

# SdPd/java Lab Exam 4

## **Objective: AirAmbulance, AirTaxi and AirCargo Helicopters**

Corrib Helicopters operates a variety of helicopter types. Design an inheritance based class structure to maintain a collection of ordinary, AirAmbulance, AirTaxi and AirCargo helicopters.

1. **Download** the lab exam 4 starter **zip** file and extract the folder, **Save** on the desktop (**not** your Network account, local C drive or USB)
  - Rename the **SurnameFirstNameLabEx4** folder as per your own name  
E.g. **AgnewGerryLabEx4** folder
  - Rename the **SurnameFirstNameLabEx4Test** test/driver classes as per your own name  
E.g. **AgnewGerryLabEx4Test1, 2 & 3**
  - To be **verified** by your lab supervisor
2. Examine/verify the existing empty/partial class files provided to be coded/implemented
  - Add your **Program Id, Name & Description as comments** at the top of each class
3. **Warning:** Marks will be deducted for **poor programming practices** such as:
  - Lacking meaningful variable names, white-space, indentation, etc.
  - Ensure redundant code is deleted prior to program submission
4. **Pilot** class (embedded as an inner class):

private Member Variables	pilotId (integer)	pilotName (String)
Member	Default Constructor	Parameter Constructor
Methods	setPilot	toString
	setPilotId	getPilotId
	setPilotName	getPilotName
– setPilot ( ) changes existing Pilot object details		

5. **Helicopter** super class with inner **Pilot** class instance:

private Member Variables	helicopterId (int) heliAllWeather (boolean) pilot (Pilot)	heliMakeModel (String) heliRange (double)
Member	Default Constructor	All Parameter Constructor
Methods		Helicopter only Param Constructor
	setHelicopter	toString
	setHelicopterId	getHelicopterId
	setHeliMakeModel	getHeliMakeModel
	setHeliAllWeather	getHeliAllWeather
	setHeliRange (double)	getHeliRange
	setHeliRange (int)	
	setPilot	getPilot
– setHelicopter only changes existing Helicopter object details (excluding Pilot info) – overloaded setHeliRange (int) increases the helicopter Range by the integer per cent provided e.g. 10%		

6. Sub class **AirAmbulance** inherits or is derived from the Super class **Helicopter**:

	No Member Variables	
Member	Default Constructor	Parameter Constructor
Methods		toString

7. Sub class **AirTaxi** inherits or is derived from the Super class **Helicopter**:

private Member Variables	maxPassengers (int)	
Member	Default Constructor	Parameter Constructor
Methods		toString
	setMaxPassengers	getMaxPassengers

8. Sub class **AirCargo** inherits or is derived from the Super class **Helicopter**:

private Member Variables	maxCapacity (int)	maxWeight (int) DEFAULT_CAPACITY (int) = 12
Member	Default Constructor	Parameter Constructor
Methods	setAirCargo	toString
	setMaxCapacity	getMaxCapacity
	setMaxWeight	getMaxWeight
– setAirCargo only changes existing AirCargo object details – The Default Capacity if not provided is 12 and should be defined as a class constant		

9. **SurnameFirstNameLabEx4Test1 driver class (without an object array):**

- Code a test/driver class that creates 2 simple instances of each of the above classes (without object arrays) using the sample data provided (3 Helicopter instances)
- Which calls both default and parameter descriptors and the associated setHelicopter/ setAirTaxi/setAirCargo methods as appropriate to initialise blank objects
- Then output the associated toString ( ) method to verify the object contents
- Match the attached page 4 **Screenshot 1** output

10. **SurnameFirstNameLabEx4Test2 driver class (with an object array):**

- Declare an object array of mixed ordinary, AirAmbulance, AirTaxi and AirCargo helicopter object instances using the same sample data provided
- Test/exercise/call the same methods as before using the sample data provided
- Interrogate each object and output the class name before each line output
- Match the attached page 4 **Screenshot 2** output using a **for loop**, an object array and the toString ( ) method

11. **SurnameFirstNameLabEx4Test3 driver class (with an object array and menu):**

- Declare an object array of mixed ordinary, AirAmbulance, AirTaxi and AirCargo helicopter object instances using the same sample data provided
- Display the Corrib Helicopter Menu (code provided) – see page 4 **Screenshot 3**

- Then call selected methods as required from the while loop/switch statement provided

## 12. Corrib Helicopter Menu Options – 0) Quit

- |                               |                                    |
|-------------------------------|------------------------------------|
| 1) List Helicopters           | 2) List Air Ambulances             |
| 3) List Air Taxis             | 4) List Air Cargo                  |
| 5) Non-Helicopter All Weather | 6) Air Cargo Capacity 50% increase |
| 7) Set Helicopter Range       | 8) Rename Pilot                    |

