting in poor braking. Check the brake drums for wear and tear, as our environment causes them to deteriorate over time. Check the hydraulic fuel in disc brakes first to see if it is reaching the drums properly. Only use the fuel that is advised. Check the buckets in the levers as well. Check the brake shoes on a regular basis.

Secondly, the most common problem is bad throttle response. If you're having trouble getting a good throttle response, there are a few things to investigate. The carburetor adjustment, for example, will come first, followed by engine tuning. Make that the air filter, fuel filter, and spark plugs are all in good working order. If the problem persists, you should also investigate the gasoline quality. These are the most important things to look for first. You can also check the spark, CDI, or coils to see if they are delivering enough sparks at the proper moment to broaden your observation. Check your acceleration cable as well. We typically overlook it, but because the wire is exposed to the outside, rust begins to form inside it over time. You can also see if your clutch plates are in good working order.

Thirdly, motorcycles may experience vibrations or jerking. You should be aware that almost all bikes have some level of vibration. However, if your bike is experiencing excessive vibrations, there are a few things to look for, as they can have a significant impact on your riding abilities, especially when riding at a high speed. First and foremost, make sure that all the bike's body parts are correctly connected, especially if it's a Chinese full-faired bike. One thing to stress out is that the seat bolts should be checked for adequate tightness. We don't check this too much, but it can really ruin a fantastic ride. We can also inspect the shock absorbers and suspensions to see if they are in good operating order. If the suspensions are oil-based, check the oil level. Another reason for the wobbling appearance is a worn-out chain sprocket or the entire chain set. If you're only going to replace the chain, my personal recommendation is to replace the entire set because this will extend the life of your chain.

Lastly, high fuel consumption is also a common problem for motorcycles. This is something that all bikers are concerned about, as gas prices are skyrocketing. First and foremost, it is determined by the way you ride your bicycle. Proper gear shifting and cycling at a consistent speed will help you get a lot of miles out of your bike. However, this is only one aspect of achieving a healthy economy. There are a few minor but significant factors as well. Changing your engine oil properly will help you obtain better mileage. A good carburetor adjustment is also very crucial. It's also a good idea to inspect your clutch plates. The radials are also important. In radials, lower air pressure can lead to higher fuel consumption. Your tires should be able to move freely. Chain sprockets, brake shoe issues, drum issues, and bearing issues can all contribute to high fuel use.

2. Understand the problem

Users would often want to calculate the estimated maintenance charge for their motorcycle to ensure they know what to expect. In this way, they will make proper budgeting, so they are able to do a complete maintenance on their motorcycle. Knowing the estimated price for motorcycle service every year will enable the user to always have some savings for that purpose. Other than that, it is also important to make an estimation to avoid fraud by the by mechanics such as charging a higher price for the motorcycle parts and do additional repairs that are not needed. If the price stated by the mechanics is way higher than the estimated service price that the user has done, then the user may consult the mechanic to know thoroughly the reason behind the high price given. Therefore, users should know the model of motorcycle and identify the issues that the motorcycle must help estimate the service charge.

3. Identify alternative ways to solve the problem

- Identify the nearest workshop for inquiries regarding service charge

Pros	Cons
• Could get accurate pricing for motorcycle parts prices and service charge	• User may not have time to visit the workshop

- Do maintenance on the motorcycle by yourself

Pros	Cons
• Could save some money as no extra service charge for the mechanics is needed	• User may not know other issues the motorcycle is having • User may not have enough knowledge about motorcycle to know the suitable spare parts for it

- Consider buying a new motorcycle

Pros	Cons
• May save money as an old motorcycle might be broken more often	• User may not have enough money for a new motorcycle • User may need to use the motorcycle urgently and buying a new one will take some time

- Create a system to estimate the price for service

Pros	Cons
• User will get to prepare the estimated cash beforehand • Reduce the risk of fraud by the mechanic	• Price may not be accurate as it is just an estimation

• Can identify beforehand some of the problems that the motorcycle is having	

4. Select the best way to solve the problem from the list of alternatives solution.

The best solution to tackle the problem will be to create a system to estimate the price for motorcycle service. This method allows user to have an overview of the condition of the motorcycle beforehand so any problems that the motorcycle is facing can be informed to the mechanic. The estimated price will also allow user to prepare the cash needed and user can make price comparison from various workshops with the estimated price as reference.

5. List instructions that enables you to solve the problem

1. User need to enter the model of motorcycle.
2. User chooses the problem faced by the motorcycle from the information shown.
3. User enters the quantity needed for each part that needs to be replaced.
4. The price for each aspect will be calculated.
5. The 6% discount for aspects with more than 2 items will be calculated.
6. Subtotal will be calculated.
7. The total after SST tax will be calculated.

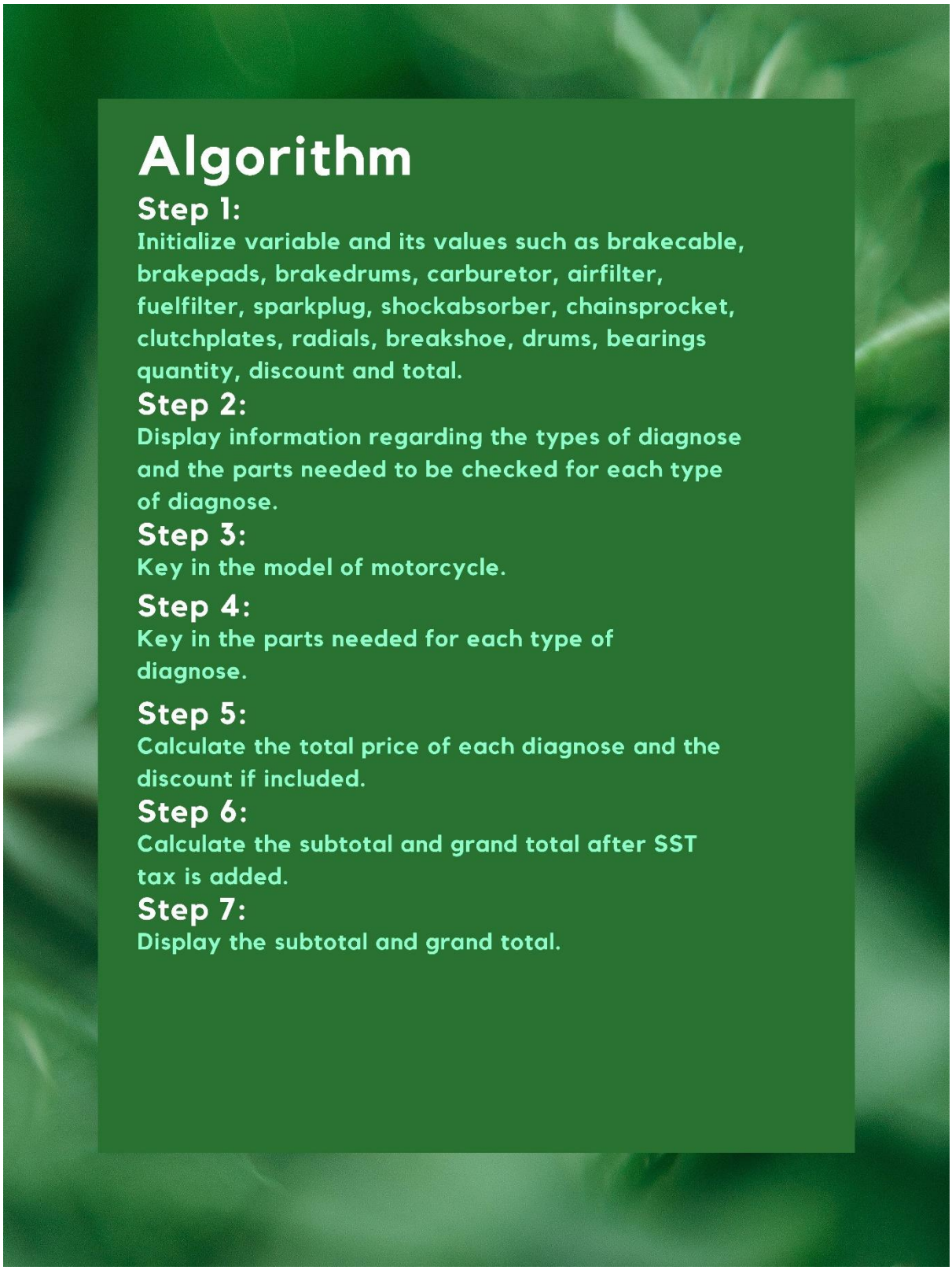
6. Evaluate the solution

1. Declare the variables and its value using String, double and int.
2. Declare the double called
3. Print out the descriptive statement to ask the inputs needed from user.
4. User will key in the input.
5. The estimated service charge is computed using mathematical operations.
6. The output will show the estimated service charge.

Calculation method

Item	Variable	Calculation
Total price for the diagnose of braking problems	total1	total1 = (brakecable*quantity1) + (brakepads*quantity2) + (brakedrums*quantity3)
Total price for the diagnose of bad throttle response	total2	total2 = (carburetor*quantity4) + (airfilter*quantity5) + (fuelfilter*quantity6) + (sparkplug*quantity7)
Total price for the diagnose of vibrations or jerking	total3	total3 = (shockabsorber*quantity8) + (chainsprocket*quantity9)
Total price for the diagnose of high fuel consumption	total4	total4 = (clutchplates*quantity10) + (radials*quantity11) + (breakshoe*quantity12) + (drum*quantity13) + (bearings*quantity14)
50% discount for diagnose of braking problems	discount1	discount1 = total1*0.5
50% discount for diagnose of bad throttle response	discount2	discount2 = total2*0.5
50% discount for diagnose of high fuel consumption	discount3	discount3 = total4*0.5
Subtotal for service charge	subtotal	subtotal = discount1 + discount2 + total3 + discount3
10% SST tax charged to user	sst	sst = subtotal*0.1
Grand total of service charge	grandtotal	grandtotal = subtotal + sst

7. Algorithm


Algorithm
Step 1:
Initialize variable and its values such as brakecable, brakepads, brakedrums, carburetor, airfilter, fuelfilter, sparkplug, shockabsorber, chainsprocket, clutchplates, radials, breakshoe, drums, bearings quantity, discount and total.
Step 2:
Display information regarding the types of diagnose and the parts needed to be checked for each type of diagnose.
Step 3:
Key in the model of motorcycle.
Step 4:
Key in the parts needed for each type of diagnose.
Step 5:
Calculate the total price of each diagnose and the discount if included.
Step 6:
Calculate the subtotal and grand total after SST tax is added.
Step 7:
Display the subtotal and grand total.

8. Pseudocode

```
Start
        Read brakecable = 35;
        Read brakepads = 8;
        Read brakedrums = 89;
        Read carburetor = 55;
        Read airfilter = 13;
        Read fuelfilter = 10.40;
        Read sparkplug = 8;
        Read shockabsorber = 52.90;
        Read chainsprocket = 49;
        Read clutchplates = 50.20;
        Read radials = 168;
        Read breakshoe = 29.20;
        Read drum = 242.80;
        Read bearings = 22;
        Output “Enter model of motorcycle:”
        Input model
        Display “Braking problems”
        Output “Quantity of item 1:”
        Input quantity1
        Output “Quantity of item 2:”
        Input quantity2
        Output “Quantity of item 3:”
        Input quantity3
        Calculate total1 = (brakecable*quantity1) + (brakepads*quantity2) + (
        brakedrums*quantity3)
        Display “Price:” + total1
        Calculate discount1 = total1*0.5
        Display “Price after discount:” + discount1
        Display “Bad Throttle Response”
        Output “Quantity of item 1:”
        Input quantity4
        Output “Quantity of item 2:”
```

Input quantity5

Output “Quantity of item 3:”

Input quantity6

Output “Quantity of item 4:”

Input quantity7

Calculate total2 = (carburetor*quantity4) + (airfilter*quantity5) +

(fuelfilter*quantity6) + (sparkplug*quantity7)

Display “Price:” + total2

Calculate discount2 = total2*0.5

Display “Price after discount:” + discount2

Display “Vibrations or jerking:”

Output “Quantity of item 1”

Input quantity8

Output “Quantity of item2:”

Input quantity9

Calculate total3 = total3 = (shockabsorber*quantity8) + (chainsprocket*quantity9)

Display “Price:” + total3

Display “High Fuel Consumption”

Output “Quantity of item 1:”

Input quantity10

Output “Quantity of item 2:”

Input quantity11

Output “Quantity of item 3:”

Input quantity12

Output “Quantity of item 4:”

Input quantity13

Output “Quantity of item 5:”

Input quantity14

Calculate total4 = (clutchplates*quantity10) + (radials*quantity11) +

(breakshoe*quantity12) + (drum*quantity13) + (bearings*quantity14)

Display “Price:” + total4

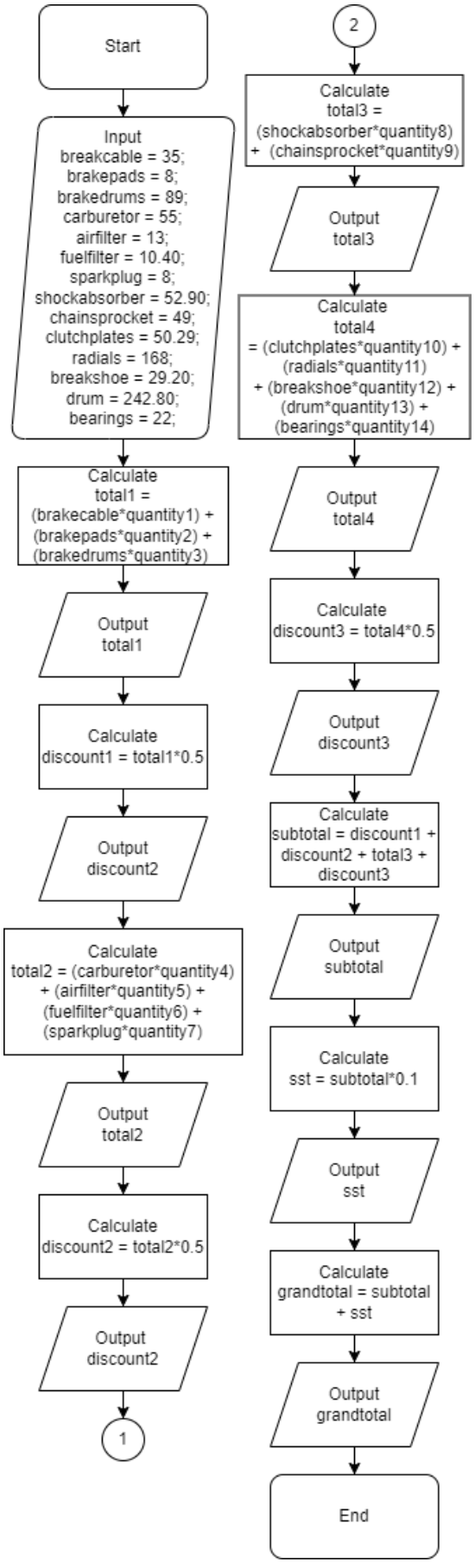
Calculate discount3 = total4*0.5

Display “Price after discount:” + discount3

Display “Model of motorcycle” + model

```
        Calculate subtotal = discount1 + discount2 + total3 + discount3
        Display “Subtotal:” + subtotal
        Calculate sst = subtotal*0.1
        Display “SST:” + sst
        Calculate grandtotal = subtotal + sst
        Display “Grand total:” + grandtotal
End
```

9. Flowchart


Start
Input
breakcable = 35;
brakepads = 8;
brakedrums = 89;
carburetor = 55;
airfilter = 13;
fuelfilter = 10.40;
sparkplug = 8;
shockabsorber = 52.90;
chainsprocket = 49;
clutchplates = 50.29;
radials = 168;
breakshoe = 29.20;
drum = 242.80;
bearings = 22;
Calculate total1 = (brakecable*quantity1) + (brakepads*quantity2) + (brakedrums*quantity3)
Output total1
Calculate discount1 = total1*0.5
Output discount2
Calculate total2 = (carburetor*quantity4) + (airfilter*quantity5) + (fuelfilter*quantity6) + (sparkplug*quantity7)
Output total2
Calculate discount2 = total2*0.5
Output discount2
1
2
Calculate total3 = (shockabsorber*quantity8) + (chainsprocket*quantity9)
Output total3
Calculate total4 = (clutchplates*quantity10) + (radials*quantity11) + (breakshoe*quantity12) + (drum*quantity13) + (bearings*quantity14)
Output total4
Calculate discount3 = total4*0.5
Output discount3
Calculate subtotal = discount1 + discount2 + total3 + discount3
Output subtotal
Calculate sst = subtotal*0.1
Output sst
Calculate grandtotal = subtotal + sst
Output grandtotal
End

10. Coding

```
package assignment1;
import java.util.Scanner;
public class SystemToCalculateEstimatedServiceCharge {

	public static void main(String[] args) {
		// TODO Auto-generated method stub

		Scanner scan = new Scanner (System.in);
		String model;
		double brakecable = 35;
		double brakepads = 8;
		double brakedrums = 89;
		double carburetor = 55;
		double airfilter = 13;
		double fuelfilter = 10.40;
		double sparkplug = 8;
		double shockabsorber = 52.90;
		double chainsprocket = 49;
		double clutchplates = 50.20;
		double radials = 168;
		double breakshoe = 29.20;
		double drum = 242.80;
		double bearings = 22;
		int quantity1, quantity2, quantity3, quantity4, quantity5,
quantity6, quantity7;
		int quantity8, quantity9, quantity10, quantity11, quantity12,
quantity13, quantity14;
		double discount1, discount2, discount3;
		double total1, total2, total3, total4;
		double subtotal, sst, grandtotal;

		System.out.print("Welcome to System to Calculate Estimated Service
Charge");


	System.out.println("\n_____
_____");
		System.out.println("| Braking problems    | Bad Throttle Response |
Vibrations or jerking | High Fuel Consumption|");

	System.out.println("|_____|_____|_____
_____|_____|");
		System.out.println("|Item 1: Brake cable  |Item 1: Carburetor
|Item 1: Shock absorber |Item 1: Clutch plates |");
		System.out.println("|Item 2: Brake pads   |Item 2: Air filter
|Item 2: Chain sprocket |Item 2: Radials       |");
		System.out.println("|Item 3: Brake drums  |Item 3: Fuel filter    |
|Item 3: Break shoe    |");
		System.out.println("|                     |Item 4: Spark plug     |
|Item 4: Drum          |");
		System.out.println("|                     |                       |
|Item 5: Bearings      |");

	System.out.println("|_____|_____|_____
_____|_____|");
		System.out.println("50% off will be given for diagnose with more
than two items");
```

```
                System.out.println("\nEnter model of motorcycle: ");
                model = scan.next();

                System.out.println("\nBraking Problems");
                System.out.print("Quantity of item 1: ");
                quantity1 = scan.nextInt();
                System.out.print("Quantity of item 2: ");
                quantity2 = scan.nextInt();
                System.out.print("Quantity of item 3: ");
                quantity3 = scan.nextInt();
                total1 = (brakecable*quantity1) + (brakepads*quantity2) +
(brakedrums*quantity3);
                System.out.printf("Price: RM %.2f" , total1);
                discount1 = total1*0.5;
                System.out.printf("\nPrice after discount: RM %.2f" , discount1);

                System.out.println("");
                System.out.println("\nBad Throttle Response");
                System.out.print("Quantity of item 1: ");
                quantity4 = scan.nextInt();
                System.out.print("Quantity of item 2: ");
                quantity5 = scan.nextInt();
                System.out.print("Quantity of item 3: ");
                quantity6 = scan.nextInt();
                System.out.print("Quantity of item 4: ");
                quantity7 = scan.nextInt();
                total2 = (carburetor*quantity4) + (airfilter*quantity5) +
(fuelfilter*quantity6) + (sparkplug*quantity7);
                System.out.printf("Price: RM %.2f" , total2);
                discount2 = total2*0.5;
                System.out.printf("\nPrice after discount: RM %.2f" , discount2);

                System.out.println("");
                System.out.println("\nVibrations or jerking");
                System.out.print("Quantity of item 1: ");
                quantity8 = scan.nextInt();
                System.out.print("Quantity of item 2: ");
                quantity9 = scan.nextInt();
                total3 = (shockabsorber*quantity8) + (chainsprocket*quantity9);
                System.out.printf("Price: RM %.2f" , total3);

                System.out.println("");
                System.out.println("\nHigh Fuel Consumption");
                System.out.print("Quantity of item 1: ");
                quantity10 = scan.nextInt();
                System.out.print("Quantity of item 2: ");
                quantity11 = scan.nextInt();
                System.out.print("Quantity of item 3: ");
                quantity12 = scan.nextInt();
                System.out.print("Quantity of item 4: ");
                quantity13 = scan.nextInt();
                System.out.print("Quantity of item 5: ");
                quantity14 = scan.nextInt();
                total4 = (clutchplates*quantity10) + (radials*quantity11) +
(breakshoe*quantity12) + (drum*quantity13) + (bearings*quantity14);
                System.out.printf("Price: RM %.2f" , total4);
                discount3 = total4*0.5;
                System.out.printf("\nPrice after discount: RM %.2f" , discount3);
```

```
            System.out.println(" ");
            System.out.println("\nModel of motorcycle: " + model);
            subtotal = discount1 + discount2 + total3 + discount3;
            System.out.printf("Subtotal: RM %.2f" , subtotal);
            sst = subtotal*0.1;
            System.out.printf("\nSST: RM %.2f" , sst);
            grandtotal = subtotal + sst;
            System.out.printf("\nGrand total: RM %.2f" , grandtotal);
        }

}
```

Output

```
Welcome to System to Calculate Estimated Service Charge
_____________________________________________________________________________
_____________
| Braking problems    | Bad Throttle Response | Vibrations or jerking | High Fuel
Consumption|
|_____________________|_______________________|_______________________|_________
___________|
|Item 1: Brake cable  |Item 1: Carburetor     |Item 1: Shock absorber |Item 1:
Clutch plates |
|Item 2: Brake pads   |Item 2: Air filter     |Item 2: Chain sprocket |Item 2:
Radials       |
|Item 3: Brake drums  |Item 3: Fuel filter    |                       |Item 3:
Break shoe    |
|                     |Item 4: Spark plug     |                       |Item 4:
Drum          |
|                     |                       |                       |Item 5:
Bearings      |
|_____________________|_______________________|_______________________|_________
___________|
50% off will be given for diagnose with more than two items

Enter model of motorcycle:
Yamaha

Braking Problems
Quantity of item 1: 1
Quantity of item 2: 1
Quantity of item 3: 1
Price: RM 132.00
Price after discount: RM 66.00

Bad Throttle Response
Quantity of item 1: 1
Quantity of item 2: 1
Quantity of item 3: 1
Quantity of item 4: 1
Price: RM 86.40
Price after discount: RM 43.20

Vibrations or jerking
Quantity of item 1: 1
Quantity of item 2: 1
Price: RM 101.90

High Fuel Consumption
Quantity of item 1: 1
Quantity of item 2: 1
Quantity of item 3: 1
Quantity of item 4: 1
Quantity of item 5: 1
Price: RM 512.20
Price after discount: RM 256.10

Model of motorcycle: Yamaha
Subtotal: RM 467.20
SST: RM 46.72
Grand total: RM 513.92
```

11. References

Six Common Motorcycle Problems And Solutions. (2013, April 11). Retrieved from BikeBD: https://www.bikebd.com/six-common-motorcycle-problems-and-solutions/

SKIP1013:

INTRODUCTION TO PROGRAMMING

AND PROBLEM SOLVING

(SEMESTER A211)

INDIVIDUAL ASSIGNMENT 1

Topic:
Problem Solving for Vehicle

Subtopic:
Aircraft

System:
Flight Price Ticket System - Display Promotion Package Ticket Price

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Matric No: 284253
Class: A
Lecturer name: Prof Madya Dr. Azman B. Yasin
Submission Date: 20 December 2021

TABLE OF CONTENT

1. Identify the problem

Airline reservation systems are systems that allow an airline to sell their seats. It contains information on schedules and fares and contains a database of reservations (or> passenger name records) and of tickets issued (if applicable). Airline Reservation Systems are supporting the direct contact with the passenger. Airline reservation systems will show every detail of airline schedules, fare tariffs, passenger reservations and ticket records. An airline's direct distribution works within their own reservation system, as well as pushing out information to users. The second type of direct distribution channel are consumers who use the internet or mobile applications to make their own reservations. Airline is generally classified into service classes (e.g. economy, premium economy, business or first class) and any number of fare classes, to which different prices and booking conditions may apply. The price for each sold seat is determined by a combination of the fares and booking conditions.

