

Lab Exercise 2: Object, Array List, Composite Classes

ALL

- This lab exercise is divided into four stages – Stage 1, Stage 2, Stage 3 and Stage 4.
- You need to complete Stage 1 without errors before you can proceed to Stage 2, and complete Stage 2 without errors before you can proceed to Stage 3 and Stage 4.
- For reference (e.g., list of methods in ArrayList class that you can use), you may refer to the following Java documentation:
 - ArrayList (Java Platform SE 8):

<https://docs.oracle.com/javase/8/docs/api/java/util/ArrayList.html>

Question:

Biladi AirPort is an International airport which caters for flights from various airlines. One of its services is to print boarding passes for passengers who perform web or mobile check-in. To ensure efficiency, all boarding passes are printed according to flight, one after another. Figure 1 shows information usually displayed on a Boarding Pass:


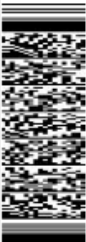

		ECONOMY CLASS			
	Name MOHAZLAN/MARWA HUMAIRA MS		Frequent Flyer Number 49		Security Number 49
	From HEATHROW- LONDON	To KUALA LUMPUR	SSR MOML CHD	Flight Number MH 0001	Date 19 APR
	Gate 21:00	Class O	PNR L90HT	Seat 58B	Departure Time 22:00
				E-Ticket Number 2322431195137	

Figure 1

The general structure is as follows:

- A Flight contains information on From (source airport), To (destination airport), Flight Number, Date, Departure Time. It also maintains boardingPassList (a list of Boarding Pass, each is associated to one passenger on board this flight).
- A Boarding Pass contains information on associated Passenger, Gate, Gate Opens (the time the gate is open for passengers), Security Number and Seat (only assigned when a passenger checks in).
- Passenger's information that will be displayed in the boarding pass includes Name (for simplicity name is in format surname/firstname title), Frequent Flyer Number (if any),

SSR (Special Service Request – for example Moslem Meal (MOML) CHD (child), Class (O-economy, B-business, F-first) and E-Ticket Number. Other information includes passport number, nationality, and gender.

Task:

Your tasks are to develop a program to keep track of flight associated information, print all boarding passes according to flight and print statistics of passengers by ticket class for each flight.

Stage 1:

1. Create a Java project named `Lab2-Stage1`.
2. Copy file `FlightPlanTester1.java` into your project.

Define a class named `Passenger` (in file `Passenger.java`) that has:

- i. *Instance variables* to represent name, frequentFlyerNum, passportNum, nationality, gender, eTicketNum, specialServiceRequest and ticketClass.
- ii. *Constructor* method which receives seven parameters in (i) and assigns them to the associated instance variables.

Define a class named `BoardingPass` (in file `BoardingPass.java`) that has:

- i. *Instance variables* to represent a Passenger object, securityNum, gate, gateOpen and seat.
- i. *Constructor* method which receives 5 parameters, and
 - assigns the parameters to the instance variables in (i) and assigns them to the associated instance variables.

Define a class named `Flight` (in file `Flight.java`) that has:

- i. *Instance variables* to represent the from, to, flightNumber, date, departureTime, firstClassNum, businessClassNum, economyClassNum, and boardingPassList (to keep an array list of Boarding Pass) .
- ii. *Constructor* method which receives five parameters representing from (source airport), to (destination airport), flightNumber, date, departureTime,
 - and assigns the parameters to the associated instance variables of class `Flight`.
 - Assigns initial values for firstClassNum, businessClassNum, economyClassNum as 0.

- creates an empty array list of `BoardingPass` and assigned it to instance variable `boardingPassList`.

Check your answer by invoking the main method in class `FlightPlanTester1` (just run project as Java Application) and your output should be as follows:

Total number of flights :3

*Proceed to Stage 2 only after you have completed Stage 1 without errors.

Stage 2:

1. Create a Java project named `Lab2-Stage2`.
2. Copy file `FlightPlanTester2.java` into your project.
3. Copy files `Passenger.java`, `BoardingPass.java` and `Flight.java` in Stage 1 into your Stage 2 Java project.

Add into the `Flight` class:

- i. A method named `getFrom` that returns the instance variable `from`.
- ii. A method named `getTo` that returns the instance variable `to`.
- iii. A method named `getFlightNum` that returns the instance variable `flightNum`.
- iv. A method named `getDate` that returns the instance variable `date`.
- v. A method named `getDepartureTime` that returns the instance variable `departureTime`.
- vi. A method named `getEconomyClassNum` that returns the instance variable `economyClassNum`.
- vii. A method named `getBusinessClassNum` that returns the instance variable `businessClassNum`.
- viii. A method named `getFirstClassNum` that returns the instance variable `firstClassNum`.
- ix. A method named `getBoardingPassList` that returns the instance variable `boardingPassList`.

Get Methods for class `BoardingPass` and `Passenger` will be added in the next stage.

Check your answer by invoking the main method in class `FlightPlanTester2` and your output should be as follows:

```
Total number of flights :3
== Flight Plan ==

From : HEATHROW-LONDON
To : KUALA LUMPUR
Flight Number : MH001
Date : 19 APR
Departure Time : 22:00

From : CDG-PARIS
To : JFK-NEW YORK
Flight Number : Icelandair 541
Date : 20 JUN
Departure Time : 15:00

From : ADL-ADELAIDE
To : DOH-DOHA
Flight Number : EY6311
Date : 13 JUL
Departure Time : 00:40
```

*Proceed to Stage 3 only after you have completed Stage 2 without errors.