## 13. List Helicopters (menu option 1/see page 5 **Screenshot 4**)

- List details for all Helicopter objects prefixed by the class name

## 14. List Air Ambulances (menu option 2/see page 5 **Screenshot 5**)

- List details for all Air Ambulance objects prefixed by the class name

## 15. List Air Taxis (menu option 3/see page 5 **Screenshot 6**)

- List details for all Air Taxi objects prefixed by the class name

## 16. List Air Cargo (menu option 4/see page 5 **Screenshot 7**)

- List details for all Air Cargo objects prefixed by the class name

## 17. List Non-Helicopter All Weather (menu option 5/see page 5 **Screenshot 8**)

- List details for all non-Helicopters with All Weather capabilities (true)
- i.e. Qualifying Air Ambulance, Air Taxi and Air Cargo objects but **not** ordinary Helicopters

## 18. List/Increase Air Cargo Capacity (menu option 6/see page 5 **Screenshot 9**)

- Increase all Air Cargo Capacity by 50% (\* 1.5) using existing methods (without new methods)
- Showing both the before and after (toString) object contents (i.e. before/after Capacity)

## 19. Set Helicopter Range (menu option 7/see page 6 **Screenshot 10**)

- Enter a Helicopter Id and search for that id using a while loop & standard search functionality
- If a Helicopter is found with that id then display current helicopter Range details
- Prompt/Enter (int + double) and update a double Range value e.g. 0 44444.44
- Prompt/Enter (int + double) and update an integer percentage Range increase e.g. 50 0.00
- Otherwise: Helicopter Id not found – try again error message
- Showing both the before and after (toString) object contents

## 20. Rename Air Ambulance Pilot (menu option 8/see page 6 **Screenshot 11**)

- Enter a Helicopter Id and search for that id using a while loop & standard search functionality
- If an Air Ambulance is found with that id then display current Pilot details
- Prompt/Enter and update a new Pilot name using an existing method (with 0 for the pilot Id)
- Otherwise: Helicopter Id not found – try again error message
- Otherwise: Helicopter is not an Air Ambulance – try again error message
- Showing both the before and after (toString) object contents

## 21. Save – The End

- When finished Save and Exit TextPad
- Zip (R/click: Send Compressed) your **SurnameFirstNameLabEx4** folder
- Upload your **SurnameFirstNameLabEx4** zip file to the Moodle link provided
- To be **verified** by your supervisor **before** you **submit** the zip file
- Sign the **attendance sheet** before you exit the lab

### Test Helicopter 1 Screenshot 1

Heli	Id	Make/Model	All W	Range	Id	Pilot	
p1:					0	no pilot	
p1:					150	Top Gun	
p2:					151	P Agnew	
h1:	0	noMakeModel	false	0.00	0	no pilot	
h1:	1111	Red Heli	true	10000.00	152	P Murphy	
h2:	2222	Green Heli	false	20000.00	153	P Reilly	
h3:	3333	Blue Heli	true	17000.00	0	no pilot	
h3:	3333	Blue Heli	true	17000.00	154	P Wally	
a1:	0	noMakeModel	false	0.00	0	no pilot	
a1:	4444	Orange Heli	true	18000.00	155	P Smith	
a2:	5555	Brown Heli	false	16500.00	156	P Bart	
t1:	0	noMakeModel	false	0.00	0	no pilot	Pass: 0
t1:	6666	Grey Heli	true	13000.00	157	P Homer	Pass: 7
t2:	7777	White Heli	true	19000.00	158	P Marge	Pass: 8
c1:	0	noMakeModel	false	0.00	0	no pilot	Cap: 12 wght: 0
c1:	8888	Purple Heli	false	17777.99	159	P Lisa	Cap: 50 wght: 789
c2:	9999	Black Heli	true	15700.00	160	P Maggie	Cap: 34 wght: 340

### Test Helicopter 2 Screenshot 2

Class	Heli	Id	Make/Model	All W	Range	Id	Pilot	
Helicopter	1111	Red Heli	true	10000.00	152	P Murphy		
Helicopter	2222	Green Heli	false	20000.00	153	P Reilly		
Helicopter	3333	Blue Heli	true	17000.00	154	P Wally		
AirAmbulance	4444	Orange Heli	true	18000.00	155	P Smith		
AirAmbulance	5555	Brown Heli	false	16500.00	156	P Bart		
AirTaxi	6666	Grey Heli	true	13000.00	157	P Homer	Pass: 7	
AirTaxi	7777	White Heli	true	19000.00	158	P Marge	Pass: 8	
AirCargo	8888	Purple Heli	false	17777.99	159	P Lisa	Cap: 50 wght: 789	
AirCargo	9999	Black Heli	true	15700.00	160	P Maggie	Cap: 34 wght: 340	

### Helicopter Menu Screenshot 3

Corrib Helicopter Menu Options - 0/Quit	
1: List Helicopters	2: List Air Ambulances
3: List Air Taxis	4: List Air Cargo
5: Non Heli All Weather	6: Air Cargo Capacity 50% increase
7: Set Helicopter Range	8: Rename Pilot
Enter option: <input type="text"/>	