Airline ticket is a document or electronic record, issued by an airline or a travel agency, that confirms that an individual is entitled to a seat on a flight on an aircraft. The airline ticket may be one of two types: a paper ticket, which comprises coupons or vouchers; and an electronic ticket (commonly referred to as an e-ticket). The ticket, in either form, is required to obtain a boarding pass during check-in at the airport. Then with the boarding pass and the attached ticket, the passenger is allowed to board the aircraft. As we can see, for travel agency itself, they couldn't purchase a bunch of ticket price. They only get to purchase the ticket for individual and separate only. People want to book flight ticket seat in a group and not at an individual seat. But there are no airlines that can give customers any package at family price and group price at the system. Airlines will only sell their tickets to individual seats only. Regardless of the type, tickets contain the following information: the passenger's name, issuing airline, ticket number, the cities between which the ticket is valid for travel, fare. taxes, dates, restrictions on changes, dates for which the ticket is valid.

Gerak Airlines is a flight airline in Malaysia that operates scheduled domestic flights in the country and decided to have promotion deals during the holiday month. They will have promotion deals to their customers according to the special package. Gerak Airlines has trouble calculating the final price of every holiday package and will calculate their price during the deals that have different offers of price in every package. They want to have bundle promotions that will be able to attract more customers in their airways. More people

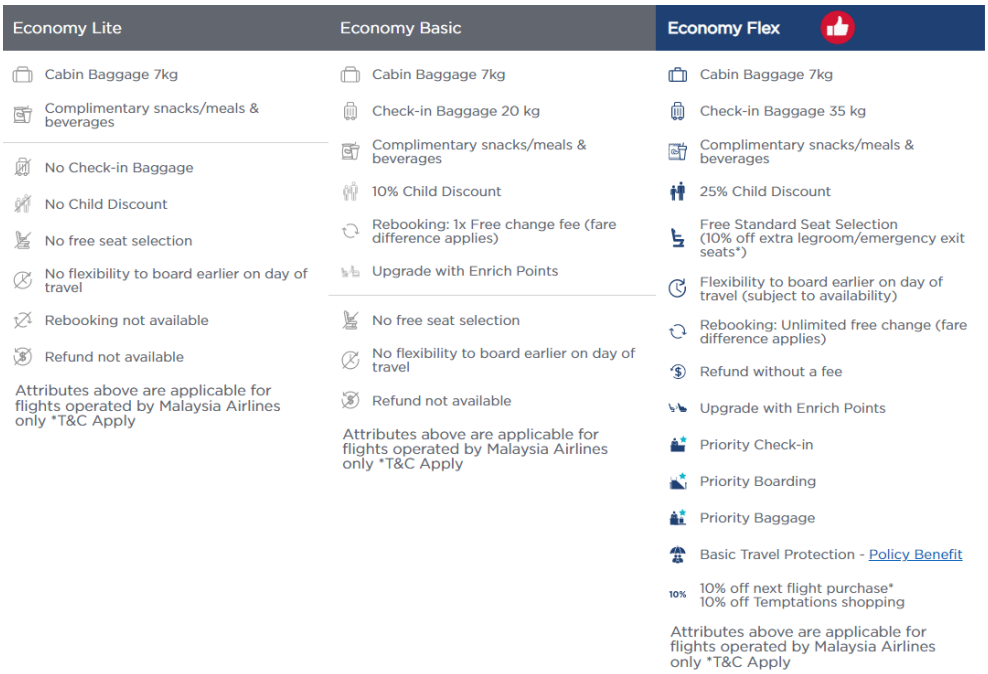
will be attracted to buy tickets in this airline company. Gerak Airlines need a system that will tell the customers the final total price and display all the booking price details after the promotion.

Flight promotion in common airways only gives discount for an individual seat only. They only promote the cut off price for only per pax but not in high amount of pax. Moreover they are usually add charge for foods, baggage during the checkout. The price on sales in the advertisement are not included with other service. Customers might get confuse and didn't get a clear amount of charge at the advertisement.

Here are the example of the promotion on the flight advertisement in Malaysia that are not included the price of food and baggage. They tends to hide the original price with every charges. Other than that, there are no promotion package that provided to the customers. It will be much harder for people travelling in groups.

Advantages of using flight booking system has completely transformed the system of booking tickets. Earlier people have to visit airline company's centers to book tickets and had to wait for hours in the queue. Or they have to book tickets on phone, there also waiting for minutes to complete the booking process. But now with just a few clicks, your ticket is booked. Travelers just have to enter time and location of the destination. It's so easy now to book flights. Travelers can book flights for domestic and overseas location easily from anywhere at any time. Flight Reservation System is a major contributor to the growth of airline and travel industry. It updates inventories of different airline companies real-time. The system will become easier to book tickets, saves time and money, provides every information about flight and send automated receipt ticket details to the customers after the booking. However, the flight reservation ticket system have some disadvantages to allow the customers to continue their purchases. Reliable internet access is required to check reservations and add bookings that are made over the phone.

Here is the example of flight booking system that only offer for an individual package only. They only give option for a person package only. There are no books for the travelers in group.



Problems faced	Elaboration
1. Purchasing ticket problem	- Flight tickets sold for individual price only. - Customers cannot purchase in bundle of tickets.
2. Calculation problem for the package by the administrator	- Every package has its own price and promotion deals. No method of calculation for final price after promotion and before promotion
3. Customers don't have booking details with clear understanding of price details.	- Customers need to know their final price after promotion and choosing their package.

Table 1: Problem faced by Gerak Airlines

2. Understand the problem

- An airline system that can give the passengers choice to have package bookings which easily help a family and a group to book their seat. The package deals will have a cheaper and more affordable price. Customers that have more accompanies following them travelling would be able to purchase the seat at bundle price and can checkout price at once.
- Gerak Airlines needs to have a system that can calculate every package that has a different calculation of price that differs with baggage, food, seat. Every package will have a different price. The packages are 'single package' for a person, 'duo package' for two people and 'Familia package' for 5 people. An extra 10% will be given to the package with more people.
- A system should be able to show to the customers their final price after they choose the package they want. A display will show their final bookings with price details only. Customers get to know their booking price details before choosing any seat.

3. Identify alternative ways to solve the problem

- Display price list tickets and let customers choose their seat individually.

Pros	Cons
-Can choose their seat on at Economy Class Seat	-Could not be able to get any free additional foods and 7kgs baggage price

- Manual calculation for every booking of customers

Pros	Cons
-Able to calculate the price anytime	-Miscalculation after using a calculator and longtime calculation -Take a longer time to have a correct calculation ang have lost data

- Use more workers at the counter

Pros	Cons
- Have a user friendly that can interact with all customers need	-Take time and need to wage workers -Lost the data of customers and privacy of customers bookings

- A system that will calculate the price of every package deal.

Pros	Cons
-Able to promote the ticket at higher quantity of sales -Get free additional foods and baggage -Easier calculation and fast bookings	-Less usage of workers to interact with customers' needs.

- A system can calculate the promotion price and show the final booking details before price and after price

Pros	Cons
-Display a clear ticket price deals to the customers and show the final booking price details -Show customers what they have save during the holiday promotion	-Requires maintenance fees.

Table 2: Advantages and Disadvantages of alternative ways to solve the problems

4. Select the best way to solve the problem from the list of alternative solutions.

- Gerak Airlines can provide a system that will show the price promotions deals during the holiday season. The system will promote the users to get better prices when they purchase more flight tickets. They will increase their promotion during the sales. Customers get to know their final price when purchasing a flight ticket when they purchase a package. For the administration of Gerak Airlines, the system will give them an easier way to calculate every ticket flight of the customers using the system. This is because the system will even calculate the package deals in bundle purchases.

Table 3: An early framework of system before coding

—-WELCOME TO GERAK AIRWAYS — HOLIDAY DECEMBER PROMO DEALS		
INDIVIDUAL PACKAGE	**DUO PACKAGE**	**FAMILIA PACKAGE**
Before Promo Price :RM180 After Promo Price:RM 171.00 (One way per person) - No Food included - No 7kg extra Baggage **EXTRA 5% DISCOUNT**	Before Promo Price:RM450 After Promo Price :Rm382.50 (One way per 2 person) - No food included - Included 7 kg extra baggage **EXTRA 15% DISCOUNT**	Before Promo Price:Rm1020 After Promo Price:Rm765.00 (One way for five person) - Included food - Included 7kg extra baggage **EXTRA 25% DISCOUNT**

GERAK AIRWAYS
FLIGHT PRICE TICKET SYSTEM
HOLIDAY DECEMBER PROMO DEALS
Travel Together, Get Better Deals

Please insert name:
Please insert destination:
Please insert departure date:
Please insert departure time:
Please insert the number of individual packages to book:
Please insert the number of duo package to book:
Please insert the number of familia package to book:

GERAK AIRWAYS
FLIGHT PAYMENT DETAILS

Name:
Destination:
Departure Date:
Departure Time:
Total individual package:
Total duo package:

Total familia package:
Total price BEFORE discount:
Total price AFTER discount:
YOU GET TO SAVE YOUR TICKET FLIGHT IN DECEMBER PROMOTION FOR “RM”
****

YOUR PURCHASE HAVE BEEN SUCCESSFULLY BOOOKED

THANK YOU FOR BOOKING WITH GERAK AIRWAYS

Travel Together, Get Better Deals

****

5. List instructions (steps) that enable you to solve the problem using the selected solution.

1. Calculate single package price which is RM180 for a one-way trip per person. Single package price will not include the foods and baggage price. Single package will only get a 5% discount.
2. Calculate the duo package price which is RM450 for a one-way trip for two people and get included a food price. Baggage will not be included. The Duo package will get an extra 15% discount at the final cutoff price.
3. Calculate the familia package price which is RM1020 for a one-way trip for five people and get included a food price and additional 10kgs baggage. The Familia package will get an extra 25% discount at the final cutoff price.
4. Ask the user to input the booking details which are the name and total of package
5. Calculate the price of the package.
6. Prints the final booking price details with cut off price before and after to the customers

6. Evaluate the solution.

1. Declare variable and its value:

String name;
String destination;
String departureDate;
String departureTime;
int totalIndividualPack, totalDuoPack, totalFamiliaPack;
float individualPrice, duoPrice, familiaPrice;
float individualPrice2,duoPrice2,familiaPrice2;
float foodPrice = 30;
float baggagePrice = 90;
float seatPrice = 180;
int disc1 = 95;
int disc2 = 85;
int disc3 = 75;
float totalIndividual,totalDuo,totalFamilia;
float totalIndividual2,totalDuo2,totalFamilia2;
float totalPrice;
float finalPrice;
floatsavePrice;

2. Declare type of data to every variable using double and float.
3. Use mathematical operations (+ / * / /) to calculate every package price to have additional value and multiply value of the foodPrice, baggagePrice. seatPrice to get the duoPrice: bundlePrice: familiaPrice.
4. Compute the discount price of every package price with each discount; to get the final discountedPrice. (discount (%) * originalPrice = discountedPrice)
5. Output will show the final price (totalPrice) of every package
6. Ask the user the input of their name and their choice of package.
7. Calculate the final price of customers and display it booking price details after and before discount price.
8. Calculate the amount of saving from the promotion of customers and display in booking price details after and before discount price.

Table 4: Calculation Method

Item	Variable	Calculation
Price of Single Package	invidualPrice:	seatPrice
Price of Duo Package	duoPrice:	seatPrice*2 + baggagePrice*2
Price of Familia Package	familiaPrice:	seatPrice*5+baggagePrice*5+ foodPrice*5
Price of Single Package After Discount	invidualPrice2:	(individualPrice * disc1) /100;
Price of Duo Package After Discount	duoPrice2:	(duoPrice *disc2) / 100;
Price of Familia Package After Discount	familiaPrice2:	(familiaPrice * disc3)/100;
Total Price of Single Package After Discount	totalIndividual2	individualPrice2 *totalIndividualPack;
Total Price of Duo Package After Discount	totalDuo2	duoPrice2 * totalDuoPack
Total Price of Familia Package After Discount	totalFamilia2	familiaPrice2 * totalFamiliaPack
Total Price of Individual Package before Discount	totalIndividual;	individualPrice * totalIndividualPack;
Total Price of duo Package before Discount	totalDuo;	duoPrice * totalDuoPack
Total Price of Familia Package before Discount	totalFamilia;	familiaPrice * totalFamiliaPack
Total price BEFORE discount	totalPrice;	totalIndividual + totalDuo +totalFamilia;
Total price AFTER discount	finalPrice;	totalIndividual2 + totalDuo2 +totalFamilia2;
Total price of saving from the promotion	savePrive;	savePrice = totalPrice - finalPrice;

7. Algorithm

Algorithm :
GERAK AIRLINES PRICE PACKAGE SYSTEM
Reserve flight ticket according package

Step 1 : Initialize variable and its value such as; foodPrice, baggagePrice, seatPrice, discount, total pack order, price each package before discount, price each package after discount.

Step 2 : Calculate price of each package before discount and price each package after discount.

Price of package before promotion deals

Single Package: seatPrice
*Duo Package: seatPrice*2 + baggagePrice*2*
*Familia Package: seatPrice*5+baggagePrice*5+ foodPrice*5*

Price of package before promotion deals

*(individualPrice * disc1) /100;*
*(duoPrice *disc2) / 100;*
*(familiaPrice * disc3)/100;*

Step 3 : Display information such as food information, baggage information, an extra discount for the individual package, duo package, familia package and the price of every package before and after discount.

Step 4 : Key in name, destination, departure date, departure time, number of books for individual package, duo package and familia package.

Step 5 : Compute the total payment of each booking with the price of package after the discount.

Price of total booking after promotion deals

totalindividual2= *individualPrice2 *totalIndividualPack;*
*totalDuo2=duoPrice2 * totalDuoPack*
*ftotalFamilia2=amiliaPrice2 * totalFamiliaPack*

Price of total booking before promotion deals

*totalIndividual1=individualPrice * totalIndividualPack;*
*totalDuoPrice * totalDuoPack*
*totalFamiliaPrice * totalFamiliaPack*

Step 6 : Calculate differences between price before promotion and price after promotion.

Total price BEFORE promo

totalIndividual + totalDuo +totalFamilia;

Total price AFTER promo

totalIndividual2 + totalDuo2 +totalFamilia2;

Step 7 : Display the customer flight payment details.

8. Pseudocode

Problem 1: Calculate the price per package for individual package, duo package, and familia package before and after promotion to display for customers **Problem 2:** Calculate the total and price of individual seat, duo package, familia package according to the customers input. **Problem 3:** Display user flight payment and show all the total price before discount and after discount

Table 5: Problem in the system to solve in the pseudocode

Start

//Problem 1:

Read foodPrice = 30;

Read baggagePrice = 90;

Read seatPrice = 180;

Read disc1 = 95;

Read disc2 = 85;

Reas disc3 = 75;

Read individual package;

Calculate individualPrice = seatPrice;

Calculate individualPrice2 = (individualPrice * disc1) /100;

Output individualPrice;

Output individualPrice2;

Read duo package;

Calculate duoPrice = (seatPrice * 2) + (baggagePrice*2);

Calculate duoPrice2 = (duoPrice * disc1) /100;

Output duoPrice;

Output duoPrice2;

Read familia package;

Calculate familiaPrice= (seatPrice * 5) + (baggagePrice*5)+ (foodPrice*5);

Calculate familiaPrice2 = (familiaPrice * disc3)/100;

Output familiaPrice ;

Output familiaPrice2;

//Problem 2:

Output “Please insert name:”

Input name

Output “Please insert destination:”

Input destination

Output “Please insert departure date:”

Input departureDate

Output “Please insert departure time”

Input departureTime

Output “Please insert the number of individual package to book:”

Input totalIndividualPack

Calculate totalIndividual = individualPrice * totalIndividualPack;

Calculate totalIndividual2 = individualPrice2 * totalIndividualPack;

Output Please insert the number of duo package to book:

Input totalDuoPack

Calculate totalDuo= duoPrice * totalDuoPack;

Calculate totalDuo2= duoPrice2 * totalDuoPack;

Output “Please insert the number of familia package to book:”

Input totalFamiliaPack

Calculate totalFamilia = familiaPrice * totalFamiliaPack;

Calculate totalFamilia2 = familiaPrice2 * totalFamiliaPack;

//Problem 3:

Display “No of Order:" +orderNumber;

Display “Name: " +name;

Display “Destination: " +destination;

Display “Departure Date: " +departureDate;

Display “Departure Time: " +departureTime;

Calculate totalPrice = totalIndividual + totalDuo +totalFamilia;

Display “Total price BEFORE discount:”;

Output totalPrice;

Calculate finalPrice = totalIndividual2 + totalDuo2 +totalFamilia2;

Display “Total price AFTER discount:”

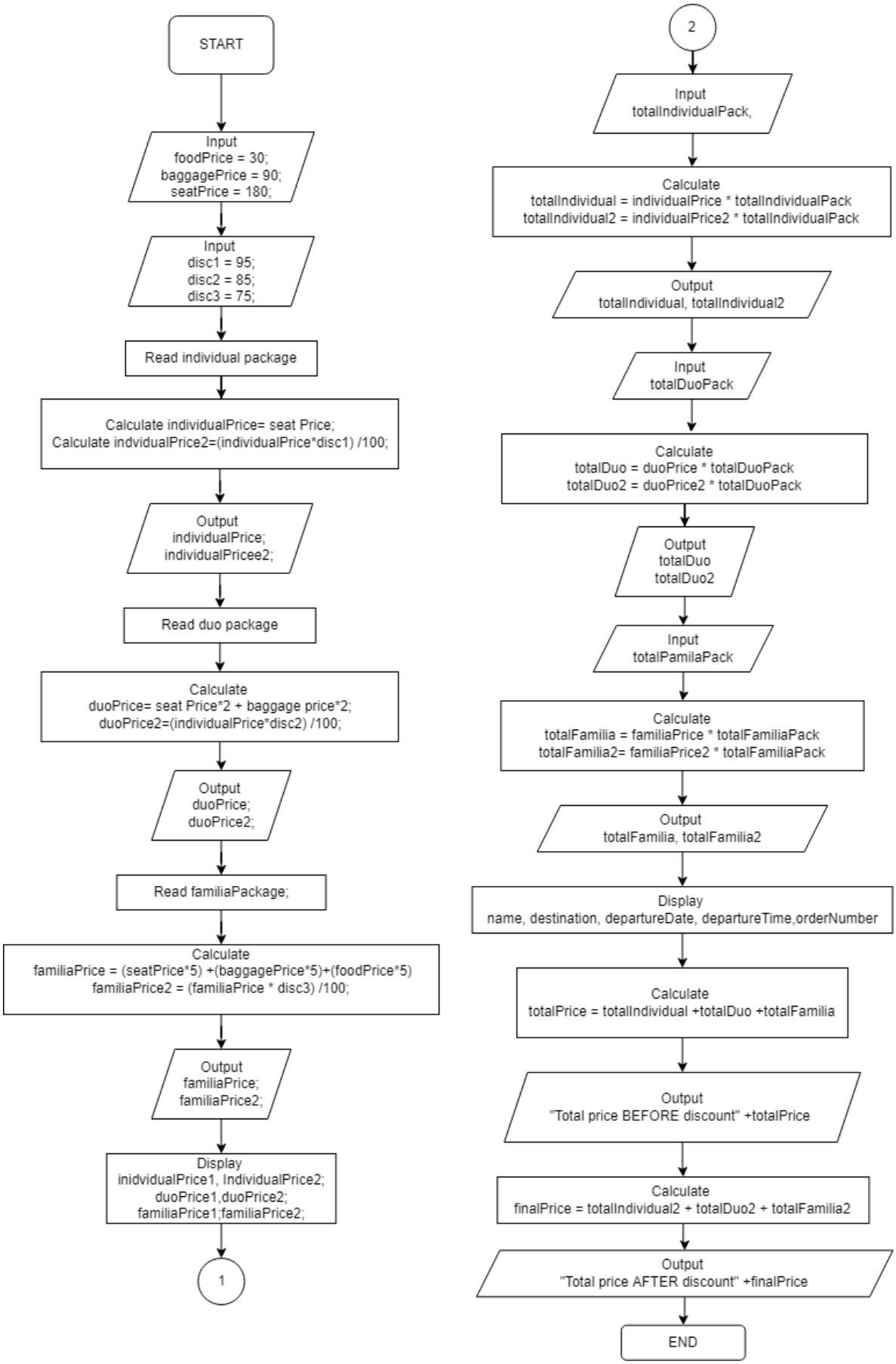
Output finalPrice;

Calculate savePrice= totalPrice- finalPrice;

Output savePrice, Flight Payment Details.

End

9. Flow Chart


START
Input
foodPrice = 30;
baggagePrice = 90;
seatPrice = 180;
Input
disc1 = 95;
disc2 = 85;
disc3 = 75;
Read individual package
Calculate individualPrice= seat Price;
Calculate indvidualPrice2=(individualPrice*disc1) /100;
Output
individualPrice;
individualPricee2;
Read duo package
Calculate
duoPrice= seat Price*2 + baggage price*2;
duoPrice2=(individualPrice*disc2) /100;
Output
duoPrice;
duoPrice2;
Read familiaPackage;
Calculate
familiaPrice = (seatPrice*5) +(baggagePrice*5)+(foodPrice*5)
familiaPrice2 = (familiaPrice * disc3) /100;
Output
familiaPrice;
familiaPrice2;
Display
inidvidualPrice1, IndividualPrice2;
duoPrice1,duoPrice2;
familiaPrice1;familiaPrice2;
1
2
Input
totalIndividualPack,
Calculate
totalIndividual = individualPrice * totalIndividualPack
totalIndividual2 = individualPrice2 * totalIndividualPack
Output
totalIndividual, totalIndividual2
Input
totalDuoPack
Calculate
totalDuo = duoPrice * totalDuoPack
totalDuo2 = duoPrice2 * totalDuoPack
Output
totalDuo
totalDuo2
Input
totalPamilaPack
Calculate
totalFamilia = familiaPrice * totalFamiliaPack
totalFamilia2= familiaPrice2 * totalFamiliaPack
Output
totalFamilia, totalFamilia2
Display
name, destination, departureDate, departureTime,orderNumber
Calculate
totalPrice = totalIndividual +totalDuo +totalFamilia
Output
"Total price BEFORE discount" +totalPrice
Calculate
finalPrice = totalIndividual2 + totalDuo2 + totalFamilia2
Output
"Total price AFTER discount" +finalPrice
END