Stage 3:

1. Create a Java project named `Lab2-Stage3`.
2. Copy file `FlightPlanTester3.java` into your project.
4. Copy files `Passenger.java`, `BoardingPass.java` and `Flight.java` in Stage 2 into your Stage 3 Java project.

Add into the `Passenger` class:

- i. A method named `getName` that returns the instance variable `name`.
- ii. A method named `getPassportNum` that returns the instance variable `passportNum`.
- iii. A method named `getNationality` that returns the instance variable `nationality`.
- iv. A method named `getGender` that returns the instance variable `gender`.
- v. A method named `getFrequentFlyerNum` that returns the instance variable `frequentFlyerNum`.
- vi. A method named `getETicketNum` that returns the instance variable `eTicketNum`.
- vii. A method named `getSpecialServiceRequest` that returns the instance variable `specialServiceRequest`.
- viii. A method named `getTicketClass` that returns the instance variable `ticketClass`.

Add into the BoardingPass class:

- i. A method named `getPassenger` that returns the instance variable `passenger`.
- ii. A method named `getSecurityNum` that returns the instance variable `securityNum`.
- iii. A method named `getGate` that returns the instance variable `gate`.
- iv. A method named `getGateOpen` that returns the instance variable `gateOpen`.
- v. A method named `getSeat` that returns the instance variable `seat`.

Add into the Flight class:

- i. A void method named `printBoardingPass` that receives a Flight `f` object as a parameter, and print the boarding pass using Flight object `f` for each BoardingPass object in `boardingPassList`.

(Hints: use get methods of object BoardingPass and Flight when required.)

Check your answer by invoking the main method in class FlightPlanTester3 and your output should be as follows:

```
Printing Boarding Pass For All Flights
```

```
Flight 1 : MH001
```

```
Name:AZIZ/MOHD AZLAN DR | Frequent Flyer Number:MH 304662573 BLUE | Security Number:40
From:HEATHROW-LONDON | To:KUALA LUMPUR | SSR:MOML | Flight Number:MH001 | Date:19 APR | Departure:22:00
Gate:A | Gate Open:17:00 | Class:O | Seat:58A | E-Ticket Number:E778988688
```

```
Name:LEAS/LIYANA MS | Frequent Flyer Number: | Security Number:41
From:HEATHROW-LONDON | To:KUALA LUMPUR | SSR:MOML CHD | Flight Number:MH001 | Date:19 APR |
Departure:22:00
Gate:A | Gate Open:17:00 | Class:B | Seat:45F | E-Ticket Number:E12349876
```

```
Name:ABDULLAH/ZURAIDAH MS | Frequent Flyer Number:MH012333444 GOLD | Security Number:44
From:HEATHROW-LONDON | To:KUALA LUMPUR | SSR:MOML | Flight Number:MH001 | Date:19 APR | Departure:22:00
Gate:A | Gate Open:17:00 | Class:F | Seat:07A | E-Ticket Number:E77778888
```

```
Flight 2 : Icelandair 541
```

```
Name:LEE/MIN HO MR | Frequent Flyer Number:SK0777999 | Security Number:42
From:CDG-PARIS | To:JFK-NEW YORK | SSR:VML | Flight Number:Icelandair 541 | Date:20 JUN | Departure:15:00
Gate:G | Gate Open:12:10 | Class:B | Seat:12A | E-Ticket Number:E23455678
```

```
Name:YOUNG/ALEX MR | Frequent Flyer Number:RC081737 | Security Number:43
From:CDG-PARIS | To:JFK-NEW YORK | SSR:CHD | Flight Number:Icelandair 541 | Date:20 JUN | Departure:15:00
Gate:G | Gate Open:12:10 | Class:B | Seat:13B | E-Ticket Number:E23455678
```

```
Flight 3 : EY6311
```

```
Name:KURNIAWAN/ELIYA EKA MS | Frequent Flyer Number: | Security Number:45
From:ADL-ADELAIDE | To:DOH-DOHA | SSR:MOML | Flight Number:EY6311 | Date:13 JUL | Departure:00:40
Gate:C | Gate Open:21:10 | Class:O | Seat:37D | E-Ticket Number:E12345678
```

***Proceed to Stage 3 only after you have completed Stage 2 without errors.**

Stage 4:

3. Create a Java project named Lab2-Stage4.
4. Copy file FlightPlanTester4.java into your project.
5. Copy files Passenger.java, BoardingPass.java and Flight.java in Stage 3 into your Stage 4 Java project.

Add into the Flight class :

- i. A void method named updatePassengerNum that checks each BoardingPass object in boardingPassList and calculate the total number BoardingPass with economy class, business class and first class.
- ii. A void method named printPassengerNumByTicketClass that receives a Flight f object as a parameter, and print the total number of economy class, business class and first class boarding pass in this flight.

Check your answer by invoking the main method in class FlightPlanTester4 and your output should be as follows:

```
Print number of passenger according to Ticket Class

Flight 1 : MH001
Number of Economy Class Passengers : 1
Number of Business Class Passengers : 1
Number of First Class Passengers : 1

Flight 2 : Icelandair 541
Number of Economy Class Passengers : 0
Number of Business Class Passengers : 2
Number of First Class Passengers : 0

Flight 3 : EY6311
Number of Economy Class Passengers : 1
Number of Business Class Passengers : 0
Number of First Class Passengers : 0
```