SdPd/java Lab Exam 4

Corrib Helicopters operates a variety of helicopters. Design an OO 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** in your root network (u:) account (**not** the desktop, local C drive or USB)
   – Rename the **SurnameFirstName18LabEx4** folder as per your own name
     E.g. **AgnewGerry18LabEx4** folder
   – Rename the **SurnameFirstNameLabEx4Test** test/driver classes as per your own name
     E.g. **AgnewGerryLabEx4Test1, 2** and **3**
   – To be **verified** by your lab supervisor

2. Review 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
   – Enable Inheritance for the designated Sub classes listed below

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
   – Untested code - ensure that all constructors/methods are called/exercised at least once

4. **Pilot** class (embedded as an inner class subsequently)**:**

private Member Variables	pilotId (integer) pilotHours (integer)	*member vars coded left to right* pilotName (String)
public Member Methods	Default Constructor	Parameter Constructor
	setPilot	toString
	setPilotId	getPilotId
	setPilotName	getPilotName
	setPilotHours	getPilotHours
– setPilot ( ) only changes existing Pilot object details		

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

private Member Variables	helicopterId (int) heliAllWeather (boolean) pilot (Pilot)	heliMakeModel (String) heliRange (double)
public Member Methods	Default Constructor	All Parameter Constructor
		Helicopter only Param Constructor
	setHelicopter	toString
	setHelicopterId	getHelicopterId
	setHeliMakeModel	getHeliMakeModel
	setHeliAllWeather	getHeliAllWeather
	setHeliRange setHeliRange (int) – overloaded	getHeliRange
	setPilot	getPilot getPilot (int) – overloaded
– 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% – overloaded getPilot (any integer) returns an object of type Pilot rather than a string		

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

	No new Member Variables	
public Methods	Default Constructor	Parameter Constructor
		toString

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

private Mem Var	maxPassengers (integer)	
public Member Methods	Default Constructor	Parameter Constructor
		toString
	setMaxPassengers	getMaxPassengers

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

private Member Variables	DEFAULT_CAPACITY (double) maxCapacity (double)	DEFAULT_WEIGHT (integer) maxWeight (int)
public Member Methods	Default Constructor	Parameter Constructor
	setAirCargo	toString
	setMaxCapacity	getMaxCapacity
	setMaxWeight	getMaxWeight
		exportAirCargo (AirCargo)

– setAirCargo only changes existing AirCargo object details
– The default Capacity/Weight if not provided is 3.3 & 101 respectively and both should be defined as static class constants
– exportAirCargo creates/clones & returns the current instance as an AirCargo object

9. **SurnameFirstNameLabEx4Test1 driver class (without an object array):**
   – Code a test/driver class that creates 2 or 3 simple object instances of each of the above classes (without an object array) using the sample data provided from screenshot 1
   – Which calls both default and parameter descriptors and the associated setHelicopter/ AirTaxi/setAirCargo methods as appropriate to populate the default/blank objects
   – Output the associated toString ( ) and other methods required 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 Helicopter, AirAmbulance, AirTaxi and AirCargo object instances using the same sample data created in the first test program (Test 1)
   – Output the object array for each helicopter within a **for loop** using the toString ( ) method
   – Interrogate each object and show the class name abbreviation prefix before each line output
   – Match the attached page 4 **Screenshot 2** output

11. **SurnameFirstNameLabEx4Test3 driver class (with an object array and menu):**
   – Declare an object array of mixed Helicopter, AirAmbulance, AirTaxi and AirCargo object instances within a method with the same sample data from the second test program (Test 2)
   – Display the Corrib Helicopters Menu (code provided) – see page 4 **Screenshot 3**
   – Code user defined methods for each of the menu options rather than a big switch statement
   – Then call selected methods as required from within the while loop/switch statement provided

12. **List All Helicopters** (menu option 1/see page 4 **Screenshot 4)**
   – List details for all Helicopter objects prefixed by the class abbreviation (same as for Test 2)

13. **List Air Ambulances (**menu option 2/see page 4 **Screenshot 5)**
   – List details for all Air Ambulance objects prefixed by the class abbreviation

14. **List Air Taxis (**menu option 3/see page 5 **Screenshot 6)**
   – List details for all Air Taxi objects prefixed by the class abbreviation

15. **List Air Cargos (**menu option 4/see page 5 **Screenshot 7)**
   – List details for all Air Cargo objects prefixed by the class abbreviation

16. **List only Helicopters** (menu option 5/see page 5 **Screenshot 8)**
   – List ordinary Helicopters objects (i.e. **not** Air Ambulance, Air Taxi or Air Cargo helicopters)