10. Coding - Numerical Computation & Expression

Table 6: Coding of the system

```
package assignment1;

import java.util.Scanner;

public class FlightPriceTicketSystem {

	public static void main(String[] args) {
		// TODO Auto-generated method stub

		//Declare variable and its value
		String name;
		String destination;
		String departureDate;
		String departureTime;
		int totalIndividualPack, totalDuoPack, totalFamiliaPack;
		float individualPrice, duoPrice, familiaPrice;
		float individualPrice2,duoPrice2,familiaPrice2;
		float foodPrice = 30;
		float baggagePrice = 90;
		float seatPrice = 180;
		int disc1 = 95;
		int disc2 = 85;
		int disc3 = 75;
		float totalIndividual,totalDuo,totalFamilia;
		float totalIndividual2,totalDuo2,totalFamilia2;
		float totalPrice;
		float finalPrice;
		float savePrice;
		int orderNumber = (int)(Math.random() * 10000);

		//Calculate every package before promotion
		individualPrice = seatPrice;
		duoPrice = (seatPrice * 2) + (baggagePrice * 2);
		familiaPrice= (seatPrice * 5) + (baggagePrice * 5) + (foodPrice *
5);

		//Calculate every package after promotion
		individualPrice2 = (individualPrice * disc1 ) /100;
		duoPrice2= (duoPrice *disc2) / 100;
		familiaPrice2 = (familiaPrice * disc3)/100;

		//Display package deals during the holiday promotion deals
		//Display original price and after promotion price
		System.out.println("\n                                    WELCOME TO
GERAK AIRWAYS                          ");
		System.out.println("                                  HOLIDAY DECEMBER
PROMO DEALS                          ");
		System.out.println("                                Travel Together, Get
Better Deals                        ");
		System.out.print(" ");

	System.out.println("_____________________________________________________________
_____________________________" );
		System.out.println("|    INDIVIDUAL PACKAGE     |         DUO
PACKAGE       |        FAMILIA PACKAGE       |");
```

```
      System.out.println("|_____________________________|_____________________________
_|_____________________________|");
            System.out.printf("|BEFORE PROMO PRICE:RM%.2f" ,individualPrice);
            System.out.printf("|BEFORE PROMO PRICE:RM%.2f" ,duoPrice);
            System.out.printf("|BEFORE PROMO PRICE:RM%.2f" ,familiaPrice);
            System.out.print("  |");
            System.out.println("");
            System.out.printf("|AFTER PROMO PRICE:RM %.2f", individualPrice2);
            System.out.printf("|AFTER PROMO PRICE :RM%.2f",duoPrice2);
            System.out.printf("|AFTER PROMO PRICE:RM%.2f " ,familiaPrice2 );
            System.out.print("   |");
            System.out.println("");
            System.out.println("|      (ONE WAY PER PERSON) |     (ONE WAY TWO
PERSON)  |    (ONE WAY FIVE PERSON)     |");
            System.out.println("|      -No food included    |    -Not food
included     |    - Included food          |");
            System.out.println("|      -No 7kgs baggage     |    -7kgs baggage
included |    - 7kgs baggage included   |");
            System.out.println("|                           |
|                           |" );
            System.out.println("|    EXTRA 5% DISCOUNT      |    EXTRA 15%
DISCOUNT     |       EXTRA 25% DISCOUNT     |");

      System.out.println("|_____________________________|_____________________________
_|_____________________________|" );

            //User input the information using Scanner
            System.out.println("\n\n                                        GERAK
AIRWAYS                                 ");
            System.out.println("                                FLIGHT PRICE TICKET
SYSTEM                                ");
            System.out.println("                                HOLIDAY DECEMBER
PROMO DEALS                             ");
            System.out.println("                            Travel Together, Get
Better Deals                          ");

            Scanner input = new Scanner(System.in);
            System.out.println("");
            System.out.print(" Please insert name: ");
            name=input.nextLine();

            System.out.print(" Please insert destination: ");
            destination=input.nextLine();

            System.out.print(" Please insert departure date: ");
            departureDate=input.nextLine();

            System.out.print(" Please insert departure time: ");
            departureTime=input.nextLine();

            System.out.print(" Please insert the number of individual package to
book: ");
            totalIndividualPack=input.nextInt();

            System.out.print(" Please insert the number of duo package to book:
");
            totalDuoPack=input.nextInt();
```

```
            System.out.print(" Please insert the number of familia package to
book: ");
            totalFamiliaPack=input.nextInt();

            //Calculate total price input from the users
            //Calculate to show the differences of before after total promotion
price
            totalIndividual2 = individualPrice2 * totalIndividualPack;
            totalDuo2= duoPrice2 * totalDuoPack;
            totalFamilia2 = familiaPrice2 * totalFamiliaPack;
            totalIndividual = individualPrice * totalIndividualPack;
            totalDuo= duoPrice * totalDuoPack;
            totalFamilia = familiaPrice * totalFamiliaPack;
            totalPrice = totalIndividual + totalDuo +totalFamilia;
            finalPrice = totalIndividual2 + totalDuo2 +totalFamilia2;
            savePrice = totalPrice - finalPrice;

      System.out.println("_____________________________________________________
_____________________________");
            //Display user flight payment details
            System.out.println("\n                                        GERAK
AIRWAYS                                  ");
            System.out.println("                                    FLIGHT PAYMENT
DETAILS                                ");
            System.out.println("No of Order:" +orderNumber);
            System.out.println("\nName: " +name);
            System.out.println("Destination: " +destination);
            System.out.println("Departure Date: " +departureDate);
            System.out.println("Departure Time: " +departureTime);
            System.out.println("Total individual package: "
+totalIndividualPack);
            System.out.println("Total duo package: " +totalDuoPack);
            System.out.println("Total familia package: " +totalFamiliaPack);
            System.out.printf("Total price BEFORE discount: RM%.2f"
,totalPrice);
            System.out.println("");
            System.out.printf("Total price AFTER discount: RM%.2f" ,finalPrice);
            System.out.println("");
            System.out.printf("CONGRATULATIONS!! YOU GET TO SAVE YOUR TICKET
FLIGHT FOR DECEMBER PROMOTION WITH RM%.2f" ,savePrice);

      System.out.println("\n*****************************************************
*****************************");
            System.out.println("\n                        YOUR PURCHASE HAVE BEEN
SUCCESSFULLY BOOOKED                  ");
            System.out.println("\n                           THANK YOU FOR BOOKING
WITH GERAK AIRWAYS                    ");
            System.out.println("\n                              Travel Together, Get
Better Deals                          ");

      System.out.println("\n*****************************************************
*****************************");

      System.out.println("_____________________________________________________
_____________________________");

      }

}
```

Table 7: Output of the system

```
                                WELCOME TO GERAK AIRWAYS
                              HOLIDAY DECEMBER PROMO DEALS
                            Travel Together, Get Better Deals
 _____________________________ _____________________________ _____________________________
|    INDIVIDUAL PACKAGE       |         DUO PACKAGE         |        FAMILIA PACKAGE      |
|_____________________________|_____________________________|_____________________________|
|BEFORE PROMO PRICE:RM180.00|BEFORE PROMO PRICE:RM540.00|BEFORE PROMO PRICE:RM1500.00  |
|AFTER PROMO PRICE:RM 171.00|AFTER PROMO PRICE :RM459.00|AFTER PROMO PRICE:RM1125.00   |
|      (ONE WAY PER PERSON) |     (ONE WAY TWO PERSON)  |    (ONE WAY FIVE PERSON)    |
|      -No food included    |    -Not food included     |    - Included food          |
|      -No 7kgs baggage     |    -7kgs baggage included |    - 7kgs baggage included  |
|                           |                           |                             |
|    EXTRA 5% DISCOUNT      |    EXTRA 15% DISCOUNT     |       EXTRA 25% DISCOUNT    |
|___________________________|___________________________|_____________________________|


                                    GERAK AIRWAYS
                                FLIGHT PRICE TICKET SYSTEM
                              HOLIDAY DECEMBER PROMO DEALS
                            Travel Together, Get Better Deals

 Please insert name: Ezurin
 Please insert destination: Alor Setar
 Please insert departure date: 21.12.21
 Please insert departure time: 12.00pm
 Please insert the number of individual package to book: 1
 Please insert the number of duo package to book: 2
 Please insert the number of familia package to book: 3
_____________________________________________________________________________________

                                    GERAK AIRWAYS
                                FLIGHT PAYMENT DETAILS
No of Order:2212

Name: Nur Ezurin Farisha
Destination: Alor Setar
Departure Date: 21.12.21
Departure Time: 12.00pm
Total individual package: 1
Total duo package: 2
Total familia package: 3
Total price BEFORE discount: RM5760.00
Total price AFTER discount: RM4464.00
CONGRATULATIONS!! YOU GET TO SAVE YOUR TICKET FLIGHT IN DECEMBER PROMOTION FOR RM1296.00
*****************************************************************************

                    YOUR PURCHASE HAVE BEEN SUCCESSFULLY BOOOKED

                       THANK YOU FOR BOOKING WITH GERAK AIRWAYS

                          Travel Together, Get Better Deals

*****************************************************************************
_____________________________________________________________________________________
```

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SKIP 1013
INTRODUCTION TO PROGRAMMING AND PROBLEM SOLVING
(SEMESTER A211)

INDIVIDUAL ASSIGNMENT 1

Theme:
Problem Solving for Auto/Vehicles

Title:
Performance Car Tuning System

Submitted to:
PROF.MADYA DR. AZMAN B YASIN

Prepared by:

Name:	Shreethaar A/L Arunagirinathan
Matric No:	284262
Group:	A

Table of Contents

1. Identify the problem

In today's automotive industry with the rapid improvement in technology helps to improve the performance of a car. With the invention of ECU (Electronic Control Unit), which is a small device in a car that is responsible for controlling a function of a car. For instance, ECU controls the fuel supply, air management system, fuel injection and ignition. Hence, modern car tuning heavily involves ECU which provides 15% or more performance from the factory standard. However, most of the time when a car is being tuned, it has a high potential of engine stress increase and damaging other mechanical components connected to the engine. Car tuning is the modification of a car to optimise it for a different set of performance requirements from those it was originally designed to meet. Most commonly this is a higher engine performance and dynamic handling characteristic but cars may also be altered to provide better fuel economy or smoother response. The goal when tuning is the improvement of a vehicle's overall performance in response to the user's needs. Often, tuning is done at the expense of emissions performance, component reliability and occupant comfort.

When tuning, some users may have some incorrect thoughts which may lead to them fitting the wrong parts for their needs. In the end, it will cause either engine to blow up or damage it. For this reason, it is important for the user to know the right parts and which are necessarily needed for them to achieve their desired performance. For performance purpose tuning, there are 3 different stages of tuning modifications. The first stage, known as stage 1 modification, which can be added in isolation. This means that a true stage 1 modification part does not require any other engine modifications to get it to work. While other mods can help to raise the power gains and realize the full potential of the mod that are not mandatory. Typically stage 1 modifications are generally a straightforward DIY fit and should work on a standard engine that is in good condition. Some examples of stage 1 mods include, induction kits, panel air filters, sports exhaust, fuel pressure regulators, a simple engine remap or timing changes, blow-off valves or diverters and the like. Many stage 1 modifications will raise the peak power, but you might sacrifice some low end power, so effectively is moving the power band rather than just adding power. For the next

stage is known as stage 2, these stage modifications offer large power gains than stage 1 but will usually require additional work or other parts if want it all to work to reliably. A stage 2 mod is usually a DIY fit but many will require specialist knowledge and tools. This is because the addition of a larger or hybrid turbo which require a remap and fuelling upgrades as well as potential engine strengthening, fast road cams which need some engine dismantling and will need to be fitted with followers or lifters but ideally the engine will need to be remapped and supercharger kits which need air intake, exhaust and mapping modifications before all the components work together. Lastly, stage 3 modification is regarded by most as a track day or motor sport modification. It is like stage 2 modifications, they will also need other modifications to support them but usually far from ideal for road use. For instance, racing brakes can tolerate extremely high temperature but they are pretty useless while cool. Moreover, heavy duty clutch can be off or on their nature and make driving in slow traffic nearly impossible.

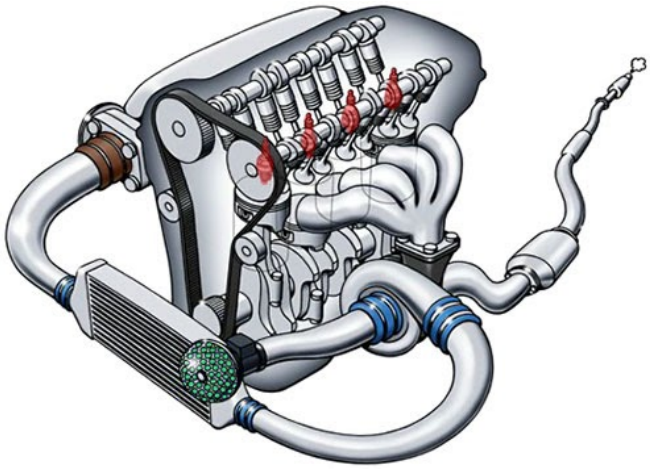

Figure 1: Turbocharged engine

Cars will not become fast by simply throwing parts at it. It is important to understand your own requirements and then tune to suit. This can also be applied to increasing engine power also. There are many routes to obtaining more power but depending on whether you want big peak power or want low engine speed torque for comfortable street driving, the choice of parts will change along with the order in which each process must be completed. In order to efficiently know what course to follow, it is important to understand how an engine and its components work.

Table 1: Details of the engine parts for tuning

Part of the engine	Mechanism	Tuning
Air Cleaner/Filter	Filters out and removes dust and debris from the air which flows int the engine. Most standard air filters are located within a box in the engine bay.	Replacement of the air filter or removal of the complete air box in favour of an open filter is possible. It is possible to further increase intake efficiency by the air inlet pipes with a less restrictive item.
Air Flow Meter	A sensor which measures the amount of air flowing int the engine. The Engine's Computer (ECU) uses this information to determine the correct amount of fuel which is required. There are several methods of measurement including “L Jetro” and “Hot Wire” types.	Replacing the air flow meter with a large volume type will allow for high power use. It is also possible to remove the restrictive air flow meter in favour of a “D Jetro (Airflow less)” setup. In this situation a high performance engine management system is necessary
Turbocharger	Uses exhaust gas pressure to rotate a turbine. This turbine is connected to a compressor which send compressed air into the engine. This allows even small displacement engines to produce high power.	The easiest turning is to raise turbo boost pressure. For higher power, changing to a larger turbo becomes a more suitable option. It is also possible to add a turbo to a vehicle which may not already have one through the use of a “bolt on turbo kit”.
Intercooler	A device designed to reduce the temperature of which from the turbocharger. As air is compressed, it is also heated which reduces density. The intercooler reduces this temperature to oxygen content of the air.	Increasing intercooler volume and moving the intercooler to a location with increased air flow such as in the center of the bumper (often referred to as from mount). There is also the option of using a water spray to further increase cooling efficiency.
Exhaust manifold	Collects the exhaust gasses from each cylinder and brings them together. The length and way that the joints are designed can greatly affect engine performance especially on naturally aspirated engines.	Equalising the length of the pipe from each cylinder by using an equal length manifold with higher exhaust efficiency is most common. With turbocharged engines, it may be necessary to change the manifold when turbos are charged

In order to increase intake efficiency, the most important thing is to remove anything that could become a restriction and guide air smoothly into the engine. However, the stock air cleaner is designed to reduce intake noise and to prevent the filter from being blocked over a long period of use under a variety of conditions. This makes the stock air intake system very inefficient from a performance point of view.

There is also a myth about tuning that states it will greatly affect more fuel consumption. That is fully true but with proper tuning using quality camshafts and engine valves, it will get more horsepower and less fuel consumption.

The factory makes numerous compromises in the design process. They have to follow the principle of standardization in order to achieve an optimal balance between investment and quality, so they put the same aggregate, with certain modifications, into a great number of models. This does not mean that tuning is bad for the car, is just that it is not cost-efficient enough for the factory to commit to tuning.

Table 2: Problems faced when tuning a car

Problems faced	Elaboration
1. Wrong assumption made by the user regarding tuning.	-Have the worries that the car will reduce in reliability and more fuel consumption.
2. Not enough information and knowledge about tuning.	-Not enough resources or comparisons of each tuning part for the car.
3. Factory tuning does not satisfy the user.	-User wants to have more performance from the factory standard.

2. Understand the problem

EvoClub Tuning workshop is an expert in tuning performance cars. They have a variety of packages that are specified for that particular model and have tested through and through so that it guarantees the car's performance and reliability plus customers' satisfaction. They wanted to create a system for it easy for the customers to understand and know what are the components are being installed and the result of increment in performance. Unlike other tuner workshops, they would not make detailed research regarding the parts that are installed in the car. Moreover, after the hardware installation in the car, it is very crucial for the tuner to use software to overlay the factory standard software. This system is created for the customers to know different parts and customization will deliver different performance upgrades. This system is able to give customers the to choose their desired tuning upgrades based on their budget.

In this system, the user must know the details of their car and the engine specifications and information so that it is useful for the system to calculate the expected output in the end after the car is tuned. Hence, the user would also know what are the components that are fitted in the car and the performance that able to contribute individually. With that, the user would be able to understand the dynamics and efficiency of the engine. Moreover, the powerband of the engine would be tuned to suit to needs of the user depends whether wanted to be more aggressive or linear in power delivery.

For calculating the output of the engine, a formula is applied in order to know the maximum RPM (Revolution Per Minute) of the engine. Besides United States of America, all parts of the world uses Newton Meter (Nm) as a standard measurement for measuring the torque of the engine. So with that, the system would convert the torque figures in Newton-Meter to Pound-feet by multiply to 0.73756.

3. Identify alternative ways to solve the problem

a. Verbally explain the tuning customisation to the customer

Pros	Cons
● Customers would appreciate face-to-face interaction and explaination from a human	● Customers will only able get abstract idea about tuning and would not know what components are installed for the tuning upgrade

b. Create a catalogue for customers about tuning customisation

Pros	Cons
● Customers would be able to compare different packages and have a concrete idea of their desired performance result after tuning	● Additional expenses for printing catalogue

c. Having the expectations on customers where they did their research and understanding before tuning their car

Pros	Cons
● Customers would not have the confusion and uncertainties regarding tuning their car	● Customers may be unsatisfied of the performance increment as it sometimes does not meet to customers' expectations

d. Build a system which shows different tuning packages and the final output after the car being tuned

Pros	Cons
● Low maintenance and able to develop the system in-house	● Limited number of customization provided by tuner workshop

4. Select the best way to solve the problem from the list of alternative solutions.

From the above solutions, EvoClub Tuning Workshop would choose to build a system for car tuning to solve the problem. At first, the system is able to be developed in-house which saves from costing and hiring someone. The system provides a backup system to prevent any unexpected interruptions or mishaps. The system also able to reduce human errors and minimizing the time from solving human errors. Moreover, the system will be able to calculate the latest engine output of the car after being tuned and let customers have confidence before and after the car was tuned.

Table 3: List of packages and the performance output increment

Package 3 (Torque Performance)		
Takeda Momentum Cold Air Intake System	17HP+	36NM+
Bladerunner Intercooler Hot and Cold Side	8HP+	15NM+
Wagner Tuning Competition Intercooler Kit	32HP+	50NM+
Takeda Twisted Steel Down-pipe	26HP+	37NM+
Takeda Stainless Steel Cat-Back Exhaust	10HP+	22NM+
Takeda Twisted Steel Mid-pipe	13HP+	18NM+
Hondata FlashPro	42HP+	89NM+
Total Output (Horsepower/Torque)	**148HP+**	**267NM+**

5. List instructions (steps) that enable you to solve the problem using the selected solution

i. User input the car and engine information

ii. System will calculate the maximum engine RPM redline based on the input of horsepower and torque of the engine.

iii. System will show the information which the user inserted as a confirmation.

iv. System will show the Stage 2 tuning package and will calculate the total increment of output in terms of horsepower and torque

v. System will calculate the result of the total engine horsepower, torque and the maximum RPM after the tuning is installed.

6. Evaluate the solution

i. Declare the variables for using integer, double and string.

ii. Input the information of the car and engine output.

iii. System will give output and calculate the maximum engine RPM based on the horsepower and torque figures.

iv. System will show the stage 2 tuning package from Torque Performance

v. System will calculate the total output increment combined from all the components from the package

vi. System will calculate the new engine performance by showing the increment of horsepower, torque and RPM redline

Formula for calculating horsepower, torque and RPM:

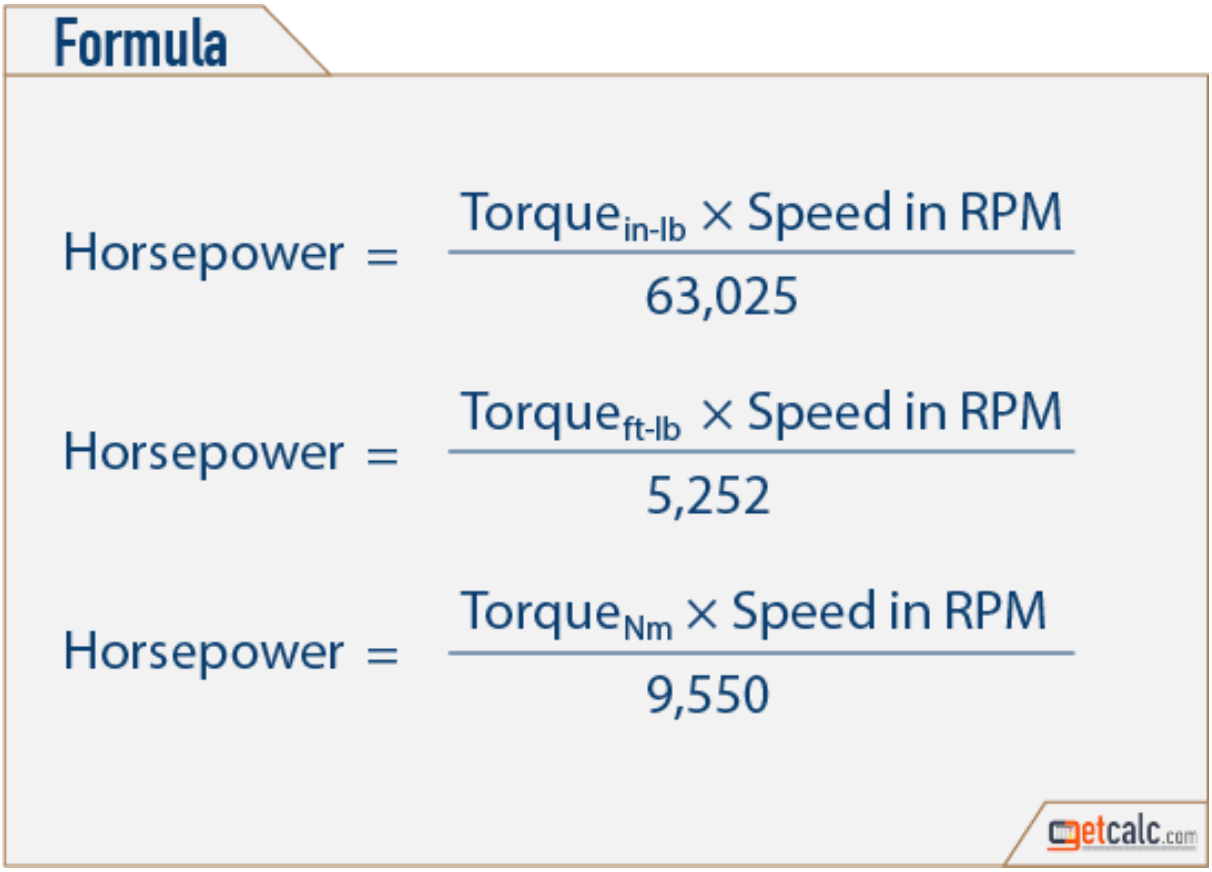

Figure 2: Formula calculating horsepower

7. Algorithm

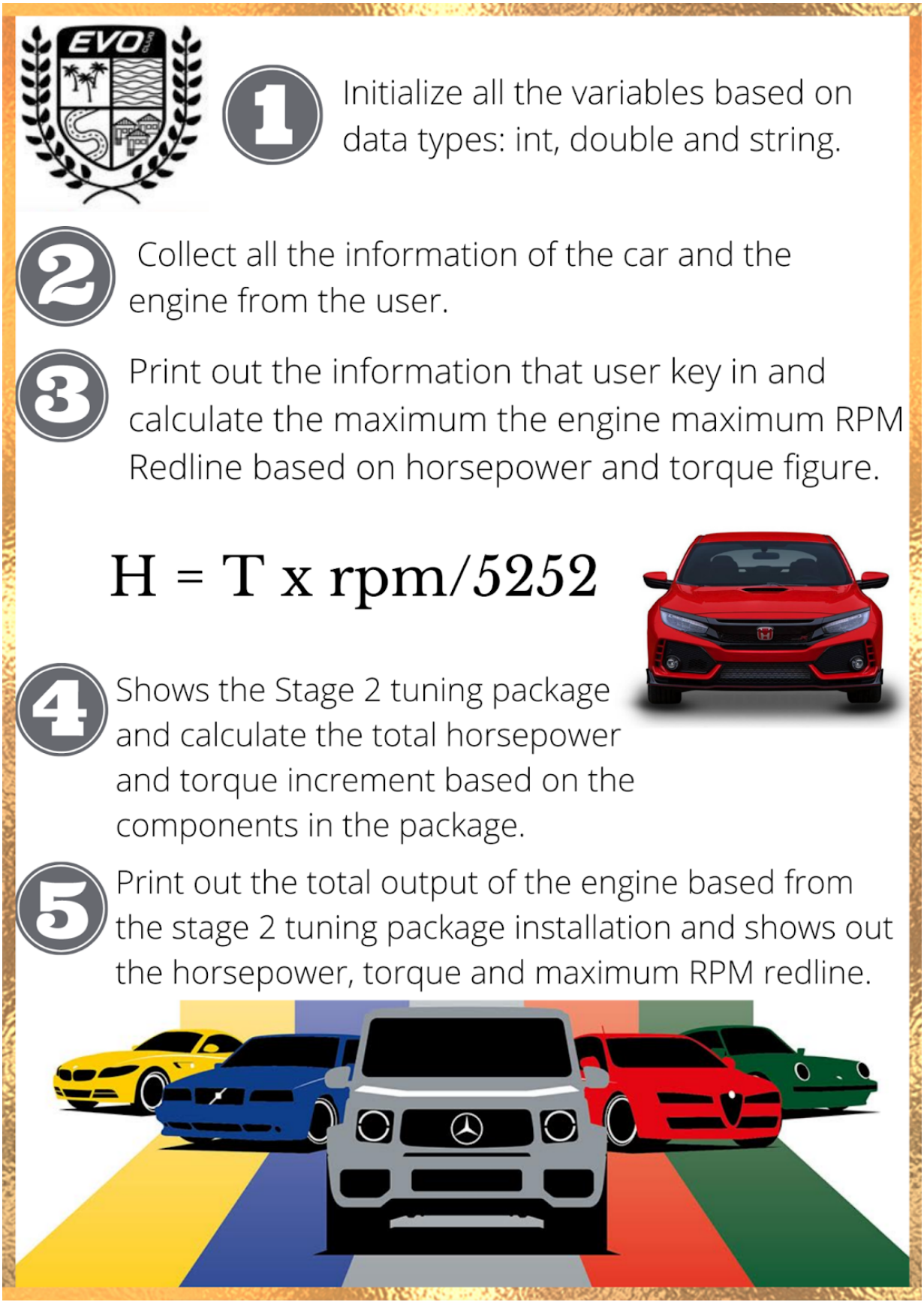

Figure 3: Algorithm

8. Pseudocode

- A detailed yet readable description of what a computer program does
- Expressed in a formally-styled natural language rather than in a programming language
- A detailed step in the process of developing a program

