

# Final Exam CSC 215

## King Saud University

### Computer Science and Information Sciences

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## 1 Problem

In this exam, you will write a program that manages passengers's travel plans in a world where four airports exist (Riyadh, Jeddah, Dammam and Dubai)

1. In the file "passenger.h" (3 pts):

(a) define the structure **passenger** with *at least* the following attributes:

- **Name**: This will hold the passenger's name. (maximum of 50 characters)
- **Trip**: A linked list of destination airports. For example, if traveling from Riyadh to Dubai through dammam: Riyadh  $\rightarrow$  Dammam  $\rightarrow$  Dubai. ( How you make structures for this is up to you )
- **Family**: An array of strings representing the names of family members. Each passenger can have at most 4 family members.
- **Famsize**: The number of family members.

(b) Define the structure **plist** to describe a linked list of passengers.

(c) You may need more structures.

2. In the file "passenger.c", define the functions: (4 pts)

- (a) **newPassenger** which *receives* the name for one passenger and constructs and initializes an instance of the structure.
- (b) **addDest** which *receives* a passenger and a destination. It adds this destination as the last hop in the passenger's trip.
- (c) **addFamily** which *receives* a passenger and the name of a family member. It adds this family member to the passenger's family.
- (d) **calculateFare** which receives one passenger and calculates the fare for *the passenger and their family*. Fares are out of the following table. Note that the first hop is at full fare, while the  $i$ th hop is discounted at  $(\frac{1}{2})^i$ .

From/To	Riyadh	Jeddah	Dammam	Dubai
Riyadh	0	300	200	800
Jeddah	300	0	500	1000
Dammam	200	500	0	400
Dubai	800	1000	400	0

Table 1: Example: For Jeddah  $\rightarrow$  Riyadh  $\rightarrow$  Dammam  $\rightarrow$  Dubai, the fee is  $300 + \frac{200}{2} + \frac{400}{4}$  **per person**

3. In "program.c", write a main function that does: **(5 pts)**

- Creates and initialize four linked lists: One for passengers who visit each airport. (A passenger who travels from riyadh to dammam will be in both linked lists) ( $\frac{1}{2}$  **pt**)
- Opens the plain text file "trips.txt" and constructs passengers from it according to the formatting: **(3 pts)**

- Each line that begins with "Passenger:" is the beginning of a new passenger's information.
- Each line that begins with "Trip:" describes the travel plans for this passenger, each hop in a line.
- Each line that begins with "Family:" has the *first* names of family members, each name in a line

```

1 Passenger :
2 Mohammed AlKhaldy
3 Trip :
4 Riyadh
5 dammam
6 Jeddah
7 Family :
8 Jumanah
9 Ali
10 Saleh

```

- Insert this passenger's information into the list of *each airport they visit*. ( Do not allow duplicates ) ( $\frac{1}{2}$  **pt**)
- Offer the user the choice of printing the list of any of the four airports. For each passenger, print the passenger's information and the fees of their trip. **(1 pt)**

4. Write a makefile **(1 pt)**

### Example output:

```
1 Please choose :
2 1) Passengers through Riyadh
3 2) Passengers through Jeddah
4 3) Passengers through Dammam
5 4) Passengers through Dubai
6 Choice: 3
7
8 Passengers through Dammam:
9 Passenger:
10 Khalid Alali
11 Trip:
12 Jeddah
13 Dammam
14 Riyadh
15 Family:
16 Hussah
17 Mohammed
18 Fee:1800
19 =====
20 Passenger:
21 Mohammed Alkhalidy
22 Trip:
23 Riyadh
24 Dammam
25 Dubai
26 Family:
27 Khalid
28 Fee:1200
29 =====
30 Passenger:
31 Saad AlSaad
32 Trip:
33 Jeddah
34 Dammam
35 Dubai
36 Riyadh
37 Family:
38 Alaa
39 Fee:1800
```