17. **List All Weather Non-Helicopters (**menu option 6/see page 5 **Screenshot 9)**
   – List details for all non-Helicopters with All Weather (true) capabilities
   – Qualifying all-weather Air Ambulance, Air Taxi & Air Cargo objects (**not** ordinary Helicopters)

18. **List Pilot Hours Range** (menu option 7/see page 5 **Screenshot 10)**
   – Prompt/input (integer, integer) both lower and upper Pilot hours limits
   – List Helicopter details where the pilot hours are within the specified range provided (inclusive)
   – Showing the toString( ) object contents & a footer count of the number of Helicopters listed

19. **Increase Helicopter Range (**menu option 8/see page 5 **Screenshot 11)**
   – Prompt/input (double, integer) both the Amount and Percentage Range increases
   – Increase all Helicopter ranges either by an Amount or the Percentage provided
   – Showing both the before and after toString( ) object contents (including before/after Ranges)
   – With a footer count of the number of Helicopters updated

20. **Increase Air Cargo Capacity (**menu option 9/see page 6 **Screenshot 12)**
   – Prompt/input (integer) the Cargo Capacity percentage increase
   – Increase the Air Cargo Max Capacity by the percentage provided
   – Showing both the before and after toString( ) object contents (including before/after Capacity)
   – With a footer count of the number of Air Cargo Helicopters updated

21. **Set Helicopter Make/Model (**menu option 10/see page 6 **Screenshot 13)**
   – Prompt/Input a Helicopter Id and search for that helicopter using a while loop **method**
   – Prompt/Input/Apply the new Make/Model provided if the Helicopter found (ignored if blank)
   – Showing both the before and after toString( ) object contents (inc. before/after Make/Model)
   – Otherwise, display error message: Helicopter Id not found – please try again

22. **Add Air Taxi Passengers (**menu option 11/see page 6 **Screenshot 14)**
   – Prompt/Input a Helicopter Id and search for that helicopter using a while loop method
   – Prompt/Input/Apply the passengers to be added provided using existing methods if the Air Taxi Helicopter found
   – Showing both the before and after toString( ) object contents (inc. before/after Passengers)
   – Otherwise, display error message: Helicopter Id not found – please try again
   – Otherwise, display error message: Not an Air Taxi – please try again

23. **Rename Air Ambulance Pilot (**menu option 12/see page 6 **Screenshot 15)**
   – Prompt/Input a Helicopter Id and search for that helicopter using a while loop method
   – Prompt/Input/Apply the new Pilot name provided (not blank) to be updated if the Air Ambulance Helicopter found
   – Showing both the before and after toString( ) object contents (inc. before/after Pilot name)
   – Otherwise, display error message: Helicopter Id not found – please try again
   – Otherwise, display error message: Not an Air Ambulance – please try again