Problem 1: Calculate the maximum RPM (Revolution Per Minute) of the engine based on the horsepower and torque.
Horsepower = Torque x RPM / 5,252
Problem 2: Calculate the total amount of horsepower and torque for the tuning package.
Problem 3: Calculate the engine's horsepower, torque and maximum RPM redline after being tuned.
Start
Read packageIntakeHP=17
Read packageIntakeTorque=36
Read packageHotColdPipeHP=8
Read packageHotColdPipeTorque=13
Read packageIntercoolerHP=32
Read packageIntercoolerTorque=53
Read packageDownpipeHP=36
Read packageDownpipeTorque=37
Read packageCatBackExhaustHP=14
Read packageCatBackExhaustTorque=22
Read packageMidpipeHP=15
Read packageMidpipeTorque=20
Read packageECUHP=45
Read packageECUTorque=79
ReadpackageTotalOutputHP=
(packageIntakeHP+packageHotColdPipeHP+packageIntercoolerHP+packageDownpipeHP+packageCatBackExhaustHP+packageMidpipeHP+packageECUHP);

packageTotalOutputTorque=(packageIntakeTorque+packageHotColdPipeTorque+pa

ckageIntercoolerTorque+packageDownpipeTorque+packageCatBackExhaustTorque
+packageMidpipeTorque+packageECUTorque);
Input carBrand
Input carModel
Input carManufacturedYr
Input engineCode
Input engineSpec1, engineSpec2, engineSpec3
Input engineCurrentHP
Input engineCurrentTorque
Calculate
engineMaxRPM=((engineCurrentHP/(engineCurrentTorque*0.73756)*5252))
Output engineMaxRPMString
Output packageIntakeHP
Output packageIntakeTorque
Output packageHotColdPipeHP
Output packageHotColdPipeTorque
Output packageIntercoolerHP
Output packageIntercoolerTorque
Output packageDownpipeHP
Output packageDownpipeTorque
Output packageCatBackExhaustHP
Output packageCatBackExhaustTorque
Output packageMidpipeHP
Output packageMidpipeTorque
Output packageECUHP
Output packageECUTorque
Output packageTotalOutputHP
Output package TotalOutputTorque
Calculate newEngineHP=engineCurrentHP+packageTotalOutputHP
Calculate newEngineTorque=ngineCurrentTorque+packageTotalOutputTorque
Calculate
newEngineRPMRedline=((newEngineHP/(newEngineTorque*0.73756)*5252)
Output newEngineHP
Output newEngineTorque

Output newEngineRPMRedlineString

End

9. Flowchart

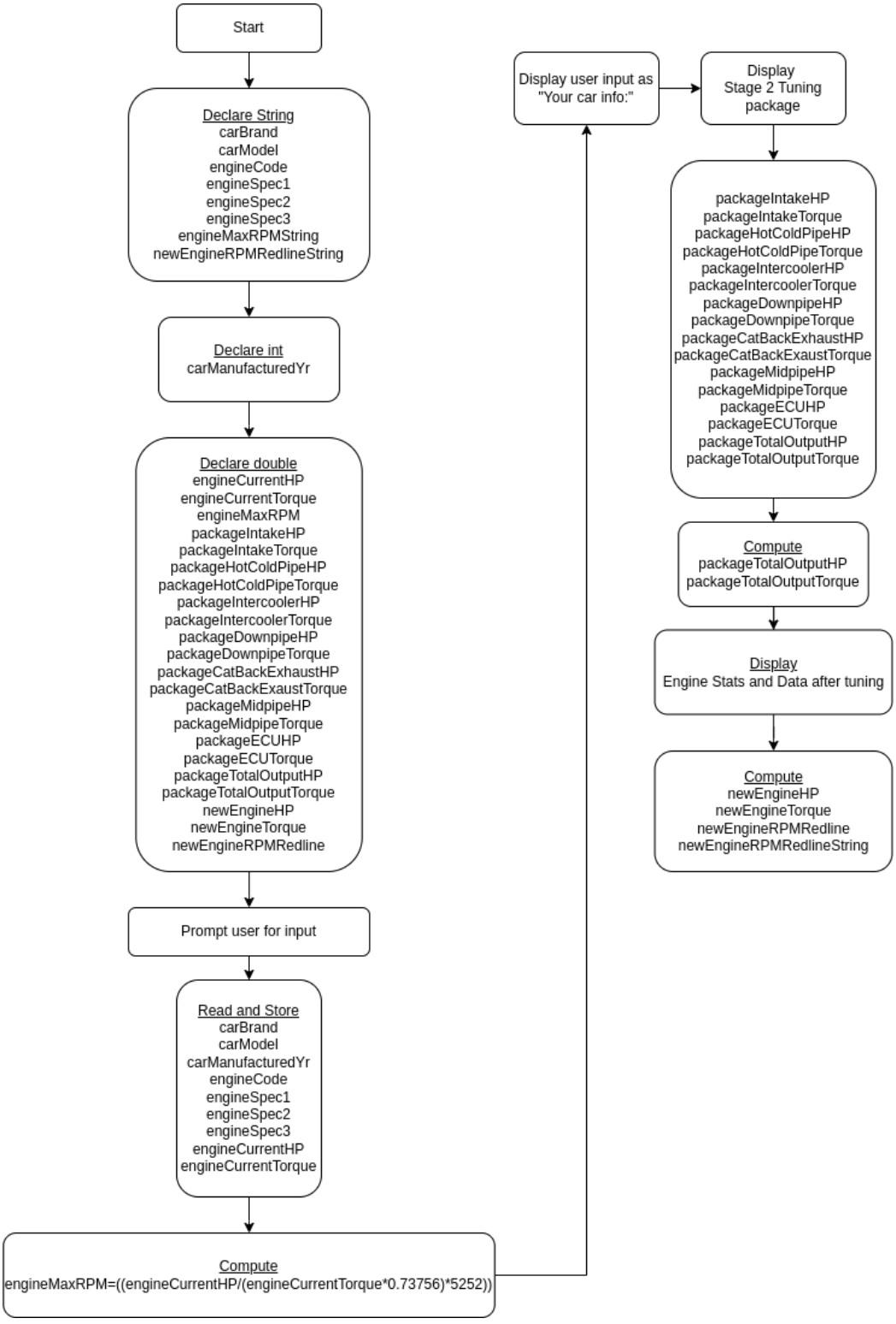

Figure 4: Flowchart of coding

10. Coding

Input Coding

```
package assignment1;
import java.util.Scanner;
public class CarProbSolution {
	public static void main(String[] args) {

		Scanner sc=new Scanner(System.in);
		String
carBrand,carModel,engineCode,engineSpec1,engineSpec2,engineSpec3,engineMa
xRPMString,newEngineRPMRedlineString;
		int carManufacturedYr;
		double
engineCurrentHP,engineCurrentTorque,engineMaxRPM,packageIntakeHP,packageIn
takeTorque,packageHotColdPipeHP,packageHotColdPipeTorque,

packageIntercoolerHP,packageIntercoolerTorque,packageDownpipeHP,packageDow
npipeTorque,packageCatBackExhaustHP,

packageCatBackExhaustTorque,packageMidpipeHP,packageMidpipeTorque,packag
eECUHP,packageECUTorque,packageTotalOutputHP,packageTotalOutputTorque,
		newEngineHP,newEngineTorque,newEngineRPMRedline;
		packageIntakeHP=17;
		packageIntakeTorque=36;
		packageHotColdPipeHP=8;
		packageHotColdPipeTorque=13;
		packageIntercoolerHP=32;
		packageIntercoolerTorque=53;
		packageDownpipeHP=36;
		packageDownpipeTorque=37;
		packageCatBackExhaustHP=14;
		packageCatBackExhaustTorque=22;
		packageMidpipeHP=15;
```

```
                packageMidpipeTorque=20;
                packageECUHP=45;
                packageECUTorque=79;

packageTotalOutputHP=(packageIntakeHP+packageHotColdPipeHP+packageIntercoolerHP+packageDownpipeHP+packageCatBackExhaustHP+packageMidpipeHP+packageECUHP);

packageTotalOutputTorque=(packageIntakeTorque+packageHotColdPipeTorque+packageIntercoolerTorque+packageDownpipeTorque+packageCatBackExhaustTorque+packageMidpipeTorque+packageECUTorque);

                System.out.println("Welcome to EvoClub Tuning Workshop");
                System.out.println("Enter the details and specifications of the car");
                System.out.println("Car Brand:");
                carBrand=sc.next();
                System.out.println("Car Brand: "+carBrand);
                System.out.println("Car Model:");
                carModel=sc.next();
                System.out.println("Car Model: "+carModel);
                System.out.println("Car Manufactured Year:");
                carManufacturedYr=sc.nextInt();
                System.out.println("Car Manufactured in "+carManufacturedYr);
                System.out.println("Engine Code:");
                engineCode=sc.next();
                System.out.println("Engine Code: "+engineCode);
                System.out.println("Engine Spec(Capacity,Arrangement of Cylinders, Type of aspiration):");
                engineSpec1=sc.next();
                engineSpec2=sc.next();
                engineSpec3=sc.next();
                System.out.println("Engine Spec: "+engineSpec1+" "+engineSpec2+" "+engineSpec3);j
                System.out.println("Current Engine Horsepower:");
```

```
		engineCurrentHP=sc.nextDouble();
		System.out.println("Current Engine Horsepower: "+engineCurrentHP+"HP");
		System.out.println("Current Engine Torque(Nm):");
		engineCurrentTorque=sc.nextDouble();
		System.out.println("Current Engine Torque: "+engineCurrentTorque+"Nm");

engineMaxRPM=((engineCurrentHP/(engineCurrentTorque*0.73756)*5252));
		engineMaxRPMString=("Current Engine Max RPM Redline: "+(String.format("%.2f",engineMaxRPM))+"RPM");
		System.out.println(engineMaxRPMString);
		System.out.println();

System.out.println(">>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>");
		System.out.println("|Your car info:                    |");
		System.out.println("|Car Brand: "+carBrand+"                    |");
		System.out.println("|Car Model: "+carModel+"                    |");
		System.out.println("|Car Manufactured Year: "+carManufacturedYr+"
|");
		System.out.println("|Engine Code: "+engineCode+"                    |");
		System.out.println("|Engine Spec: "+engineSpec1+","+engineSpec2+","+engineSpec3+"        |");
		System.out.println("|Current Engine Horsepower: "+engineCurrentHP+"
|");
		System.out.println("|Current Engine Torque(Nm): "+engineCurrentTorque+"        |");
		System.out.println("|"+engineMaxRPMString+"|");

System.out.println("<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<");
		System.out.println();

System.out.println("--------------------------------------------------------------------");
```

```
                System.out.println("|Stage 2 Tuning Package: Torque Performance
|");
                System.out.println("|Takeda Momentum Cold Air Intake System:
"+packageIntakeHP+"HP"+", "+packageIntakeTorque+"Nm          |");
                System.out.println("|Bladerunner Intercooler Hot and Cold Side:
"+packageHotColdPipeHP+"HP"+", "+packageHotColdPipeTorque+"Nm          |");
                System.out.println("|Wagner Tuning Competition Intercooler Kit:
"+packageIntercoolerHP+"HP"+", "+packageIntercoolerTorque+"Nm          |");
                System.out.println("|Takeda Twisted Steel Down-pipe:
"+packageDownpipeHP+"HP"+", "+packageDownpipeTorque+"Nm                |");
                System.out.println("|Takeda Stainless Steel Cat-Back Exhaust:
"+packageCatBackExhaustHP+"HP"+",  "+packageCatBackExhaustTorque+"Nm
|");
                System.out.println("|Takeda Twisted Steel Mid-pipe:
"+packageMidpipeHP+"HP"+", "+packageMidpipeTorque+"Nm                |");
                System.out.println("|Hondata Flash Pro ECU:
"+packageECUHP+"HP"+", "+packageECUTorque+"Nm                        |");
                System.out.println("|Total Output: "+packageTotalOutputHP+"HP"+",
"+packageTotalOutputTorque+"Nm                       |");

System.out.println("-----------------------------------------------------------------");
                System.out.println();
                System.out.println("Engine Stats and Data after tuning:");
                newEngineHP=engineCurrentHP+packageTotalOutputHP;
                newEngineTorque=engineCurrentTorque+packageTotalOutputTorque;
                System.out.println("Engine Horsepower: "+newEngineHP+"HP");
                System.out.println("Engine Torque: "+newEngineTorque+"Nm");

newEngineRPMRedline=((newEngineHP/(newEngineTorque*0.73756)*5252));

newEngineRPMRedlineString=(String.format("%.2f",newEngineRPMRedline));
                System.out.println("Engine Max RPM Redline:
"+newEngineRPMRedlineString+"RPM");
        }
```

}

Output Coding

Car Brand:

BMW

Car Brand: BMW

Car Model:

M5

Car Model: M5

Car Manufactured Year:

2019

Car Manufactured in 2019

Engine Code:

S63

Engine Code: S63

Engine Spec(Capacity,Arrangement of Cylinders, Type of aspiration):

4.4L

V8

Twin-turbo

Engine Spec: 4.4L V8 Twin-turbo

Current Engine Horsepower:

592

Current Engine Horsepower: 592.0HP

Current Engine Torque(Nm):

750

Current Engine Torque: 750.0Nm

Current Engine Max RPM Redline: 5620.67RPM

>>

|Your car info: |

|Car Brand: BMW |

|Car Model: M5 |

|Car Manufactured Year: 2019 |

|Engine Code: S63 |

|Engine Spec: 4.4L,V8,Twin-turbo |
|Current Engine Horsepower: 592.0 |
|Current Engine Torque(Nm): 750.0 |
|Current Engine Max RPM Redline: 5620.67RPM|
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<

|Stage 2 Tuning Package: Torque Performance |
|Takeda Momentum Cold Air Intake System: 17.0HP, 36.0Nm |
|Bladerunner Intercooler Hot and Cold Side: 8.0HP, 13.0Nm |
|Wagner Tuning Competition Intercooler Kit: 32.0HP, 53.0Nm |
|Takeda Twisted Steel Down-pipe: 36.0HP, 37.0Nm |
|Takeda Stainless Steel Cat-Back Exhaust: 14.0HP, 22.0Nm |
|Takeda Twisted Steel Mid-pipe: 15.0HP, 20.0Nm |
|Hondata Flash Pro ECU: 45.0HP, 79.0Nm |
|Total Output: 167.0HP, 260.0Nm |

>>
|Engine Stats and Data after tuning:|
|Engine Horsepower: 759.0HP |
|Engine Torque: 1010.0Nm |
|Engine Max RPM Redline: 5351.16RPM |
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<

```
>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
|Your car info:                            |
|Car Brand: BMW                            |
|Car Model: M5                             |
|Car Manufactured Year: 2019               |
|Engine Code: S63                          |
|Engine Spec: 4.4L,V8,Twin-turbo           |
|Current Engine Horsepower: 592.0          |
|Current Engine Torque(Nm): 750.0          |
|Current Engine Max RPM Redline: 5620.67RPM|
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<

---------------------------------------------------------------------
|Stage 2 Tuning Package: Torque Performance                         |
|Takeda Momentum Cold Air Intake System: 17.0HP, 36.0Nm             |
|Bladerunner Intercooler Hot and Cold Side: 8.0HP, 13.0Nm           |
|Wagner Tuning Competition Intercooler Kit: 32.0HP, 53.0Nm          |
|Takeda Twisted Steel Down-pipe: 36.0HP, 37.0Nm                     |
|Takeda Stainless Steel Cat-Back Exhaust: 14.0HP, 22.0Nm            |
|Takeda Twisted Steel Mid-pipe: 15.0HP, 20.0Nm                      |
|Hondata Flash Pro ECU: 45.0HP, 79.0Nm                              |
|Total Output: 167.0HP, 260.0Nm                                     |
---------------------------------------------------------------------

>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
|Engine Stats and Data after tuning:|
|Engine Horsepower: 759.0HP         |
|Engine Torque: 1010.0Nm            |
|Engine Max RPM Redline: 5351.16RPM |
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
```

Figure 5: Output of coding

11. References

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3. *Home*. Calculator.net: Free Online Calculators - Math, Fitness, Finance, Science. (n.d.). Retrieved December 17, 2021, from https://www.calculator.net/engine-horsepower-calculator.html?v1weight=1500&v1weightunit=kilogram&v1time=9&v1timeunit=second&calctype=et&x=98&y=26#et

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SKIP1013
INTRODUCION TO PROGRAMMING AND PROBLEM SOLVING
(SEMESTER A211)

ASSIGNMENT 1

Theme :

Problem Solving for Auto / Vehicles (Cruise)

Title :

Dining System for Cruise

Lecturer :

PROF. MADYA DR. AZMAN B YASIN

Prepared by :

Name	: TAN ZHI XIAN
Matric No.	: 284333
Class	: A
Group	: 1

TABLE OF CONTENTS

1. Identify the problem.

Malaysia is a unique country strategically located at the equator of the earth, where summer is expected every day since the sun shines all year long. Hence, a cruise vacation would be the best to be expected if one wishes to enjoy the uniqueness of Malaysia. A cruise vacation is a great getaway too from the hustle of the city, where the vehicles and environmental pollution are nowhere in sight. Cruise ships today can provide everything a passenger needs, from your food, accommodations to leisure. Cruise travel has grown in popularity in recent years. The Cruise Lines International Association (CLIA), which tracks cruises worldwide found that cruise ship passengers grew by 79% annually between 2012 and 2014.

Cruise ships generally sail regularly or irregularly along certain tourist routes on the water, mooring at one or several sightseeing locations in order to allow tourists to visit them. Cruise ships are huge passenger ships designed primarily for leisure travel. Unlike other modes of transportation, cruise ship usually embarked on round-trip cruises to numerous ports of call, where passengers can participate in "shore excursions". Italy gave an early cruise experience on the Francesco I in June 1833. With the growth of tourism in the 1960s and 1970s, an increasing number of cruise ships were designed and built specifically for sightseeing, and the majority of these ships provide special sightseeing and entertainment facilities and services in addition to the basic functions of passenger ships. There are many types of cruise ships, which can be broadly divided into ordinary cruise ships and luxury cruise ships according to the different interior facilities and decoration grades, while ocean-going cruise ships, offshore coastal cruise ships, and river cruise ships are according to the different sailing waters.

Figure 1 : RMS Strathaird, a P&O cruise ship of the early-20th century. The company began offering luxury cruise services in 1844.

Figure 2 : Example of Dining Restaurants in cruise ships.

Dining restaurant is the most important facility in cruise. Onboard restaurant includes a range of food alternatives that are available on the cruise ship along the journey. The larger ships usually offer more selections, although even the smallest ships usually feature many choices also. Traditionally, the ships' restaurants conduct two dinner services per day, early dining and late dining, and guests are assigned a certain eating hour for the duration of the cruise. However, a recent trend on Liberty Cruise allows diners to dine whenever they wish. Other than that, cruise ships normally offer both free and paid restaurants, while Liberty Cruise only features a charged restaurant. Thus, as a cruise ship, Liberty cruise has faced some challenges when they carry out their performance. In this case, the nature of the problem stated is abstract since it may be utilized to tackle several problems that Liberty Cruise encountered on a daily basis. There are 3 problems listed down by Liberty Cruise :

Table 1: Several problems faced by Liberty Cruise

(a)	Miscommunication	: Prevent staff mistakes
(b)	Package distribution error	: Distribute the correct package with the number of passenger given
(c)	Price recording error	: Calculate the cost for passengers' payment according to the package

2. Understand the problem.

Liberty Cruise is a small size cruise that can accommodate 28 crews and 42 passengers. In the cruise line of Liberty Cruise at Paradise 101 (Telaga), the menu becomes an important part of the journey. In the beginning, the staff was concerned about how to serve the meals on the cruise. They decide to prepare a variety of food to attract customers. However, they realized that the restricted capacity and weight of a cruise ship limit the quantity of ingredients that may be brought on board, preventing them from freely selecting the meal they wish to create. As a result, it is critical to regulating the menu to the degree that it can be supplied. Due to the limited number of people on the cruise, the number of chefs should be reduced. Also, as there is a lot of food to make simultaneously, it is the best choice to pick the chef's best menu. This action can help in preventing keeping passengers from waiting too long. Thus, the crew and staff decided to provide a variety of food with different packages. For example, Chinese cuisine, Western food, and Buffet are served in the journey. Furthermore, they opted to customize these three packages since they cater to distinct customer segments. They believed that having multiple meal packages

was required in order to suit the consumption demands of the passengers so that they can enjoy their cruise with a wonderful moment.

After agreeing on a menu, the staff will be confronted with a new challenge. When recording customer selections, the probability of miscommunication resulting in situations of capturing the incorrect package of passengers' options frequently increases. As a result, it may cause waste as some passengers order unwanted food. Moreover, there have been complaints of staff registering the wrong menu set pricing due to their confusion. For example, using the price of Chinese cuisine package for Western food package. There are also cases such as misrepresentation of age occurs because the staff is hard to distinguish the age of the children whether they are less than 6 years old or not. Thus, the probability of causes in package and price distribution problems is high. Liberty Cruise may suffer massive financial losses and its credibility may be challenged if this situation continues. Therefore, Liberty Cruise decided to solve the problem by generating the list in order to reduce time and staff mistakes.

There are 3 forms of meals (Chinese cuisine, Western food, and Buffet) prepared for the passengers to purchase on their cruise. The meals have a specific price and only the cost of the Buffet package is related to the age group of passengers. Then, the staff may total up the dining package that best suits the preferences of the passenger with the exact amount of passengers on the cruise. The menu set up with prices including the number of dishes for a set decided by Liberty Cruise is shown below :

Table 2: Menu of Chinese Cuisine, Western Food and Buffet with the prices given for each person

Chinese Cuisine	Western Food	Buffet
RM88	RM108	Adult - RM100 Children (< 6) - RM40
• White Rice • Steamed Seabass with Spicy Sauce • Lemon Chicken • Tepanyaki Tofu • Stir Fried Vegetables with Belacan • Seaweed Soup • Chilled Longan	• Tomato Rice • Stir Fried Sotong with Green Pepper • Baked Hawaiian Chicken • Brocolli & Cauliflower • Mushroom Soup • Sparkling Water • Fresh Fruit	• Salad • Rice • Main Dishes • BBQ Station • Side Dishes • Soup • Beverages • Fruits • Dessert

*****Prices for each set*****

3. Identify alternative ways to solve the problem.

a) Allowing cruise firms to set aside additional funds for the replacement of bigger ships' bodies so that Liberty Cruise can hire more staff and crews.

Pros	Cons
More recruitment so can serve passengers on time without any delay.	Difficult in preparing funds as it includes large amount of money to upgrade the cruise ship.

b) Reduces the number of passengers. At the same time, increases the number of crews.

Pros	Cons
Have enough labour as the larger the amount of staff can serve, the faster the job is done.	Impractical as the lesser the passenger intake, the smaller the amount of money earned. Other than that, it may also cause a waste in labour.

c) Held a half-year training session for the staff and test them occasionally.

Pros	Cons
The staff fulfil with experience and has the ability to overcome any problems.	Challenges in filling the vacancies during shorthanded as it takes too much time for preparing to work officially.

d) Create a multi-language menu.

Pros	Cons
Preventing language barriers.	More paper is required to construct a menu, and frequently changing the menu according to the season would be wasteful.

e) Triple confirm with the passengers' order.

Pros	Cons
Prevent recording inaccurate order.	This action might bore the passengers.

f) Use paper and pen to record the number of passengers.

Pros	Cons
There are records for the crew to refer if they get confused or forget.	It is a very primitive method. If the font is scribbled, the person who receives the following task will have difficulty reading it.

g) Show your ID card to prove the passengers' age.

Pros	Cons
To prevent the cases of seven-year-olds vying for the same price as a six-year-old in the buffet.	Failure to take care of passengers privacy.

h) Spend more time on calculating the customer's bill.

