

Exercise 4

More List Operations w/ ArrayLists

Overhaul

- In your Hands-On Exam 1, replace the **Airline Array** with an **Airline ArrayList**.
- Next, replace **all** the **Arrays** with **ArrayLists**.

Java ArrayList: What to look out for

- Figure out the following:
 1. How to **create** an ArrayList?
 2. How to **initialize** an ArrayList?
 3. How to **store** data in an ArrayList?
 4. How to **read** data from an ArrayList?
 5. How is an ArrayList **different** from an Array?

What's so *special* about ArrayLists?

*It's a **resizable** array.*

... actually, the other types Java Lists are also “special”

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Designing methods
that **work together.**

No method is an island.

How methods communicate with other methods



```
int foo(int param)
```



- The parameters are like ears
- The return values are like mouths

```
public int getSum(int a, int b)
```

getSum *listens* for two values given as a and b.
It can then *tell* other parts of the program what the sum is.

```
int sum = getSum(3, 10);
```

Here, another method can tell **getSum** to process 3 and 10.
It will then return the sum of 3 and 10, which we can store.

Looking at our
methods...

- `public static void filterByAirline(String airline)`
- `public static void filterByOrigin(String origin)`
- `public static void filterByDestination(String destination)`
- `public static void filterByDate(String date)`



void *methods cannot speak.*

Redesigning our components

```
public static void filterByAirline(String airline)
```

What is the purpose of the method?

➤ *To print a list of flights that are from a given airline*

What does it need to process?

➤ *A list of flights (currently the full list)*

➤ *A name of an airline*

parameters

What is the result of processing?

➤ *A list of flights from the given airline*

return value

The Redesign

Recall: `printFlight()`
A *flight* is just a combination of flight number, airline name, locations, dates and price stored in the same index.

```
public static void filterByAirline(String airline)
```

Parameters

➤ *A list of flights (currently the full list)*

➤ *A name of an airline*

(**<list of flights>**, **<airline>**)

(ArrayList<Integer> flights, String airline)

Return

➤ *A list of flights from the given airline*

```
public static <list of flights> filterByAirline
```

```
public static ArrayList<Integer> filterByAirline
```

Modifying the Operation

What is the purpose of the method?

- To ~~print~~ a list of flights that are from a given airline
- To **return** a list of flights that are from a given airline

Parameters

- A list of flights (*ArrayList<Integer> flights, String airline*)

```
for(int i = 0; i < <# of given flights>; i++)  
    if(<flight from given list>.equals(airline))  
        printFlight(i);  
        <add to filtered list of flights>
```

Using ArrayLists

Reminder:

A *flight* is just a combination of flight number, airline name, locations, dates and price stored in the same index.

All ArrayList contents must be Objects, so we must use `Integer` instead of `int`.

```
ArrayList<Integer> filteredList = new ArrayList();

for(int i = 0; i < flights.size(); i++)
    if(airlines[flights.get(i).intValue].equals(airline))
        filteredList.add(i);

return filteredList;
```

The flights list only contains the indices of the flights that we should filter.

If all methods
your methods
could
communicate..

- Filtering by destination and origin:

```
ArrayList<Integer> m1aOnly  
    = filterByOrigin(getAllIndices(), "Manila");  
ArrayList<Integer> m1aToCebOnly  
    = filterByDestination(m1aOnly, "Cebu");  
printFlights(m1aToCebOnly);
```

... or (in one line/expression), just:

```
printFlights(  
    filterByDestination(  
        filterByOrigin(getAllIndices(), "Manila"),  
        "Cebu")  
);
```

Checking

- Prepare a $\frac{1}{8}$ th piece of Yellow Pad
- Write your name and section on the upper-left
- List down the item numbers that you have completely answered
 - E.g.,
Juan de la Cruz So1
1
3
^means he was only able to answer items 1 and 3
- During checking, first present the console output for each item, then show the source code to the instructor.

Exercise Problems

Implement the following methods using proper method combinations:

1. Create a method **filterByAirlineOrigin** that displays only flights from a given airline and place of origin.
2. Create a method **filterDestinationArrival** that displays only flights to a given destination and arriving at a given date.
3. Create a method **filterAirlineOriginDate** that displays only flights from a given airline, from a given location, and departing at a given date.
4. Create a method **sortByPrice** that displays all the flights from the cheapest to the most expensive.