#### Menu Option 1: List Helicopters Screenshot 4

Enter option: 1

Class	Heli	Id	Make/Model	All w	Range	Id	Pilot	
Helicopter		1111	Red Heli	true	10000.00	152	P Murphy	
Helicopter		2222	Green Heli	false	20000.00	153	P Reilly	
Helicopter		3333	Blue Heli	true	17000.00	154	P Wally	
AirAmbulance		4444	Orange Heli	true	18000.00	155	P Smith	
AirAmbulance		5555	Brown Heli	false	16500.00	156	P Bart	
AirTaxi		6666	Grey Heli	true	13000.00	157	P Homer	Pass: 7
AirTaxi		7777	White Heli	true	19000.00	158	P Marge	Pass: 8
AirCargo		8888	Purple Heli	false	17777.99	159	P Lisa	Cap: 50 wght: 789
AirCargo		9999	Black Heli	true	15700.00	160	P Maggie	Cap: 34 wght: 340

#### Menu Option 2: List Air Ambulances Screenshot 5

Enter option: 2

Class	Heli	Id	Make/Model	All w	Range	Id	Pilot	
AirAmbulance		4444	Orange Heli	true	18000.00	155	P Smith	
AirAmbulance		5555	Brown Heli	false	16500.00	156	P Bart	

#### Menu Option 3: List Air Taxis Screenshot 6

Enter option: 3

Class	Heli	Id	Make/Model	All w	Range	Id	Pilot	
AirTaxi		6666	Grey Heli	true	13000.00	157	P Homer	Pass: 7
AirTaxi		7777	White Heli	true	19000.00	158	P Marge	Pass: 8

#### Menu Option 4: List Air Cargo Screenshot 7

Enter option: 4

Class	Heli	Id	Make/Model	All w	Range	Id	Pilot	
AirCargo		8888	Purple Heli	false	17777.99	159	P Lisa	Cap: 50 wght: 789
AirCargo		9999	Black Heli	true	15700.00	160	P Maggie	Cap: 34 wght: 340

#### Menu Option 5: Non-Helicopter All Weather Screenshot 8

Enter option: 5

Class	Heli	Id	Make/Model	All w	Range	Id	Pilot	
AirAmbulance		4444	Orange Heli	true	18000.00	155	P Smith	
AirTaxi		6666	Grey Heli	true	13000.00	157	P Homer	Pass: 7
AirTaxi		7777	White Heli	true	19000.00	158	P Marge	Pass: 8
AirCargo		9999	Black Heli	true	15700.00	160	P Maggie	Cap: 34 wght: 340

#### Menu Option 6: Air Cargo Capacity 50% Increase Screenshot 9

Enter option: 6

Class	Heli	Id	Make/Model	All w	Range	Id	Pilot	
AirCargo		8888	Purple Heli	false	17777.99	159	P Lisa	Cap: 50 wght: 789
AirCargo		8888	Purple Heli	false	17777.99	159	P Lisa	Cap: 75 wght: 789
AirCargo		9999	Black Heli	true	15700.00	160	P Maggie	Cap: 34 wght: 340
AirCargo		9999	Black Heli	true	15700.00	160	P Maggie	Cap: 51 wght: 340

### Menu Option 7: Set Helicopter Range Screenshot 10

```
Enter option: 7
Enter Helicopter Id: 1234
Helicopter Id not found - try again
```

```
Enter option: 7
Enter Helicopter Id: 1111
Class    Heli  Id  Make/Model All W    Range    Id Pilot
=====
Helicopter  1111  Red Heli  true  10000.00  152 P Murphy
Current Helicopter Range: 10000.0
Enter new Range (int & double): 0 44444.44
Helicopter  1111  Red Heli  true  44444.44  152 P Murphy
```

```
Enter option: 7
Enter Helicopter Id: 2222
Class    Heli  Id  Make/Model All W    Range    Id Pilot
=====
Helicopter  2222  Green Heli false  20000.00  153 P Reilly
Current Helicopter Range: 20000.0
Enter new Range (int & double): 50 0.00
Helicopter  2222  Green Heli false  30000.00  153 P Reilly
```

### Menu Option 8: Rename Air Ambulance Pilot Screenshot 11

```
Enter option: 8
Enter Helicopter Id: 1234
Helicopter Id not found - try again
```

```
Enter option: 8
Enter Helicopter Id: 8888
Helicopter Id:8888 not an Air Ambulance - try again
```

```
Enter option: 8
Enter Helicopter Id: 4444
Class    Heli  Id  Make/Model All W    Range    Id Pilot
=====
AirAmbulance 4444 Orange Heli  true  18000.00  155 P Smith
Current Pilot name: 155 P Smith
Enter new Pilot name: P Murphy
AirAmbulance 4444 Orange Heli  true  18000.00    0 P Murphy
```