Pros	Cons
Double confirm with the correct amount.	The passengers may wait for a longer time to complete the payment process.

i) Use a scientific calculator to compute the change and return to the passengers.

Pros	Cons
High probability of miscalculation in addition, subtraction, multiplication and division.	Takes longer to complete the written and calculation records.

j) Built a Dining System for Cruise.

Pros	Cons
A very effective way on preventing miscommunication, package distribution error and price recording error at the same time.	Requires maintenance fees.

4. Select the best way to solve the problem from the list of alternative solutions.

From the above solutions, Liberty Cruise select 'Built a Dining System for Cruise' as their first choice to solve the problems they faced. Firstly, it is environmentally friendly and saves on labour costs. Other than that, the Dining System provides a backup system to prevent any unexpected interruptions or mishaps. To know further information on profits, the staff and crew can check the system on daily basis. The system maintenance fees are also cheaper than replacing the size of the cruise ship. The use of the Dining System for the cruise can help in minimizing the time uses and errors occurs as it can calculate the total price for the package in a short time with the price-setting up appropriately for each package without confusion and mistakes.

5. List instructions (steps) that enable you to solve the problem using the selected solution.

1. Identify the number of passengers that come to the restaurant in the cruise.
2. Recording personal information from passengers.
3. Enter the number of order for each package.
4. Calculate the total price of each package.
5. Calculate the discount, service charge and sales and service tax (SST) for the payment based on the number of package order.
6. Calculate the bill and changes from payment.
7. Print receipts.

6. Evaluate the solution.

1. Declare the variables for using double price, discountRate, taxRate and String.
2. Declare the double and float variable called sum, sub and mul to hold the addition, subtraction and multiply value. Declare double discount, charge, tax and subtotal also.
3. Print out the descriptive statement for asking the name, age group, cruise ticket ID, room number and number of passengers.
4. Key in the statement with exact information or answer of the passengers.

5. Compute the total price for each package (Chinese cuisine, Western food and Buffet) by using mul = price * noOfpassenger respectively. Most importantly, total price for Buffet has to according to the age category children (< 6) and adult (> 7).
6. Print the value stored in the variable multiple.
7. Use sum to final up the total amount for 3 package.
8. Use discountRate to find the discount received for each payment, e.g. : discount8 = discountRate8 * sum.
9. Use chargeRate to find the service charge, e.g. : charge = chargeRate * sum.
10. Use taxRate to find the sales and service tax that charge to passengers, e.g. : tax = taxRate * sum.
11. Use subtotal to compute the real payment after minus discountRate and add chargeRate and taxRate, e.g. : subtotal3 = sum - discount8 + charge + tax.
12. Use sub to calculate the changes, e.g. : cashPayment – subtotal3.
13. The receipts may print out successfully.

Table 3 : Calculation method

Item	Variable	Calculation
Payment for Chinese cuisine	mul1	noOfPassenger1 × RM 88
Payment for Western food	mul2	noOfPassenger2 × RM 108
Payment for Buffet (adult)	mul3a	noOfPassenger3a × RM 100
Payment for Buffet (children)	mul3c	noOfPassenger3c × RM 20
Total Amount	sum	mul1 + mul2 + mul3a + mul3c
Discount Received	discount	discountRate × sum
Service Charge	charge	charge × sum
Sales and Service Tax (SST)	tax	tax × sum
Subtotal	subtotal	sum – (discountRate × sum) + (charge × sum) + (tax × sum)
Changes	sub	cashPayment – subtotal

Table 4 : Special Discount and Free Gift given based on number of set order

No Of Set Order	Special Discount	Free Gift	Calculation
1 – 2	Normal Price	No Free Gift	sum = mul1 + mul2 + mul3a + mul3c
3 – 6	5%	Free 2 Gymnasium Ticket	discount5 = 0.05 × sum
7 – 10	8%	Free 4 Magic Performance Ticket	discount8 = 0.08 × sum

Table 5 : Service Charge for the payment

Type Of Charges	Rate	Calculation
Service Charge	2%	charge = 0.02 × sum
Sales and Service Tax (SST)	6%	tax = 0.06 × sum

The system can generate the total bill payment by computing the money needed to pay by the passengers. It refers to the amount of set passengers order and the price of each package set up by Liberty Cruise by multiplying them. The system can calculate the correct amount needed to pay by the passengers and this may prevent wrong calculation of changes return to passengers. Furthermore, the system also provides payment receipts as proof for the passenger to recheck their purchase. Thus, they may be satisfied with all actions based on their confirmation. In a conclusion, the Dining System for Cruise may be more accurate and more saving time as it can record the real order by passenger self-service. The payment receipts that have successfully printed out have shown below :

```
                        LIBERTY CRUISE
                       PAYMENT RECEIPTS
------------------------------------------------------------------------
User         : Alex Tan
Ticket No.   : 3780092131
Room No.     : 1B121
Date         : 12/12/2021
Time         : 12:30 p.m.
------------------------------------------------------------------------
No       Item Name          Unit       Price Per Unit        Cost (RM)
------------------------------------------------------------------------
1     Chinese Cuisine       0             88.0                 0.0
2     Western Food          1            108.0               108.0
3     Buffet For Adult      0            100.0                 0.0
4     Buffet For Child      1             20.0                20.0
------------------------------------------------------------------------
Amount             :                                        128.0
------------------------------------------------------------ ----------
Service Charge     :                                          2%
------------------------------------------------------------------------
Subtotal           :                                      130.56
------------------------------------------------------------------------
Cash               :                                        200.0
------------------------------------------------------------------------
Balance            :                                        69.44
************************************************************************
                        THANK YOU COME AGAIN
************************************************************************
```

Figure 2: Payment Receipt printed

*****A passenger is available to order more than one set for his/her family. Thus, the user on the receipt may came out with just the person made payment.*****

7. Algorithm

Figure 3: Algorithm

8. Pseudocode

- a detailed yet readable description of what a computer program must do
- expressed in a formally-styled natural language rather than in a programming language
- a detailed step in the process of developing a program

Problem 1 : Calculate the cost for passengers' payment according to the package.
Problem 2 : Calculate the total bill for the passengers' by sum up the cost for all 3 packages.
Problem 3 : Calculate the changes need to return back to passengers'.

Start

Read pricepackage1 = 88
Read pricepackage2 = 108
Read pricepackage3a = 100
Read pricepackage3c = 20
Read discountRate5 = 0.05
Read discountRate8 = 0.08
Read chargeRate = 0.02
Read taxRate = 0.06
Read date = "12/12/2021"
Read time = "12:30 p.m."
Read package1 = "Chinese Cuisine"
Read package2 = "Western Food"
Read package3a = "Buffet For Adult"
Read package 3c = "Buffet For Child"
Read dis5 = "5%"
Read dis8 = "8%"
Read service = "2%"
Read sst = "6%"
Output " Please insert your name : "
Input name
Output "Please enter your cruise ticket number : "

Input ticketNo

Output “Please enter your room number : ”

Input roomNo

Output “Total set of Chinese cuisine you order : ”

Input noOfPassenger1

Output “Price of Chinese cuisine for each set : RM "

Input pricepackage1

Calculate mul1 = (noOfPassenger1 * pricepackage1)

Display “Payment for Chinese cuisine : RM ” + mul1

Output “Total set of Western food you order : ”

Input noOfPassenger2

Output “Price of Western food for each set : RM "

Input pricepackage2

Calculate mul2 = (noOfPassenger2 * pricepackage2)

Display “Payment for Western food : RM ” + mul2

Output “Total set of Buffet for adult : ”

Input noOfPassenger3a

Output “Price of Buffet for each adult : RM "

Input pricepackage3a

Calculate mul3a = (noOfPassenger3a * pricepackage3a)

Display “Payment for Buffet (adult) : RM ” + mul3a

Output “Total set of Buffet for children : ”

Input noOfPassenger3c

Output “Price of Buffet for each children : RM "

Input pricepackage3c

Calculate mul3c = (noOfPassenger3c * pricepackage3c)

Display “Payment for Buffet (children) : RM ” + mul3c

Calculate sum = mul1 + mul2 + mul3a + mul3c

Display “Total amount that need to pay : RM " + sum

Calculate discount = discountRate * sum

Display “Total discount received : RM ” + discount

Calculate charge = chargeRate * sum

Display “Service Charge : RM ” + charge

Calculate tax = taxRate * sum

Display “Sales and Service Tax : RM ” + tax

Calculate subtotal = sum – discount + charge + tax

Display “Subtotal for Discount Received and Service Charge : RM ” + subtotal

Output “Total cash pay : RM ”

Input cashPayment

Calculate sub = cashPayment – subtotal

Display “Changes : RM ” + sub

Output Payment Receipts with Free Gifts Stated

End

9. Flow Chart

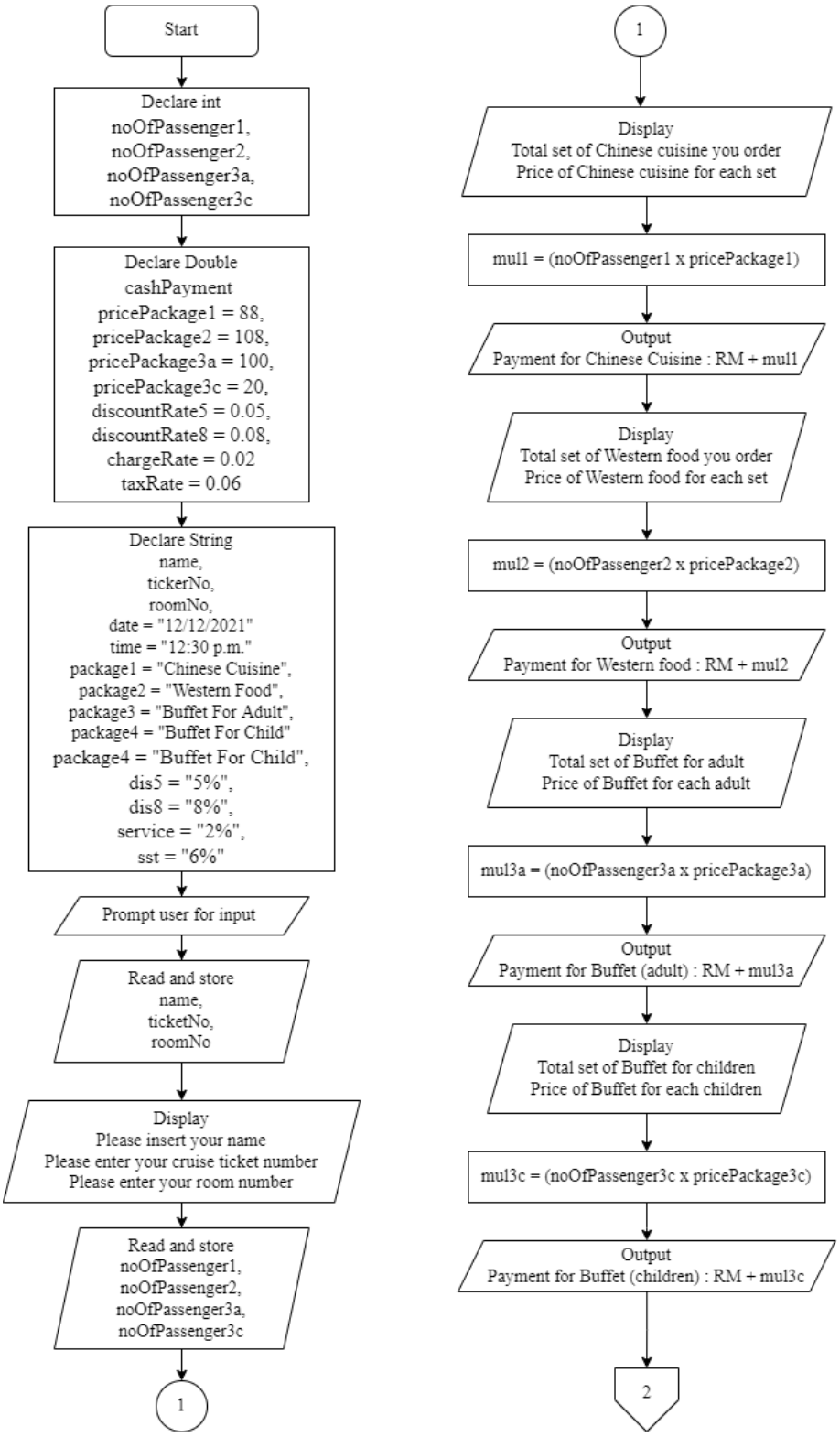

Figure 4: Flowchart page 1 and 2 are shown

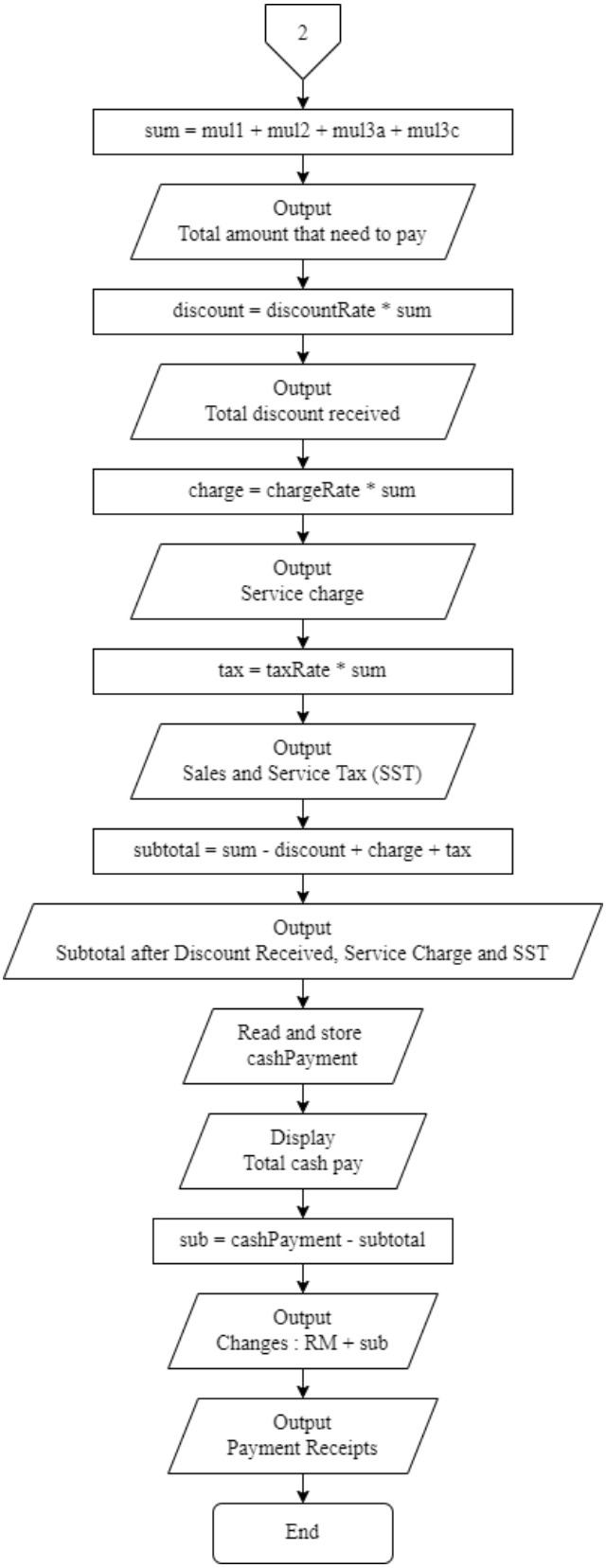

Figure 5: Last part of Flowchart are shown

10. Coding - Numerical Computation & Expression

Input Coding Example 1(1 – 2 set without discount)

```
package assignment1;

import java.util.Scanner;

class DiningSystemForCruise1 {

	public static void main(String[] args) {
		// TODO Auto-generated method stub
		int noOfPassenger1;
		int noOfPassenger2;
		int noOfPassenger3a;
		int noOfPassenger3c;
		double pricepackage1 = 88;
		double pricepackage2 = 108;
		double pricepackage3a = 100;
		double pricepackage3c = 20;
		double discountRate5 = 0.05;
		double discountRate8 = 0.08;
		double chargeRate = 0.02;
		double taxRate = 0.06;
		double cashPayment;
		String name;
		String ticketNo;
		String roomNo;
		String date = "12/12/2021";
		String time = "12:30 p.m.";
		String package1 = "Chinese Cuisine";
		String package2 = "Western Food";
		String package3a = "Buffet For Adult";
		String package3c = "Buffet For Child";
		String dis5 = "5%";
		String dis8 = "8%";
		String service = "2%";
		String sst = "6%";

		double sum;
		double sub;
		double mul1;
		double mul2;
		double mul3a;
		double mul3c;
		double discount5;
		double discount8;
		double charge;
```

```
            double tax;
            double subtotal1;
            double subtotal2;
            double subtotal3;

            System.out.println("WELCOME TO LIBERTY CRUISE");
            Scanner input = new Scanner(System.in);  // input is create new object
for scanner input

            System.out.print("Please insert your name : ");
            name = input.nextLine();

            System.out.print("Please enter your cruise ticket number : ");
            ticketNo = input.next();

            System.out.print("Please enter your room number : ");
            roomNo = input.next();

            System.out.println();

            System.out.print("Which set of meal do you want to order?");
            System.out.print("\nChinese cuisine, Western food and Buffet are served
today.");
            System.out.print("\n\n-----MENU FOR EACH SET-----");

            System.out.println("\n\nChinese Cuisine includes : ");
            System.out.println("(1) Rice");
            System.out.println("(2) Steamed Seabass with Spicy Sauce");
            System.out.println("(3) Lemon Chicken");
            System.out.println("(4) Tepanyaki Tofu");
            System.out.println("(5) Stir Fried Vegetables with Belacan");
            System.out.println("(6) Seaweed Soup");
            System.out.println("(7) Chilled Longan");

            System.out.println("\nWestern Food includes : ");
            System.out.println("(1) Tomato Rice");
            System.out.println("(2) Stir Fried Sotong with Green Pepper");
            System.out.println("(3) Baked Hawaiian Chicken");
            System.out.println("(4) Brocolli & Cauliflower");
            System.out.println("(5) Mushroom Soup");
            System.out.println("(6) Sparkling Water");
            System.out.println("(7) Fresh Fruit");

            System.out.println("\nBuffet includes : ");
            System.out.println("(1) Salad");
            System.out.println("(2) Rice");
            System.out.println("(3) Main Dishes");
            System.out.println("(4) BBQ Station");
```

```
            System.out.println("(5) Side Dishes");
            System.out.println("(6) Soup");
            System.out.println("(7) Beverages");
            System.out.println("(8) Fruits");
            System.out.println("(9) Dessert");

            System.out.print("\nPlease fill in the form below to select your
choice.");

            System.out.println();

            System.out.print("\nTotal set of Chinese cuisine you order : ");
            noOfPassenger1 = input.nextInt();
            System.out.print("Price of Chinese cuisine for each set : RM " +
pricepackage1);
            mul1 = (noOfPassenger1 * pricepackage1);
            System.out.print("\nPayment for Chinese cuisine : RM " + mul1);

            System.out.println();

            System.out.print("\nTotal set of Western food you order: ");
            noOfPassenger2 = input.nextInt();
            System.out.print("Price of Western food for each set : RM " +
pricepackage2);
            mul2 = (noOfPassenger2 * pricepackage2);
            System.out.print("\nPayment for Western food : RM " + mul2);

            System.out.println();

            System.out.print("\nTotal set of Buffet for adult : ");
            noOfPassenger3a = input.nextInt();
            System.out.print("Price of Buffet for each adult : RM " +
pricepackage3a);
            mul3a = (noOfPassenger3a * pricepackage3a);
            System.out.print("\nPayment for Buffet (adult) : RM " + mul3a);

            System.out.println();

            System.out.print("\nTotal set of Buffet for children (< 6) : ");
            noOfPassenger3c = input.nextInt();
            System.out.print("Price of Buffet for each children (< 6) : RM " +
pricepackage3c);
            mul3c = (noOfPassenger3c * pricepackage3c);
            System.out.print("\nPayment for Buffet (children) : RM " + mul3a);
            System.out.print("\n***The requirement for children package is the age
need to be smaller than 6 years old.*** ");

            System.out.println();
```

```
            sum = mul1 + mul2 + mul3a + mul3c;
            System.out.print("\nTotal amount : RM " + sum);

            charge = chargeRate * sum;
            System.out.print("\nService charge : RM " + charge);

            tax = taxRate * sum;
            System.out.print("\nSales and Service Tax (SST) : RM " + tax);

            subtotal1 = sum + charge + tax;
            System.out.print("\nSubtotal Without Discount Received, 2% Service
Charge and 6% SST : RM " + subtotal1);

            System.out.print("\nTotal cash pay : RM ");
            cashPayment = input.nextDouble();

            sub = cashPayment - subtotal1;
            System.out.print("Changes : RM " + sub);

            System.out.println();

            System.out.println("Processing...");

            System.out.println();

            System.out.println("                          LIBERTY CRUISE
");
            System.out.println("                         PAYMENT RECEIPTS
");
            System.out.println("-------------------------------------------------
---------------------");
            System.out.println("User       : " + name);
            System.out.println("Ticket No.  : " + ticketNo);
            System.out.println("Room No.    : " + roomNo);
            System.out.println("Date       : " + date);
            System.out.println("Time       : " + time);
            System.out.println("-------------------------------------------------
---------------------");
            System.out.println("No      Item Name        Unit      Price Per Unit
Cost (RM)");
            System.out.println("-------------------------------------------------
---------------------");
            System.out.println("1    " + package1 + "       " + noOfPassenger1 + "
" + pricepackage1 + "               " + mul1);
            System.out.println("2    " + package2 + "         " + noOfPassenger2 +
"          " + pricepackage2 + "              " + mul2);
```

```
            System.out.println("3     " + package3a + "      " + noOfPassenger3a + "
" + pricepackage3a + "              " + mul3a);
            System.out.println("4     " + package3c + "      " + noOfPassenger3c + "
" + pricepackage3c + "               " + mul3c);
            System.out.println("-------------------------------------------------
--------------------");
            System.out.println("Amount             :
" + sum);
            System.out.println("-------------------------------------------------
---------- ----------");
            System.out.println("Service Charge (2%)  :
" + charge);
            System.out.println("-------------------------------------------------
--------------------");
            System.out.println("SST (6%)           :
" + tax);
            System.out.println("-------------------------------------------------
--------------------");
            System.out.println("Subtotal           :
" + subtotal1);
            System.out.println("-------------------------------------------------
--------------------");
            System.out.println("Cash               :
" + cashPayment);
            System.out.println("-------------------------------------------------
--------------------");
            System.out.println("Balance            :
" + sub);

      System.out.println("*************************************************************
***************");
            System.out.println("                         THANK YOU COME AGAIN
");

      System.out.println("*************************************************************
***************");
      }

}
```

Output Coding Example 1 (1 – 2 set without discount)

```
WELCOME TO LIBERTY CRUISE
Please insert your name : Alex Tan
Please enter your cruise ticket number : 3780092131
Please enter your room number : 1B121

Which set of meal do you want to order?
```

```
Chinese cuisine, Western food and Buffet are served today.

-----MENU FOR EACH SET-----

Chinese Cuisine includes :
(1) Rice
(2) Steamed Seabass with Spicy Sauce
(3) Lemon Chicken
(4) Tepanyaki Tofu
(5) Stir Fried Vegetables with Belacan
(6) Seaweed Soup
(7) Chilled Longan

Western Food includes :
(1) Tomato Rice
(2) Stir Fried Sotong with Green Pepper
(3) Baked Hawaiian Chicken
(4) Brocolli & Cauliflower
(5) Mushroom Soup
(6) Sparkling Water
(7) Fresh Fruit

Buffet includes :
(1) Salad
(2) Rice
(3) Main Dishes
(4) BBQ Station
(5) Side Dishes
(6) Soup
(7) Beverages
(8) Fruits
(9) Dessert

Please fill in the form below to select your choice.

Total set of Chinese cuisine you order : 0
Price of Chinese cuisine for each set : RM 88.0
Payment for Chinese cuisine : RM 0.0

Total set of Western food you order: 0
Price of Western food for each set : RM 108.0
Payment for Western food : RM 0.0

Total set of Buffet for adult : 1
Price of Buffet for each adult : RM 100.0
Payment for Buffet (adult) : RM 100.0

Total set of Buffet for children (< 6) : 0
```

```
Price of Buffet for each children (< 6) : RM 20.0
Payment for Buffet (children) : RM 100.0
***The requirement for children package is the age need to be smaller than 6 years
old.***

Total amount : RM 100.0
Service charge : RM 2.0
Sales and Service Tax (SST) : RM 6.0
Subtotal Without Discount Received, 2% Service Charge and 6% SST : RM 108.0
Total cash pay : RM 200
Changes : RM 92.0
Processing...

                            LIBERTY CRUISE
                           PAYMENT RECEIPTS
-------------------------------------------------------------------------
User        : Alex Tan
Ticket No.  : 3780092131
Room No.    : 1B121
Date        : 12/12/2021
Time        : 12:30 p.m.
-------------------------------------------------------------------------
No       Item Name          Unit       Price Per Unit        Cost (RM)
-------------------------------------------------------------------------
1     Chinese Cuisine        0            88.0                0.0
2     Western Food           0           108.0                0.0
3     Buffet For Adult       1           100.0              100.0
4     Buffet For Child       0            20.0                0.0
-------------------------------------------------------------------------
Amount               :                                      100.0
------------------------------------------------------------ ----------
Service Charge (2%)  :                                        2.0
-------------------------------------------------------------------------
SST (6%)             :                                        6.0
-------------------------------------------------------------------------
Subtotal             :                                      108.0
-------------------------------------------------------------------------
Cash                 :                                      200.0
-------------------------------------------------------------------------
Balance              :                                       92.0
*************************************************************************
                          THANK YOU COME AGAIN
*************************************************************************
```

Input Coding Example 2 (3 – 6 set with discount 5%)

```
package assignment1;

import java.util.Scanner;

class DiningSystemForCruise2 {

	public static void main(String[] args) {
		// TODO Auto-generated method stub
		int noOfPassenger1;
		int noOfPassenger2;
		int noOfPassenger3a;
		int noOfPassenger3c;
		double pricepackage1 = 88;
		double pricepackage2 = 108;
		double pricepackage3a = 100;
		double pricepackage3c = 20;
		double discountRate5 = 0.05;
		double discountRate8 = 0.08;
		double chargeRate = 0.02;
		double taxRate = 0.06;
		double cashPayment;
		String name;
		String ticketNo;
		String roomNo;
		String date = "12/12/2021";
		String time = "12:30 p.m.";
		String package1 = "Chinese Cuisine";
		String package2 = "Western Food";
		String package3a = "Buffet For Adult";
		String package3c = "Buffet For Child";
		String dis5 = "5%";
		String dis8 = "8%";
		String service = "2%";
		String sst = "6%";

		double sum;
		double sub;
		double mul1;
		double mul2;
		double mul3a;
		double mul3c;
		double discount5;
		double discount8;
		double charge;
		double tax;
		double subtotal1;
```

```
            double subtotal2;
            double subtotal3;

            System.out.println("WELCOME TO LIBERTY CRUISE");
            Scanner input = new Scanner(System.in);  // input is create new object
for scanner input

            System.out.print("Please insert your name : ");
            name = input.nextLine();

            System.out.print("Please enter your cruise ticket number : ");
            ticketNo = input.next();

            System.out.print("Please enter your room number : ");
            roomNo = input.next();

            System.out.println();

            System.out.print("Which set of meal do you want to order?");
            System.out.print("\nChinese cuisine, Western food and Buffet are served
today.");
            System.out.print("\n\n-----MENU FOR EACH SET-----");

            System.out.println("\n\nChinese Cuisine includes : ");
            System.out.println("(1) Rice");
            System.out.println("(2) Steamed Seabass with Spicy Sauce");
            System.out.println("(3) Lemon Chicken");
            System.out.println("(4) Tepanyaki Tofu");
            System.out.println("(5) Stir Fried Vegetables with Belacan");
            System.out.println("(6) Seaweed Soup");
            System.out.println("(7) Chilled Longan");

            System.out.println("\nWestern Food includes : ");
            System.out.println("(1) Tomato Rice");
            System.out.println("(2) Stir Fried Sotong with Green Pepper");
            System.out.println("(3) Baked Hawaiian Chicken");
            System.out.println("(4) Brocolli & Cauliflower");
            System.out.println("(5) Mushroom Soup");
            System.out.println("(6) Sparkling Water");
            System.out.println("(7) Fresh Fruit");

            System.out.println("\nBuffet includes : ");
            System.out.println("(1) Salad");
            System.out.println("(2) Rice");
            System.out.println("(3) Main Dishes");
            System.out.println("(4) BBQ Station");
            System.out.println("(5) Side Dishes");
            System.out.println("(6) Soup");
```

```
            System.out.println("(7) Beverages");
            System.out.println("(8) Fruits");
            System.out.println("(9) Dessert");

            System.out.print("\nPlease fill in the form below to select your
choice.");

            System.out.println();

            System.out.print("\nTotal set of Chinese cuisine you order : ");
            noOfPassenger1 = input.nextInt();
            System.out.print("Price of Chinese cuisine for each set : RM " +
pricepackage1);
            mul1 = (noOfPassenger1 * pricepackage1);
            System.out.print("\nPayment for Chinese cuisine : RM " + mul1);

            System.out.println();

            System.out.print("\nTotal set of Western food you order: ");
            noOfPassenger2 = input.nextInt();
            System.out.print("Price of Western food for each set : RM " +
pricepackage2);
            mul2 = (noOfPassenger2 * pricepackage2);
            System.out.print("\nPayment for Western food : RM " + mul2);

            System.out.println();

            System.out.print("\nTotal set of Buffet for adult : ");
            noOfPassenger3a = input.nextInt();
            System.out.print("Price of Buffet for each adult : RM " +
pricepackage3a);
            mul3a = (noOfPassenger3a * pricepackage3a);
            System.out.print("\nPayment for Buffet (adult) : RM " + mul3a);

            System.out.println();

            System.out.print("\nTotal set of Buffet for children (< 6) : ");
            noOfPassenger3c = input.nextInt();
            System.out.print("Price of Buffet for each children (< 6) : RM " +
pricepackage3c);
            mul3c = (noOfPassenger3c * pricepackage3c);
            System.out.print("\nPayment for Buffet (children) : RM " + mul3a);
            System.out.print("\n***The requirement for children package is the age
need to be smaller than 6 years old.*** ");

            System.out.println();

            sum = mul1 + mul2 + mul3a + mul3c;
```

```
            System.out.print("\nTotal amount : RM " + sum);

            discount5 = discountRate5 * sum;
            System.out.print("\nTotal discount received (3 - 6 set) : RM " +
discount5);

            charge = chargeRate * sum;
            System.out.print("\nService charge : RM " + charge);

            tax = taxRate * sum;
            System.out.print("\nSales and Service Tax (SST) : RM " + tax);

            subtotal2 = sum - discount5 + charge + tax;
            System.out.print("\nSubtotal after 5% Discount Received, 2% Service
Charge and 6% SST : RM " + subtotal2);

            System.out.print("\nTotal cash pay : RM ");
            cashPayment = input.nextDouble();

            sub = cashPayment - subtotal2;
            System.out.print("Changes : RM " + sub);

            System.out.println();

            System.out.println("Processing...");

            System.out.println();

            System.out.println("                                LIBERTY CRUISE
");
            System.out.println("                               PAYMENT RECEIPTS
");
            System.out.println("-----------------------------------------------------
-------------------------------");
            System.out.println("User       : " + name);
            System.out.println("Ticket No.  : " + ticketNo);
            System.out.println("Room No.    : " + roomNo);
            System.out.println("Date       : " + date);
            System.out.println("Time       : " + time);
            System.out.println("-----------------------------------------------------
-------------------------------");
            System.out.println("No         Item Name          Unit         Price Per
Unit         Cost (RM)");
            System.out.println("-----------------------------------------------------
-------------------------------");
            System.out.println("1       " + package1 + "        " + noOfPassenger1
+ "             " + pricepackage1 + "               " + mul1);
```

```
            System.out.println("2       " + package2 + "           " +
noOfPassenger2 + "             " + pricepackage2 + "               " + mul2);
            System.out.println("3       " + package3a + "       " + noOfPassenger3a
+ "            " + pricepackage3a + "                " + mul3a);
            System.out.println("4       " + package3c + "       " + noOfPassenger3c
+ "             " + pricepackage3c + "                " + mul3c);
            System.out.println("-------------------------------------------------------
------------------------------");
            System.out.println("Amount                :
" + sum);
            System.out.println("-------------------------------------------------------
------------------------------");
            System.out.println("Discount Received (5%)  :
" + discount5);
            System.out.println("-------------------------------------------------------
------------------------------");
            System.out.println("Service Charge (2%)    :
" + charge);
            System.out.println("-------------------------------------------------------
------------------------------");
            System.out.println("SST (6%)              :
" + tax);
            System.out.println("-------------------------------------------------------
------------------------------");
            System.out.println("Subtotal              :
" + subtotal2);
            System.out.println("-------------------------------------------------------
------------------------------");
            System.out.println("Cash                  :
" + cashPayment);
            System.out.println("-------------------------------------------------------
------------------------------");
            System.out.println("Balance               :
" + sub);

      System.out.println("**********************************************************
*************************");
            System.out.println("    Remember to withdraw 2 Gymnasium Ticket as a
free gift with this receipt.    ");

      System.out.println("**********************************************************
*************************");
            System.out.println("                              THANK YOU COME AGAIN
");

      System.out.println("**********************************************************
*************************");
      }
```

```
}
```

Output Coding Example 2 (3 – 6 set with discount 5%)

```
WELCOME TO LIBERTY CRUISE
Please insert your name : David Lee
Please enter your cruise ticket number : 4673920011
Please enter your room number : 1B421

Which set of meal do you want to order?
Chinese cuisine, Western food and Buffet are served today.

-----MENU FOR EACH SET-----

Chinese Cuisine includes :
(1) Rice
(2) Steamed Seabass with Spicy Sauce
(3) Lemon Chicken
(4) Tepanyaki Tofu
(5) Stir Fried Vegetables with Belacan
(6) Seaweed Soup
(7) Chilled Longan

Western Food includes :
(1) Tomato Rice
(2) Stir Fried Sotong with Green Pepper
(3) Baked Hawaiian Chicken
(4) Brocolli & Cauliflower
(5) Mushroom Soup
(6) Sparkling Water
(7) Fresh Fruit

Buffet includes :
(1) Salad
(2) Rice
(3) Main Dishes
(4) BBQ Station
(5) Side Dishes
(6) Soup
(7) Beverages
(8) Fruits
(9) Dessert

Please fill in the form below to select your choice.

Total set of Chinese cuisine you order : 3
Price of Chinese cuisine for each set : RM 88.0
```

```
Payment for Chinese cuisine : RM 264.0

Total set of Western food you order: 2
Price of Western food for each set : RM 108.0
Payment for Western food : RM 216.0

Total set of Buffet for adult : 0
Price of Buffet for each adult : RM 100.0
Payment for Buffet (adult) : RM 0.0

Total set of Buffet for children (< 6) : 1
Price of Buffet for each children (< 6) : RM 20.0
Payment for Buffet (children) : RM 0.0
***The requirement for children package is the age need to be smaller than 6 years
old.***

Total amount : RM 500.0
Total discount received (3 - 6 set) : RM 25.0
Service charge : RM 10.0
Sales and Service Tax (SST) : RM 30.0
Subtotal after 5% Discount Received, 2% Service Charge and 6% SST : RM 515.0
Total cash pay : RM 550
Changes : RM 35.0
Processing...
                                LIBERTY CRUISE
                              PAYMENT RECEIPTS
--------------------------------------------------------------------------------
User        : David Lee
Ticket No.  : 4673920011
Room No.    : 1B421
Date        : 12/12/2021
Time        : 12:30 p.m.
--------------------------------------------------------------------------------
No          Item Name           Unit          Price Per Unit          Cost (RM)
--------------------------------------------------------------------------------
1        Chinese Cuisine         3               88.0                264.0
2        Western Food            2              108.0                216.0
3        Buffet For Adult        0              100.0                  0.0
4        Buffet For Child        1               20.0                 20.0
--------------------------------------------------------------------------------
Amount                  :                                           500.0
--------------------------------------------------------------------------------
Discount Received (5%)  :                                            25.0
--------------------------------------------------------------------------------
Service Charge (2%)     :                                            10.0
--------------------------------------------------------------------------------
SST (6%)                :                                            30.0
--------------------------------------------------------------------------------
Subtotal                :                                           515.0
--------------------------------------------------------------------------------
Cash                    :                                           550.0
--------------------------------------------------------------------------------
Balance                 :                                            35.0
********************************************************************************
     Remember to withdraw 2 Gymnasium Ticket as a free gift with this receipt.
********************************************************************************
                              THANK YOU COME AGAIN
********************************************************************************
```

Input Coding Example 3 (7 – 10 set with discount 8%)

```
package assignment1;

import java.util.Scanner;

class DiningSystemForCruise3 {

	public static void main(String[] args) {
		// TODO Auto-generated method stub
		int noOfPassenger1;
		int noOfPassenger2;
		int noOfPassenger3a;
		int noOfPassenger3c;
		double pricepackage1 = 88;
		double pricepackage2 = 108;
		double pricepackage3a = 100;
		double pricepackage3c = 20;
		double discountRate5 = 0.05;
		double discountRate8 = 0.08;
		double chargeRate = 0.02;
		double taxRate = 0.06;
		double cashPayment;
		String name;
		String ticketNo;
		String roomNo;
		String date = "12/12/2021";
		String time = "12:30 p.m.";
		String package1 = "Chinese Cuisine";
		String package2 = "Western Food";
		String package3a = "Buffet For Adult";
		String package3c = "Buffet For Child";
		String dis5 = "5%";
		String dis8 = "8%";
		String service = "2%";
		String sst = "6%";

		double sum;
		double sub;
		double mul1;
		double mul2;
		double mul3a;
		double mul3c;
		double discount5;
		double discount8;
		double charge;
		double tax;
		double subtotal1;
```

```
            double subtotal2;
            double subtotal3;

            System.out.println("WELCOME TO LIBERTY CRUISE");
            Scanner input = new Scanner(System.in);  // input is create new object
for scanner input

            System.out.print("Please insert your name : ");
            name = input.nextLine();

            System.out.print("Please enter your cruise ticket number : ");
            ticketNo = input.next();

            System.out.print("Please enter your room number : ");
            roomNo = input.next();

            System.out.println();

            System.out.print("Which set of meal do you want to order?");
            System.out.print("\nChinese cuisine, Western food and Buffet are served
today.");
            System.out.print("\n\n-----MENU FOR EACH SET-----");

            System.out.println("\n\nChinese Cuisine includes : ");
            System.out.println("(1) Rice");
            System.out.println("(2) Steamed Seabass with Spicy Sauce");
            System.out.println("(3) Lemon Chicken");
            System.out.println("(4) Tepanyaki Tofu");
            System.out.println("(5) Stir Fried Vegetables with Belacan");
            System.out.println("(6) Seaweed Soup");
            System.out.println("(7) Chilled Longan");

            System.out.println("\nWestern Food includes : ");
            System.out.println("(1) Tomato Rice");
            System.out.println("(2) Stir Fried Sotong with Green Pepper");
            System.out.println("(3) Baked Hawaiian Chicken");
            System.out.println("(4) Brocolli & Cauliflower");
            System.out.println("(5) Mushroom Soup");
            System.out.println("(6) Sparkling Water");
            System.out.println("(7) Fresh Fruit");

            System.out.println("\nBuffet includes : ");
            System.out.println("(1) Salad");
            System.out.println("(2) Rice");
            System.out.println("(3) Main Dishes");
            System.out.println("(4) BBQ Station");
            System.out.println("(5) Side Dishes");
            System.out.println("(6) Soup");
```

```
            System.out.println("(7) Beverages");
            System.out.println("(8) Fruits");
            System.out.println("(9) Dessert");

            System.out.print("\nPlease fill in the form below to select your
choice.");

            System.out.println();

            System.out.print("\nTotal set of Chinese cuisine you order : ");
            noOfPassenger1 = input.nextInt();
            System.out.print("Price of Chinese cuisine for each set : RM " +
pricepackage1);
            mul1 = (noOfPassenger1 * pricepackage1);
            System.out.print("\nPayment for Chinese cuisine : RM " + mul1);

            System.out.println();

            System.out.print("\nTotal set of Western food you order: ");
            noOfPassenger2 = input.nextInt();
            System.out.print("Price of Western food for each set : RM " +
pricepackage2);
            mul2 = (noOfPassenger2 * pricepackage2);
            System.out.print("\nPayment for Western food : RM " + mul2);

            System.out.println();

            System.out.print("\nTotal set of Buffet for adult : ");
            noOfPassenger3a = input.nextInt();
            System.out.print("Price of Buffet for each adult : RM " +
pricepackage3a);
            mul3a = (noOfPassenger3a * pricepackage3a);
            System.out.print("\nPayment for Buffet (adult) : RM " + mul3a);

            System.out.println();

            System.out.print("\nTotal set of Buffet for children (< 6) : ");
            noOfPassenger3c = input.nextInt();
            System.out.print("Price of Buffet for each children (< 6) : RM " +
pricepackage3c);
            mul3c = (noOfPassenger3c * pricepackage3c);
            System.out.print("\nPayment for Buffet (children) : RM " + mul3a);
            System.out.print("\n***The requirement for children package is the age
need to be smaller than 6 years old.*** ");

            System.out.println();

            sum = mul1 + mul2 + mul3a + mul3c;
```

```
            System.out.print("\nTotal amount : RM " + sum);

            discount8 = discountRate8 * sum;
            System.out.print("\nTotal discount received (7 - 10 set) : RM " +
discount8);

            charge = chargeRate * sum;
            System.out.print("\nService charge : RM " + charge);

            tax = taxRate * sum;
            System.out.print("\nSales and Service Tax (SST) : RM " + tax);

            subtotal3 = sum - discount8 + charge + tax;
            System.out.print("\nSubtotal after 8% Discount Received, 2% Service
Charge and 6% SST : RM " + subtotal3);

            System.out.print("\nTotal cash pay : RM ");
            cashPayment = input.nextDouble();

            sub = cashPayment - subtotal3;
            System.out.print("Changes : RM " + sub);

            System.out.println();

            System.out.println("Processing...");

            System.out.println();

            System.out.println("                                LIBERTY CRUISE
");
            System.out.println("                               PAYMENT RECEIPTS
");
            System.out.println("-----------------------------------------------------
-------------------------------");
            System.out.println("User       : " + name);
            System.out.println("Ticket No.  : " + ticketNo);
            System.out.println("Room No.    : " + roomNo);
            System.out.println("Date       : " + date);
            System.out.println("Time       : " + time);
            System.out.println("-----------------------------------------------------
-------------------------------");
            System.out.println("No         Item Name          Unit         Price Per
Unit         Cost (RM)");
            System.out.println("-----------------------------------------------------
-------------------------------");
            System.out.println("1       " + package1 + "        " + noOfPassenger1
+ "             " + pricepackage1 + "               " + mul1);
```

```
            System.out.println("2       " + package2 + "           " +
noOfPassenger2 + "             " + pricepackage2 + "               " + mul2);
            System.out.println("3       " + package3a + "       " + noOfPassenger3a
+ "            " + pricepackage3a + "              " + mul3a);
            System.out.println("4       " + package3c + "       " + noOfPassenger3c
+ "             " + pricepackage3c + "               " +mul3c);
            System.out.println("-------------------------------------------------------
------------------------------");
            System.out.println("Amount                :
" + sum);
            System.out.println("-------------------------------------------------------
------------------------------");
            System.out.println("Discount Received (8%)  :
" + discount8);
            System.out.println("-------------------------------------------------------
------------------------------");
            System.out.println("Service Charge (2%)    :
" + charge);
            System.out.println("-------------------------------------------------------
------------------------------");
            System.out.println("SST (6%)              :
" + tax);
            System.out.println("-------------------------------------------------------
------------------------------");
            System.out.println("Subtotal              :
" + subtotal3);
            System.out.println("-------------------------------------------------------
------------------------------");
            System.out.println("Cash                  :
" + cashPayment);
            System.out.println("-------------------------------------------------------
------------------------------");
            System.out.println("Balance               :
" + sub);

      System.out.println("**********************************************************
**************************");
            System.out.println(" Remember to withdraw 4 Magic Performance Ticket as
a free gift with this receipt.");

      System.out.println("**********************************************************
**************************");
            System.out.println("                              THANK YOU COME AGAIN
");

      System.out.println("**********************************************************
**************************");
      }
```

```
}
```

Output Coding Example 3 (7 – 10 set with discount 8%)

```
WELCOME TO LIBERTY CRUISE
Please insert your name : Albert Ooi
Please enter your cruise ticket number : 3789011123
Please enter your room number : 1B311

Which set of meal do you want to order?
Chinese cuisine, Western food and Buffet are served today.

-----MENU FOR EACH SET-----

Chinese Cuisine includes :
(1) Rice
(2) Steamed Seabass with Spicy Sauce
(3) Lemon Chicken
(4) Tepanyaki Tofu
(5) Stir Fried Vegetables with Belacan
(6) Seaweed Soup
(7) Chilled Longan

Western Food includes :
(1) Tomato Rice
(2) Stir Fried Sotong with Green Pepper
(3) Baked Hawaiian Chicken
(4) Brocolli & Cauliflower
(5) Mushroom Soup
(6) Sparkling Water
(7) Fresh Fruit

Buffet includes :
(1) Salad
(2) Rice
(3) Main Dishes
(4) BBQ Station
(5) Side Dishes
(6) Soup
(7) Beverages
(8) Fruits
(9) Dessert

Please fill in the form below to select your choice.

Total set of Chinese cuisine you order : 3
Price of Chinese cuisine for each set : RM 88.0
```

```
Payment for Chinese cuisine : RM 264.0

Total set of Western food you order: 2
Price of Western food for each set : RM 108.0
Payment for Western food : RM 216.0

Total set of Buffet for adult : 2
Price of Buffet for each adult : RM 100.0
Payment for Buffet (adult) : RM 200.0

Total set of Buffet for children (< 6) : 1
Price of Buffet for each children (< 6) : RM 20.0
Payment for Buffet (children) : RM 200.0
***The requirement for children package is the age need to be smaller than 6 years
old.***

Total amount : RM 700.0
Total discount received (7 - 10 set) : RM 56.0
Service charge : RM 14.0
Sales and Service Tax (SST) : RM 42.0
Subtotal after 8% Discount Received, 2% Service Charge and 6% SST : RM 700.0
Total cash pay : RM 1000
Changes : RM 300.0
Processing...
```

LIBERTY CRUISE
PAYMENT RECEIPTS

User : Albert Ooi
Ticket No. : 3789011123
Room No. : 1B311
Date : 12/12/2021
Time : 12:30 p.m.

No	Item Name	Unit	Price Per Unit	Cost (RM)
1	Chinese Cuisine	3	88.0	264.0
2	Western Food	2	108.0	216.0
3	Buffet For Adult	2	100.0	200.0
4	Buffet For Child	1	20.0	20.0

Amount	:	700.0
Discount Received (8%)	:	56.0
Service Charge (2%)	:	14.0
SST (6%)	:	42.0
Subtotal	:	700.0
Cash	:	1000.0
Balance	:	300.0

Remember to withdraw 4 Magic Performance Ticket as a free gift with this receipt.

THANK YOU COME AGAIN

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SKIP1013
INTRODUCTION TO PROGRAMMING AND PROBLEM SOLVING
(SEMESTER A211)

INDIVIDUAL ASSIGNMENT 1

Theme:

Problem Solving for Auto / Vehicles

Subtopic:

Train

Title:

Purchasing Train Ticket System

Submitted to:

Prof. Madya Dr. Azman B Yasin

Prepared by:

Name :	**Ahmad Asyraaf Danial Bin Norazlan**
Matric No. :	**284368**
Group :	**A**

Table of Contents

1. Identify the problem.

In rail transport, a train is a series of connected vehicles that run along a railway track and transport people or freight. The word train comes from the Old French *trahiner*, derived from the Latin *trahere* meaning "to pull, to draw". Trains are typically pulled or pushed by locomotives (often known simply as "engines"), though some are self-propelled, such as multiple units. Passengers and cargo are carried in railroad cars, also known as wagons. Trains are designed to a certain gauge, or distance between rails. Most trains operate on steel tracks with steel wheels, which allows low friction and makes them more efficient than other forms of transport.

Rail transport in Malaysia consists of heavy rail (including commuter rail), light rapid transit (LRT), mass rapid transit (MRT), monorails, airport rail links and a funicular railway line. Heavy rail is mostly used for intercity passenger and freight transport as well as some urban public transport, while rapid transit is used for intra-city urban public transport in Kuala Lumpur, the national capital, and the surrounding Klang Valley region. There are two airport rail link systems linking Kuala Lumpur with the Kuala Lumpur International Airport and Sultan Abdul Aziz Shah Airport. The longest monorail line in the country is also used for public transport in Kuala Lumpur, while the only funicular railway line is in Penang.

The railway network covers most of the 11 states in Peninsular Malaysia. In East Malaysia, only the state of Sabah has railways. The network is also connected to the Thai railway 1,000 mm (3 ft 3+3⁄8 in) network in the north. If the Burma Railway is rebuilt, services to Myanmar, India, and China could be initiated.

The intercity railway network in Peninsular Malaysia consists of two main lines: The West Coast Line between Singapore and Padang Besar, Perlis, on the Malaysian-Thai border, and the East Coast Line between Gemas in Negeri Sembilan and Tumpat in Kelantan. There are also several branch lines – between Kuala Lumpur and Port Klang, Batu Junction and Batu Caves, Bukit Mertajam and Butterworth, Kempas and Tanjung Pelepas, and Kempas and Pasir Gudang. The entire 1,699 km network uses 1,000 mm (3 ft 3+3⁄8 in) metre gauge tracks. The network uses a ballasted setup with locally manufactured concrete sleepers. Since the early 1980s, companies formed via international collaboration, such as Mastrak Sdn Bhd had been producing these sleepers via technology transfer. In the five years period of 1982-1987 alone,

it was estimated that about 500,000 pieces of sleepers had been laid for the Kerdau-Jerantut and Sungai Yu-Tumpat lines, giving clear preference due to its advantages over wooden sleepers. This was also evident in the changes made by Sabah State Railway in 2006 for the network under their control.

The network is linked with the Thai railway network at Padang Besar.

A total of 438 km of the network is double-tracked and electrified. They include portions of the West Coast Line between Gemas and Padang Besar and the entire Port Klang branch line as well as Batu Caves branch line. The double-tracked and electrified portions between Tanjung Malim and Pulau Sebang/Tampin, and between Padang Besar and Padang Rengas, as well as the Port Klang, Batu Caves and Butterworth branch lines are used for commuter rail services.

Double tracking and electrification of the stretch of the Batu Caves branch line between Sentul and Batu Caves were completed, having added 7.5 km of double-tracked and electrified sections to the network in 2010. Double tracking and electrification of the West Coastline between Ipoh and Padang Besar started in January 2008 and was completed by November 2014, adding a further 329 km of double-tracked and electrified railway to the network.

A train ticket is a ticket issued by a railway operator that enables the bearer to travel on the operator's network or a partner's network. Tickets can authorize the bearer to travel a set itinerary at a specific time (common for long-distance railroads), a set itinerary at any time (common for commuter railroads), a set itinerary at multiple times, or an arbitrary itinerary at specific times. The last two categories are often called passes: the former is often sold as a discounted block of trips for commuters; the latter is often sold to vacationers, such as European Eurail passes.

In some countries, like Italy, and some local railways in Germany, conductors are not used. Instead, passengers are expected to validate tickets in a special stamping machine before entering the train. A system of coupons that are validated with a special machine exists on the Mumbai Suburban Railway where combinations of coupons of denominations are used to get the corresponding ticket value. There may or may not be a conductor later on double-checking that correct tickets are actually held. Yet further systems are possible, for example in Japan, the

London Underground and in local traffic in Stockholm, the platforms are blocked by turnstiles, forcing the acquisition of a ticket before entering the platform.

Early tickets were like a form of currency issued by individual railroads, sold by agents and collected by conductors who were audited by the railroad to be sure ticket inventories matched reported passenger earnings. As continuous travel over several connected railways became common, Coupon tickets with serrated portions for each railway company might be issued at the origin of travel and sequentially collected by conductors of the railways providing travel to avoid the necessity for purchasing additional tickets at each transfer point.

Malaysia has been known for the ease of access in term of public transport. Most of Malaysian preferred to use the public transport instead of their own vehicles due to heavy traffics especially during peak hours and holidays. One of the most popular public transports in Malaysia is train railways. Most of the Malaysian used the train railways for short distance (mainly to go to workplace or school) or long distance (for holidays to another state or go to hometown).

As a train railways become one of the main public transports used by Malaysian, people are hoping that they can have some options in term of seat types. For long journey, people need more comfortability. Seats with extra legroom or seats with table and near cafeteria are great options for them.

Besides the varieties of seat options, people also hoping to get some discounts for different categories of passengers. Children, Students, Disabled and Senior Passengers deserve to get some discounts from normal price which is the Adult Ticket.

With modern technology, people also hope that they can have more varieties in term of payment method. Besides common cashless payment method which are online banking and debit, e-Wallet can be also implemented to purchase the train tickets.

2. Understand the problem.

Malaysia Railways is a train railway that connected the station from Padang Besar, Perlis to Gemas, Johor. It is one of main transports that used by people to travel across West Coast States of Malaysia. For this train, Malaysia Railways realised they need to add more options in terms

of seat options or seat types. For the seat options, Malaysia Railways has decided to add on 2 more seat options hoping that their passengers will be more comfortable when having journey with Malaysia Railways especially for the long journey. The problem is Malaysia Railways need a system that can show different prices to customers for seat options.

With the different categories of passengers, Malaysia Railways realised need to give some special discounts for special categories to emphasize more customers to use Malaysia Railways as their transport. Malaysia Railways need a system that can show discounts for each category of passengers.

Malaysia Railways also need a system that can show to users the total of payment they need to pay for their tickets and their own e-Wallet system.

3. Identify alternative ways to solve the problem.

- Display price list tickets and let customers choose their seat options.

Pros	Cons
-Can choose their own seat options.	-Could not get discounts for special categories if eligible.

- Manual calculation for every booking of customers

Pros	Cons
-Able to calculate the price anytime	-Miscalculation after using a calculator and long-time calculation. -Take a longer time to have a correct calculation ang have lost data.

- Purchase tickets at the counter.

Pros	Cons
- Less error when purchase the tickets	-Difficult for customers as they need to go to counter to buy tickets.

- System for customers that can purchase tickets by choosing seat options and passengers categories with e-Wallet functionality.

Pros	**Cons**
- Customers have freedom to choose seat options. - Show discounts for special categories - Can buy tickets using Malaysia Railways e-Wallet System.	-Need a person that can charge in system maintenance.

4. Select the best way to solve the problem from the list of alternative solutions.

Malaysia Railways can provide a system for customers that can purchase tickets by choosing seat options and passengers categories with e-Wallet functionality. The system will become more effective to customers as they can purchase the tickets online and does not need to go to the counter. This system will also show the price for each type of seat such as Normal Seat, Hot Seat and Cafeteria Seat. The system will also calculate the discount for special categories passengers such as Children Passenger (10%), Students Passenger (20%), Disabled Passenger (40%) and Senior Passenger (30%). Furthermore, the functionality of e-Wallet System will be more convenient to customers that often use Malaysia Railways services as they need to just to topup the amount into their account.

5. List instructions (steps) that enable you to solve the problem using the selected solution.

1. Recording personal information such as name, departure station and destination station.
2. Show to price of tickets according to Seat Options and Passenger Categories. Calculate the discount for Passenger Categories such as Children Passenger (10%), Students Passenger (20%), Disabled Passenger (40%) and Senior Passenger (30%).
3. Enter the number of tickets customer wants to buy according to Seat Options and Passengers Categories.
4. Calculate the total price of tickets selected.
5. Calculate Sales and Service tax (SST) for the last calculation of payment.
6. Calculate the subtotal the customers need to pay.
7. Calculate the customer account balance of Malaysia Railways e-Wallet after making the payments.
8. Print confirmation slip.

6. Evaluate the solution.

1. Declare variable and its value:
    - double norSAdult = 65.70;
    - double norSChild, norSStud, norSOKU, norSSenior;
    - double hotSAdult, hotSChild, hotSStud, hotSOKU, hotSSenior;
    - double cafeSAdult, cafeSChild, cafeSStud, cafeSOKU, cafeSSenior;
    - double totalnorSAdult, totalnorSChild, totalnorSStud, totalnorSOKU, totalnorSSenior;
    - double totalhotSAdult, totalhotSChild, totalhotSStud, totalhotSOKU, totalhotSSenior;
    - double totalcafeSAdult, totalcafeSChild, totalcafeSStud, totalcafeSOKU, totalcafeSSenior;
    - double sst = 0.06;
    - double tax;
    - double sum;
    - double subtotal;
    - double earlyBal = 700;
    - double finalBal;
    - int norSAdultQuan, norSChildQuan, norSStudQuan, norSOKUQuan, norSSeniorQuan;
    - int hotSAdultQuan, hotSChildQuan, hotSStudQuan, hotSOKUQuan, hotSSeniorQuan;
    - int cafeSAdultQuan, cafeSChildQuan, cafeSStudQuan, cafeSOKUQuan, cafeSSeniorQuan;
    - String date = “30/12/2021”;
    - String time = “4:30 p.m.”;
    - String orderID = “301221003”;
    - String category1 = “Adult Passenger (Normal Seat)”;
    - String category2 = “Adult Passenger (Hot Seat)”;
    - String category3 = “Adult Passenger (Cafeteria Seat)”;
    - String category4 = “Child Passenger (Normal Seat)”;
    - String category5 = “Child Passenger (Hot Seat)”;

- String category6 = “Child Passenger (Cafeteria Seat)”;
- String category7 = “Student Passenger (Normal Seat)”;
- String category8 = “Student Passenger (Hot Seat)”;
- String category9 = “Student Passenger (Cafeteria Seat)”;
- String category10 = “Disabled Passenger (Normal Seat)”;
- String category11 = “Disabled Passenger (Hot Seat)”;
- String category12 = “Disabled Passenger (Cafeteria Seat)”;
- String category13 = “Senior Passenger (Normal Seat)”;
- String category14 = “Senior Passenger (Hot Seat)”;
- String category15 = “Senior Passenger (Cafeteria Seat)”;
- String payMethod = “Malaysia Railways e-Wallet”;
- String clientName;
- String depSt;
- String destSt;

2. Declare type of data to every variable using double, int and string.
3. Print out the descriptive statement for asking the name, departure station, and destination station.
4. Users key in the input for the statement.
5. System calculates the price of tickets according to the Seat Options and Passengers Categories, use Adult Normal Seat Ticket = RM 65.70 as a benchmark. By using hotSAdult = (norSAdult * 110) / 100 will get the price of Adult Hot Seat Ticket. While using cafeSAdult = (norSAdult * 115) / 100 will get the price of Adult Cafeteria Seat Ticket.
6. For discounts for Passenger Categories will get different discounts. For Children Passengers will get 10% of discounts from the price Adult Tickets (According to the Seat Options), for Students Passengers will get 20% of discounts from the price Adult Tickets (According to the Seat Options), Disabled Passengers will get 40% of discounts from the price Adult Tickets (According to the Seat Options), and Senior Passengers will get 30% of discounts from the price Adult Tickets (According to the Seat Options). **Refer to the Table of Calculation Method.**
7. Users selected the tickets that they want to purchase.
8. System will calculate the price of each ticket after multiplied by the quantity.

9. System will calculate the the total amounts of tickets need to pay using sum = totalnorSAdult + totalnorSChild + totalnorSStud + totalnorSOKU + totalnorSSenior + totalhotSAdult + totalhotSChild + totalhotSStud + totalhotSOKU + totalhotSSenior + totalcafeSAdult + totalcafeSChild + totalcafeSStud + totalcafeSOKU + totalcafeSSenior.
10. Use tax to find the sales and service tax that charge to passengers, using tax = sst * sum.
11. Use subtotal to compute the real payment after adding tax, using subtotal = tax + sum.
12. Use finalBal to get the balance of user account Malaysia Railways e-Wallet, using finalBal = earlyBal – subtotal
13. The confirmation slip prints out successfully.

Table 1 : Calculation method

Item	Variable	Calculation
Price Adult Hot Seat Ticket	hotSAdult	(norSAdult * 110) / 100
Price Adult Cafeteria Seat Ticket	cafeSAdult	(norSAdult * 115) / 100;
Price Child Normal Seat Ticket	norSChild	(norSAdult * 90) / 100;
Price Child Hot Seat Ticket	hotSChild	(hotSAdult * 90) / 100;
Price Child Cafeteria Seat Ticket	cafeSChild	(cafeSAdult * 90) / 100
Price Student Normal Seat Ticket	norSStud	(norSAdult * 80) / 100
Price Student Hot Seat Ticket	hotSStud	(hotSAdult * 80) / 100
Price Student Cafeteria Seat Ticket	cafeSStud	(cafeSAdult * 80) / 100
Price Disabled Normal Seat Ticket	norSOKU	(norSAdult * 60) / 100
Price Disabled Hot Seat Ticket	hotSOKU	(hotSAdult * 60) / 100
Price Disabled Cafeteria Seat Ticket	cafeSOKU	(cafeSAdult * 60) / 100
Price Senior Normal Seat Ticket	norSSenior	(norSAdult * 70) / 100
Price Senior Hot Seat Ticket	hotSSenior	(hotSAdult * 70) / 100
Price Senior Cafeteria Seat Ticket	cafeSSenior	(cafeSAdult * 70) / 100
Total Price Adult Hot Seat Ticket	totalnorSAdult	norSAdultQuan * norSAdult
Total Price Adult Cafeteria Seat Ticket	totalhotSAdult	hotSAdultQuan * hotSAdult
Total Price Child Normal Seat Ticket	totalcafeSAdult	cafeSAdultQuan * cafeSAdult
Total Price Child Hot Seat Ticket	totalnorSChild	norSChildQuan * norSChild
Total Price Child Cafeteria Seat Ticket	totalhotSChild	hotSChildQuan * hotSChild
Total Price Student Normal Seat Ticket	totalcafeSChild	norSStudQuan * norSStud
Total Price Student Hot Seat Ticket	totalnorSStud	hotSStudQuan * hotSStud
Total Price Student Cafeteria Seat Ticket	totalhotSStud	cafeSStudQuan * cafeSStud
Total Price Disabled Normal Seat Ticket	totalcafeSStud	norSOKUQuan * norSOKU
Total Price Disabled Hot Seat Ticket	totalnorSOKU	hotSOKUQuan * hotSOKU
Total Price Disabled Cafeteria Seat Ticket	totalhotSOKU	norSSeniorQuan * norSSenior

Total Price Senior Normal Seat Ticket	totalcafeSOKU	hotSStudQuan * hotSStud
Total Price Senior Hot Seat Ticket	totalnorSSenior	hotSSeniorQuan * hotSSenior
Total Price Senior Cafeteria Seat Ticket	totalhotSSenior	cafeSSeniorQuan * cafeSSenior
Total Amount	sum	totalnorSAdult + totalnorSChild + totalnorSStud + totalnorSOKU + totalnorSSenior + totalhotSAdult + totalhotSChild + totalhotSStud + totalhotSOKU + totalhotSSenior + totalcafeSAdult + totalcafeSChild + totalcafeSStud + totalcafeSOKU + totalcafeSSenior
Sales and Service Tax (SST)	tax	sst(0.06) * sum
Subtotal	subtotal	sum + tax
Malaysia Railways e-Wallet Balance	finalBal	earlyBal – subtotal

7. Algorithm

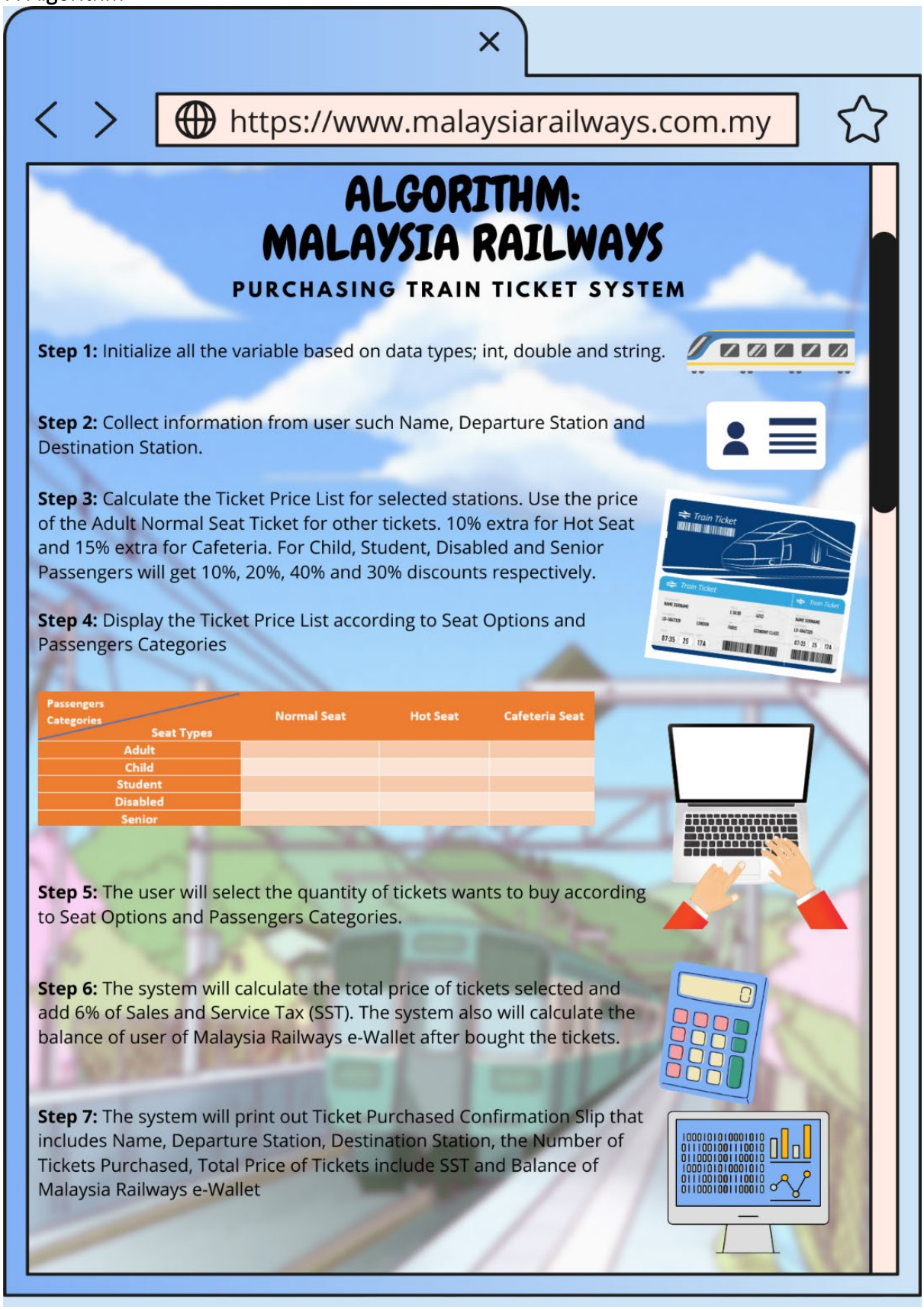

Figure 1: Infographic of Purchasing Train Ticket System

8. Pseudocode

- **Start**
    - Read norSAdult = 65.70
    - Read sst = 0.06
    - Read earlyBal = 700
    - Read date = “30/12/2021”
    - Read time = “4:30 p.m.”
    - Read orderID = “301221003”
    - Read category1 = “Adult Passenger (Normal Seat)”
    - Read category2 = “Adult Passenger (Hot Seat)”
    - Read category3 = “Adult Passenger (Cafeteria Seat)”
    - Read category4 = “Child Passenger (Normal Seat)”
    - Read category5 = “Child Passenger (Hot Seat)”
    - Read category6 = “Child Passenger (Cafeteria Seat)”
    - Read category7 = “Student Passenger (Normal Seat)”
    - Read category8 = “Student Passenger (Hot Seat)”
    - Read category9 = “Student Passenger (Cafeteria Seat)”
    - Read category10 = “Disabled Passenger (Normal Seat)”
    - Read category11 = “Disabled Passenger (Hot Seat)”
    - Read category12 = “Disabled Passenger (Cafeteria Seat)”
    - Read category13 = “Senior Passenger (Normal Seat)”
    - Read category14 = “Senior Passenger (Hot Seat)”
    - Read category15 = “Senior Passenger (Cafeteria Seat)”
    - Read payMethod = “Malaysia Railways e-Wallet”
    - Output “Please enter your Name: ”
    - Input clientname
    - Display “Welcome “ + clientName + “!”
    - Output “Where do you want to go, “+ clientName + “?”
    - Output “Departure Station: “
    - Input depSt
    - Output “Destination Station: “
    - Input destSt
    - Display “You have selected to depart at “ + depSt + “ Station and arrive at “ + destSt + “ Station.”

- Calculate
    - hotSAdult = (norSAdult * 110) / 100;
    - cafeSAdult = (norSAdult * 115) / 100;
    - norSChild = (norSAdult * 90) / 100;
    - hotSChild = (hotSAdult * 90) / 100;
    - cafeSChild = (cafeSAdult * 90) / 100;
    - norSStud = (norSAdult * 80) / 100;
    - hotSStud = (hotSAdult * 80) / 100;
    - cafeSStud = (cafeSAdult * 80) / 100;
    - norSOKU = (norSAdult * 60) / 100;
    - hotSOKU = (hotSAdult * 60) / 100;
    - cafeSOKU = (cafeSAdult * 60) / 100;
    - norSSenior = (norSAdult * 70) / 100;
    - hotSSenior = (hotSAdult * 70) / 100;
    - cafeSSenior = (cafeSAdult * 70) / 100;
- Display “TICKET PRICE LIST FOR “ + depSt + “ STATION TO “ + destSt + “ STATION (EXCLUSIVE SST)”
- Display Table of Ticket Price List
- Display “PLEASE ENTER THE QUANTITY OF TICKETS YOU WANT TO BUY ACCORDING TO THE PASSENGER CATEGORIES AND SEAT TYPES”
- Output “Adult Passenger (Normal Seat): “
- Input norSAdultQuan
- Output “Adult Passenger (Hot Seat): “
- Input hotSAdultQuan
- Output “Adult Passenger (Cafeteria Seat): “
- Input cafeSAdultQuan
- Output “Child Passenger (Normal Seat): “
- Input norSChildQuan
- Output “Child Passenger (Hot Seat): “
- Input hotSChildQuan
- Output “Child Passenger (Cafeteria Seat): “
- Input cafeSChildQuan
- Output “Student Passenger (Normal Seat): “
- Input norSStudQuan

- Output “Student Passenger (Hot Seat): “
- Input hotSStudQuan
- Output “Student Passenger (Cafeteria Seat): “
- Input cafeSStudQuan
- Output “Disabled Passenger (Normal Seat): “
- Input norSOKUQuan
- Output “Disabled Passenger (Hot Seat): “
- Input hotSOKUQuan
- Output “Disabled Passenger (Cafeteria Seat): “
- Input cafeSOKUQuan
- Output “Senior Passenger (Normal Seat): “
- Input norSSeniorQuan
- Output “Senior Passenger (Hot Seat): “
- Input hotSSeniorQuan
- Output “Senior Passenger (Cafeteria Seat): “
- Input cafeSSeniorQuan
- Calculate
    - totalnorSAdult = norSAdultQuan * norSAdult
    - totalhotSAdult = hotSAdultQuan * hotSAdult
    - totalcafeSAdult = cafeSAdultQuan * cafeSAdult
    - totalnorSChild = norSChildQuan * norSChild
    - totalhotSChild = hotSChildQuan * hotSChild
    - totalcafeSChild = cafeSChildQuan * cafeSChild
    - totalnorSStud = norSStudQuan * norSStud
    - totalhotSStud = hotSStudQuan * hotSStud
    - totalcafeSStud = cafeSStudQuan * cafeSStud
    - totalnorSOKU = norSOKUQuan * norSOKU
    - totalhotSOKU = hotSOKUQuan * hotSOKU
    - totalcafeSOKU = cafeSOKUQuan * cafeSOKU
    - totalnorSSenior = norSSeniorQuan * norSSenior
    - totalhotSSenior = hotSSeniorQuan * hotSSenior
    - totalcafeSSenior = cafeSSeniorQuan * cafeSSenior
- Calculate

        - sum = totalnorSAdult + totalnorSChild + totalnorSStud + totalnorSOKU + totalnorSSenior + totalhotSAdult + totalhotSChild + totalhotSStud + totalhotSOKU + totalhotSSenior + totalcafeSAdult + totalcafeSChild + totalcafeSStud + totalcafeSOKU + totalcafeSSenior
        - tax = sst * sum
        - subtotal = sum + tax
        - finalBal = earlyBal – subtotal
    - Output Confirmation Slips
- **End**

9. Flow Chart

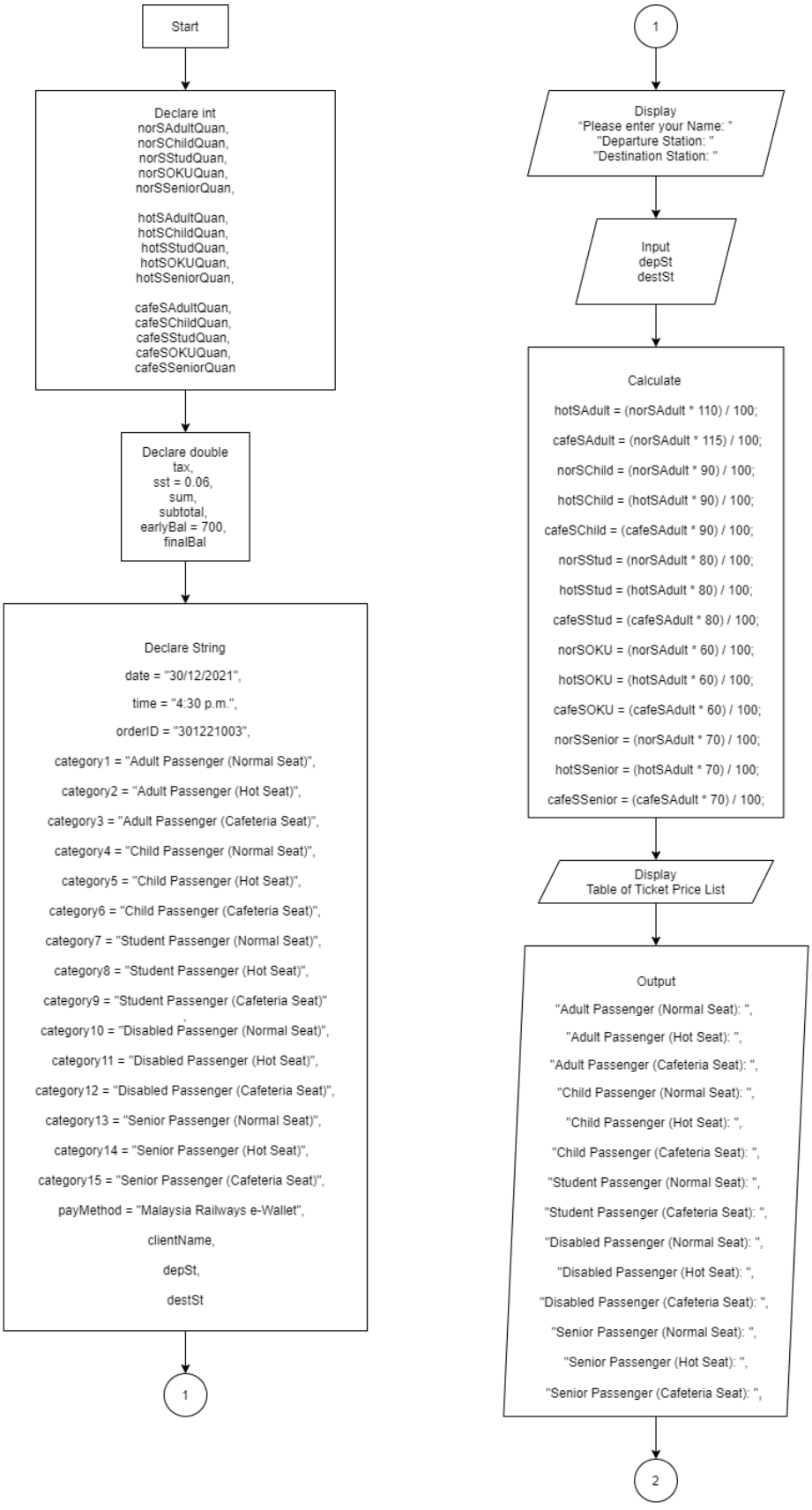

Figure 2: Flowchart

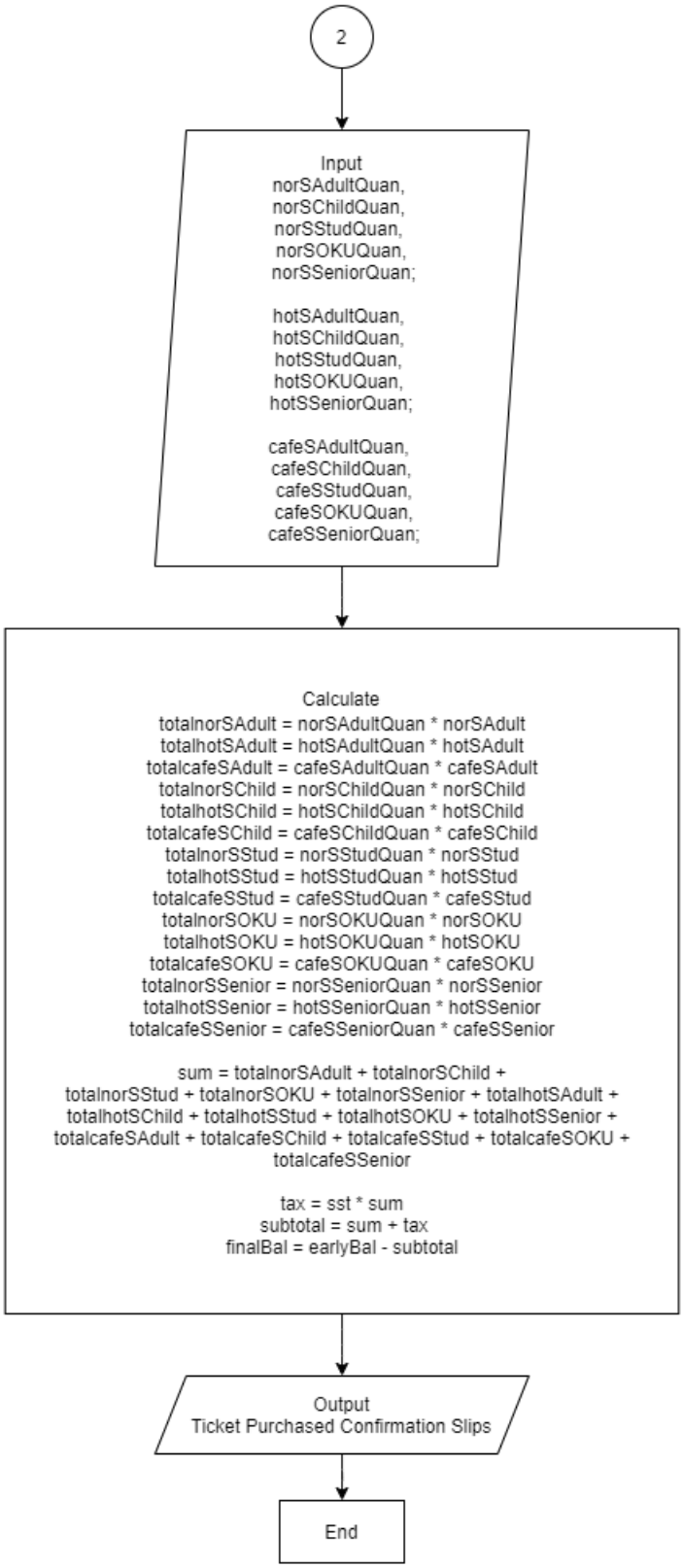

Figure 3: The continued of Flowchart

10. Coding- Numerical Computation & Expression

Table 2: Coding of the system

```
package assignment1;

import java.util.Scanner;

public class PurchasingTicketSystem {

	public static void main(String[] args) {
		// TODO Auto-generated method stub

		Scanner input = new Scanner(System.in);
		double norSAdult = 65.70;
		double norSChild, norSStud, norSOKU, norSSenior;
		double hotSAdult, hotSChild, hotSStud, hotSOKU, hotSSenior;
		double cafeSAdult, cafeSChild, cafeSStud, cafeSOKU, cafeSSenior;
		double totalnorSAdult, totalnorSChild, totalnorSStud, totalnorSOKU, totalnorSSenior;
		double totalhotSAdult, totalhotSChild, totalhotSStud, totalhotSOKU, totalhotSSenior;
		double totalcafeSAdult, totalcafeSChild, totalcafeSStud, totalcafeSOKU, totalcafeSSenior;
		double sst = 0.06;
		double tax;
		double sum;
		double subtotal;
		double earlyBal = 700;
		double finalBal;
		int norSAdultQuan, norSChildQuan, norSStudQuan, norSOKUQuan, norSSeniorQuan;
		int hotSAdultQuan, hotSChildQuan, hotSStudQuan, hotSOKUQuan, hotSSeniorQuan;
		int cafeSAdultQuan, cafeSChildQuan, cafeSStudQuan, cafeSOKUQuan, cafeSSeniorQuan;

		String date = "30/12/2021";
		String time = "4:30 p.m.";
		String orderID = "301221003";
		String category1 = "Adult Passenger (Normal Seat)";
		String category2 = "Adult Passenger (Hot Seat)";
		String category3 = "Adult Passenger (Cafeteria Seat)";
		String category4 = "Child Passenger (Normal Seat)";
		String category5 = "Child Passenger (Hot Seat)";
```

```
            String category6 = "Child Passenger (Cafeteria Seat)";
            String category7 = "Student Passenger (Normal Seat)";
            String category8 = "Student Passenger (Hot Seat)";
            String category9 = "Student Passenger (Cafeteria Seat)";
            String category10 = "Disabled Passenger (Normal Seat)";
            String category11 = "Disabled Passenger (Hot Seat)";
            String category12 = "Disabled Passenger (Cafeteria Seat)";
            String category13 = "Senior Passenger (Normal Seat)";
            String category14 = "Senior Passenger (Hot Seat)";
            String category15 = "Senior Passenger (Cafeteria Seat)";
            String payMethod = "Malaysia Railways e-Wallet";
            String clientName;
            String depSt;
            String destSt;

            hotSAdult = (norSAdult * 110) / 100;
            cafeSAdult = (norSAdult * 115) / 100;

            norSChild = (norSAdult * 90) / 100;
            hotSChild = (hotSAdult * 90) / 100;
            cafeSChild = (cafeSAdult * 90) / 100;

            norSStud = (norSAdult * 80) / 100;
            hotSStud = (hotSAdult * 80) / 100;
            cafeSStud = (cafeSAdult * 80) / 100;

            norSOKU = (norSAdult * 60) / 100;
            hotSOKU = (hotSAdult * 60) / 100;
            cafeSOKU = (cafeSAdult * 60) / 100;

            norSSenior = (norSAdult * 70) / 100;
            hotSSenior = (hotSAdult * 70) / 100;
            cafeSSenior = (cafeSAdult * 70) / 100;


            System.out.println("\n                                                    Welcome to Malaysia Railways
");
```

```
            System.out.println("                                                    Purchasing Ticket System!
");
            System.out.println("-------------------------------------------------------------------------------------------------------------
-------------------------");
            System.out.println(" ");


            System.out.print("Please enter your name: ");
            clientName = input.nextLine();
            System.out.println("Welcome " + clientName + "!");
            System.out.println(" ");

            System.out.println("-------------------------------------------------------------------------------------------------------------
-------------------------");
            System.out.println(" ");

            System.out.println("Where do you want to go, "+ clientName + "?");
            System.out.print("Departure Station: ");
            depSt = input.nextLine();
            System.out.print("Destination Station: ");
            destSt = input.nextLine();

            System.out.println(" ");
            System.out.println("You have selected to depart at " + depSt + " Station and arrive at " + destSt + " Station.");
            System.out.println(" ");

            System.out.println("-------------------------------------------------------------------------------------------------------------
-------------------------");
            System.out.println(" ");
            System.out.println("                    TICKET PRICE LIST FOR " + depSt + " STATION TO " + destSt + " STATION
(EXCLUSIVE SST)                ");

            System.out.println("
_____________________________________________________________________________________________");
            System.out.println("    |                  |                              |          HOT SEAT           |
CAFETERIA SEAT        |");
            System.out.println("    |    CATEGORIES    |         NORMAL SEAT          |       (EXTRA LEGROOM)       |
(CAFETERIA COACH)      |");
```

```
            System.out.println("
|_________________|_____________________________|_____________________________|_____________________________|");
            System.out.println("    |                 |                             |                             |
|");
            System.out.printf ("    |      ADULT"           );
            System.out.printf ("       |           RM%.2f" , norSAdult);
            System.out.printf ("            |          RM%.2f", hotSAdult );
            System.out.printf ("            |           RM%.2f", cafeSAdult );
            System.out.print  ("            |");
            System.out.println("");
            System.out.println("    |                 |                             |                             |
|");

            System.out.printf ("    |      CHILD"           );
            System.out.printf ("       |           RM%.2f" , norSChild);
            System.out.printf ("            |          RM%.2f", hotSChild );
            System.out.printf ("            |           RM%.2f", cafeSChild );
            System.out.print  ("            |");
            System.out.println("");
            System.out.println("    |                 |                             |                             |
|");

            System.out.printf ("    |     STUDENT"    );
            System.out.printf ("      |           RM%.2f" , norSStud);
            System.out.printf ("            |          RM%.2f", hotSStud );
            System.out.printf ("            |           RM%.2f", cafeSStud );
            System.out.print  ("            |");
            System.out.println("");
            System.out.println("    |                 |                             |                             |
|");

            System.out.printf ("    |     DISABLED"     );
            System.out.printf ("     |           RM%.2f" , norSOKU);
            System.out.printf ("            |          RM%.2f", hotSOKU );
            System.out.printf ("            |           RM%.2f", cafeSOKU );
            System.out.print  ("            |");
            System.out.println("");
```

```
            System.out.println("    |                  |                                  |                                  |
|");

            System.out.printf ("    |      SENIOR"          );
            System.out.printf ("      |           RM%.2f" , norSSenior);
            System.out.printf ("            |          RM%.2f", hotSSenior );
            System.out.printf ("            |           RM%.2f", cafeSSenior );
            System.out.print  ("            |");
            System.out.println("");
            System.out.println("
|________________|__________________________|__________________________|__________________________|" );


            System.out.println("");
            System.out.println("        PLEASE ENTER THE QUANTITY OF TICKETS YOU WANT TO BUY ACCORDING TO THE PASSENGER
CATEGORIES AND SEAT TYPES        ");
            System.out.println("");
            System.out.print("Adult Passenger (Normal Seat): ");
            norSAdultQuan = input.nextInt();
            System.out.print("Adult Passenger (Hot Seat): ");
            hotSAdultQuan = input.nextInt();
            System.out.print("Adult Passenger (Cafeteria Seat): ");
            cafeSAdultQuan = input.nextInt();
            System.out.println("");

            System.out.print("Child Passenger (Normal Seat): ");
            norSChildQuan = input.nextInt();
            System.out.print("Child Passenger (Hot Seat): ");
            hotSChildQuan = input.nextInt();
            System.out.print("Child Passenger (Cafeteria Seat): ");
            cafeSChildQuan = input.nextInt();
            System.out.println("");

            System.out.print("Student Passenger (Normal Seat): ");
            norSStudQuan = input.nextInt();
            System.out.print("Student Passenger (Hot Seat): ");
            hotSStudQuan = input.nextInt();
            System.out.print("Student Passenger (Cafeteria Seat): ");
```

```
            cafeSStudQuan = input.nextInt();
            System.out.println("");

            System.out.print("Disabled Passenger (Normal Seat): ");
            norSOKUQuan = input.nextInt();
            System.out.print("Disabled Passenger (Hot Seat): ");
            hotSOKUQuan = input.nextInt();
            System.out.print("Disabled Passenger (Cafeteria Seat): ");
            cafeSOKUQuan = input.nextInt();
            System.out.println("");

            System.out.print("Senior Passenger (Normal Seat): ");
            norSSeniorQuan = input.nextInt();
            System.out.print("Senior Passenger (Hot Seat): ");
            hotSSeniorQuan = input.nextInt();
            System.out.print("Senior Passenger (Cafeteria Seat): ");
            cafeSSeniorQuan = input.nextInt();
            System.out.println("");

            System.out.println("-------------------------------------------------------------------------------------------------
-------------------------");
            System.out.println(" ");

            totalnorSAdult = norSAdultQuan * norSAdult;
            totalhotSAdult = hotSAdultQuan * hotSAdult;
            totalcafeSAdult = cafeSAdultQuan * cafeSAdult;
            totalnorSChild = norSChildQuan * norSChild;
            totalhotSChild = hotSChildQuan * hotSChild;
            totalcafeSChild = cafeSChildQuan * cafeSChild;
            totalnorSStud = norSStudQuan * norSStud;
            totalhotSStud = hotSStudQuan * hotSStud;
            totalcafeSStud = cafeSStudQuan * cafeSStud;
            totalnorSOKU = norSOKUQuan * norSOKU;
            totalhotSOKU = hotSOKUQuan * hotSOKU;
            totalcafeSOKU = cafeSOKUQuan * cafeSOKU;
            totalnorSSenior = norSSeniorQuan * norSSenior;
            totalhotSSenior = hotSSeniorQuan * hotSSenior;
            totalcafeSSenior = cafeSSeniorQuan * cafeSSenior;
```

```
            sum = totalnorSAdult + totalnorSChild + totalnorSStud + totalnorSOKU + totalnorSSenior + totalhotSAdult +
totalhotSChild + totalhotSStud + totalhotSOKU + totalhotSSenior + totalcafeSAdult + totalcafeSChild + totalcafeSStud +
totalcafeSOKU + totalcafeSSenior;
            tax = sst * sum;
            subtotal = sum + tax;
            finalBal = earlyBal - subtotal;

            System.out.println("                                                    MALAYSIA RAILWAYS
");
            System.out.println("                                                TICKET PURCHASED CONFIRMATION
");
            System.out.println("-------------------------------------------------------------------------------------------
--------------------------");
            System.out.println("Name                        : " + clientName);
            System.out.println("Order ID.                   : " + orderID);
            System.out.println("Date Purchased              : " + date);
            System.out.println("Time Purchased              : " + time);
            System.out.println("Payment Method              : " + payMethod);
            System.out.println("Departure Station           : " + depSt + " Station");
            System.out.println("Destination Station         : " + destSt + " Station");
            System.out.println("-------------------------------------------------------------------------------------------
--------------------------");
            System.out.println("No            Ticket Categories                         Quantity
Cost (RM)        ");
            System.out.println("-------------------------------------------------------------------------------------------
--------------------------");
            System.out.printf ("\n1          " + category1 + "                      " + norSAdultQuan + "
%.2f" , totalnorSAdult);
            System.out.printf ("\n2          " + category2 + "                         " + hotSAdultQuan + "
%.2f" , totalhotSAdult);
            System.out.printf ("\n3          " + category3 + "                    " + cafeSAdultQuan + "
%.2f", totalcafeSAdult);
            System.out.printf ("\n4          " + category4 + "                      " + norSChildQuan + "
%.2f" , totalnorSChild);
            System.out.printf ("\n5          " + category5 + "                         " + hotSChildQuan + "
%.2f" , totalhotSChild);
```

```
            System.out.printf ("\n6          " + category6 + "                  " + cafeSChildQuan + "
%.2f" , totalcafeSChild);
            System.out.printf ("\n7          " + category7 + "                  " + norSStudQuan + "
%.2f" , totalnorSStud);
            System.out.printf ("\n8          " + category8 + "                     " + hotSStudQuan + "
%.2f" , totalhotSStud);
            System.out.printf ("\n9          " + category9 + "                " + cafeSStudQuan + "
%.2f" , totalcafeSStud);
            System.out.printf ("\n10         " + category10 + "                  " + norSOKUQuan + "
%.2f" , totalnorSOKU);
            System.out.printf ("\n11         " + category11 + "                     " + hotSOKUQuan + "
%.2f" , totalhotSOKU);
            System.out.printf ("\n12         " + category12 + "                " + cafeSOKUQuan + "
%.2f" , totalcafeSOKU);
            System.out.printf ("\n13         " + category13 + "                    " + norSSeniorQuan + "
%.2f" , totalnorSSenior);
            System.out.printf ("\n14         " + category14 + "                       " + hotSSeniorQuan + "
%.2f" , totalhotSSenior);
            System.out.printf ("\n15         "  + category15 + "                  " + cafeSSeniorQuan + "
%.2f" , totalcafeSSenior);
            System.out.println("\n-------------------------------------------------------------------------------------------
---------------------------");
            System.out.printf("\n Amount                                    :
%.2f" , sum);
            System.out.println("\n-------------------------------------------------------------------------------------------
---------------------------");
            System.out.printf("\n Sales and Service Tax (SST)               :
%.2f" , tax);
            System.out.println("\n-------------------------------------------------------------------------------------------
---------------------------");
            System.out.printf("\n Subtotal                                  :
%.2f" , subtotal);
            System.out.println("\n-------------------------------------------------------------------------------------------
---------------------------");
            System.out.printf("\n Malaysia Railways e-Wallet Balance        :
%.2f" , finalBal);
```

```
            System.out.println("\n-------------------------------------------------------------------------------------------
---------------------------");
            System.out.println(" ");

            System.out.println("                                                    Congratulations!
");
            System.out.println("                                                You purchases have been confirmed
");
            System.out.println("                                              Please be at the station 30 minutes earlier
");
            System.out.println("                                                   Have a nice day " + clientName +"!
");

      }

}
```

Table 3: Output of the system

```
                                Welcome to Malaysia Railways
                                 Purchasing Ticket System!
--------------------------------------------------------------------------------------------------------------------------

Please enter your name: ASYRAAF DANIAL
Welcome ASYRAAF DANIAL!

--------------------------------------------------------------------------------------------------------------------------

Where do you want to go, ASYRAAF DANIAL?
Departure Station: SUNGAI PETANI
Destination Station: KL SENTRAL

You have selected to depart at SUNGAI PETANI Station and arrive at KL SENTRAL Station.

--------------------------------------------------------------------------------------------------------------------------

                    TICKET PRICE LIST FOR SUNGAI PETANI STATION TO KL SENTRAL STATION (EXCLUSIVE SST)
```

CATEGORIES	NORMAL SEAT	HOT SEAT (EXTRA LEGROOM)	CAFETERIA SEAT (CAFETERIA COACH)
ADULT	RM65.70	RM72.27	RM75.56
CHILD	RM59.13	RM65.04	RM68.00
STUDENT	RM52.56	RM57.82	RM60.44
DISABLED	RM39.42	RM43.36	RM45.33
SENIOR	RM45.99	RM50.59	RM52.89

```
        PLEASE ENTER THE QUANTITY OF TICKETS YOU WANT TO BUY ACCORDING TO THE PASSENGER CATEGORIES AND SEAT TYPES
```

```
Adult Passenger (Normal Seat): 0
Adult Passenger (Hot Seat): 2
Adult Passenger (Cafeteria Seat): 0

Child Passenger (Normal Seat): 2
Child Passenger (Hot Seat): 0
Child Passenger (Cafeteria Seat): 0

Student Passenger (Normal Seat): 0
Student Passenger (Hot Seat): 0
Student Passenger (Cafeteria Seat): 3

Disabled Passenger (Normal Seat): 0
Disabled Passenger (Hot Seat): 0
Disabled Passenger (Cafeteria Seat): 0

Senior Passenger (Normal Seat): 0
Senior Passenger (Hot Seat): 2
Senior Passenger (Cafeteria Seat): 0

-------------------------------------------------------------------------------------------------------------------
                                                MALAYSIA RAILWAYS
                                            TICKET PURCHASED CONFIRMATION
-------------------------------------------------------------------------------------------------------------------
Name                        : ASYRAAF DANIAL
Order ID.                   : 301221003
Date Purchased              : 30/12/2021
Time Purchased              : 4:30 p.m.
Payment Method              : Malaysia Railways e-Wallet
Departure Station           : SUNGAI PETANI Station
Destination Station         : KL SENTRAL Station
-------------------------------------------------------------------------------------------------------------------
No                Ticket Categories                         Quantity                                    Cost (RM)
-------------------------------------------------------------------------------------------------------------------

1          Adult Passenger (Normal Seat)                      0                                          0.00
2          Adult Passenger (Hot Seat)                         2                                        144.54
3          Adult Passenger (Cafeteria Seat)                   0                                          0.00
```

4	Child Passenger (Normal Seat)	2	118.26
5	Child Passenger (Hot Seat)	0	0.00
6	Child Passenger (Cafeteria Seat)	0	0.00
7	Student Passenger (Normal Seat)	0	0.00
8	Student Passenger (Hot Seat)	0	0.00
9	Student Passenger (Cafeteria Seat)	3	181.33
10	Disabled Passenger (Normal Seat)	0	0.00
11	Disabled Passenger (Hot Seat)	0	0.00
12	Disabled Passenger (Cafeteria Seat)	0	0.00
13	Senior Passenger (Normal Seat)	0	0.00
14	Senior Passenger (Hot Seat)	2	101.18
15	Senior Passenger (Cafeteria Seat)	0	0.00

Amount	:	545.31
Sales and Service Tax (SST)	:	32.72
Subtotal	:	578.03
Malaysia Railways e-Wallet Balance	:	121.97

Congratulations!
You purchases have been confirmed
Please be at the station 30 minutes earlier
Have a nice day ASYRAAF DANIAL!

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