24. **Save** – When finished Save and Exit TextPad
   – Zip (R/click: Send Compressed) your **SurnameFirstName18LabEx4** folder
   – Upload your **SurnameFirstName18LabEx4** zip file to the Moodle link provided
   – Sign the **attendance sheet** before you exit the lab

```
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Heli   Id  Make/Model AW     Range    Id Pilot      Hours
=========================================================================
p1:                                    0 noPilot        0
p1:                                   98 Pilot Z     1234
p2:                                   99 Pilot Y     4321

h1:    0 noMakeModel  F      0.00      0 noPilot        0
h1: 1111     Red Heli  T  10001.10   101 Pilot A     1001
h2: 2222   Green Heli  F  20002.20   202 Pilot B     2002
h3: 3333    Blue Heli  T  30003.30     0 noPilot        0
h3: 3333    Blue Heli  T  30003.30   303 Pilot C     3003
h3: overloaded setHeliRange(10) 3333    Blue Heli  T  33003.63   303 Pilot C
h3: overloaded getPilot ( ):  303 Pilot C    3003

a1:    0 noMakeModel  F      0.00      0 noPilot        0
a1: 4444 Orange Heli  T  40004.40   404 Pilot D     4004
a2: 5555   Brown Heli  F  50005.50   505 Pilot E     5005

t1:    0 noMakeModel  F      0.00      0 noPilot        0    Pass: 0
t1: 6666    Grey Heli  T  60006.60   606 Pilot F     6006    Pass: 7
t2: 7777   White Heli  T  70007.70   707 Pilot G     7007    Pass: 8

c1:    0 noMakeModel  F      0.00      0 noPilot        0    Cap: 3.3 Wght: 101
c1: 8888 Purple Heli  F  80008.80   808 Pilot H     8008    Cap: 8.8 Wght: 888
c2: 9999   Black Heli  T  90009.90   909 Pilot I     9009    Cap: 9.9 Wght: 999

c3 = c2.exportAirCargo()
c3: 9999   Black Heli  T  90009.90   909 Pilot I     9009    Cap: 9.9 Wght: 999
```

```
Gerry Agnew: Lab Ex 4 April 2018

Type   Id  Make/Model AW     Range   Pilot          Hours
=========================================================================
Heli  1111     Red Heli  T  10001.10   101 Pilot A    1001
Heli  2222   Green Heli  F  20002.20   202 Pilot B    2002
Heli  3333    Blue Heli  T  30003.30   303 Pilot C    3003
Ambul 4444 Orange Heli  T  40004.40   404 Pilot D    4004
Ambul 5555   Brown Heli  F  50005.50   505 Pilot E    5005
Taxi  6666    Grey Heli  T  60006.60   606 Pilot F    6006    Pass: 7
Taxi  7777   White Heli  T  70007.70   707 Pilot G    7007    Pass: 8
Cargo 8888 Purple Heli  F  80008.80   808 Pilot H    8008    Cap: 8.8 Wght: 888
Cargo 9999   Black Heli  T  90009.90   909 Pilot I    9009    Cap: 9.9 Wght: 999
```

```
          Corrib Helicopter Menu Options - O/End
=========================================================================
 1: List Helicopters              2: List Air Ambulances
 3: List Air Taxis                4: List Air Cargo
 5: List Only Helicopters         6: List All Weather Non-Helicopters
 7: List Pilot Hours Range        8: Increase Helicopter Range
 9: Increase Air Cargo Capacity  10: Set Helicopter Make/Model
11: Add Air Taxi Passengers      12: Rename Air Ambulance Pilot

Enter option:
```

```
Enter option: 1

Class  Id  Make/Model AW     Range   Pilot          Hours
=========================================================================
Heli  1111     Red Heli  T  10001.10   101 Pilot A    1001
Heli  2222   Green Heli  F  20002.20   202 Pilot B    2002
Heli  3333    Blue Heli  T  30003.30   303 Pilot C    3003
Ambul 4444 Orange Heli  T  40004.40   404 Pilot D    4004
Ambul 5555   Brown Heli  F  50005.50   505 Pilot E    5005
Taxi  6666    Grey Heli  T  60006.60   606 Pilot F    6006    Pass: 7
Taxi  7777   White Heli  T  70007.70   707 Pilot G    7007    Pass: 8
Cargo 8888 Purple Heli  F  80008.80   808 Pilot H    8008    Cap: 8.8 Wght: 888
Cargo 9999   Black Heli  T  90009.90   909 Pilot I    9009    Cap: 9.9 Wght: 999
```

```
Enter option: 2

Class  Id  Make/Model AW     Range   Pilot          Hours
=========================================================================
Ambul 4444 Orange Heli  T  40004.40   404 Pilot D    4004
Ambul 5555   Brown Heli  F  50005.50   505 Pilot E    5005
```

Menu Option 3: List Air Taxis Screenshot 6

```
Enter option: 3

Class    Id  Make/Model  AW    Range   Pilot        Hours
=================================================================
Taxi   6666   Grey Heli   T  60006.60  606 Pilot F    6006    Pass: 7
Taxi   7777  White Heli   T  70007.70  707 Pilot G    7007    Pass: 8
```

Menu Option 4: List Air Cargos Screenshot 7

```
Enter option: 4

Class    Id  Make/Model  AW    Range   Pilot        Hours
=================================================================
Cargo  8888 Purple Heli   F  80008.80  808 Pilot H    8008    Cap: 8.8 Wght: 888
Cargo  9999  Black Heli   T  90009.90  909 Pilot I    9009    Cap: 9.9 Wght: 999
```

Menu Option 5: List Only Helicopters Screenshot 8

```
Enter option: 5

Class    Id  Make/Model  AW    Range   Pilot        Hours
=================================================================
Heli   1111    Red Heli   T  10001.10  101 Pilot A    1001
Heli   2222  Green Heli   F  20002.20  202 Pilot B    2002
Heli   3333   Blue Heli   T  30003.30  303 Pilot C    3003
```

Menu Option 6: All Weather Non-Helicopters Screenshot 9

```
Enter option: 6

Class    Id  Make/Model  AW    Range   Pilot        Hours
=================================================================
Ambul  4444 Orange Heli   T  40004.40  404 Pilot D    4004
Taxi   6666   Grey Heli   T  60006.60  606 Pilot F    6006    Pass: 7
Taxi   7777  White Heli   T  70007.70  707 Pilot G    7007    Pass: 8
Cargo  9999  Black Heli   T  90009.90  909 Pilot I    9009    Cap: 9.9 Wght: 999
```

Menu Option 7: List Pilot Hours Range Screenshot 10

```
Enter option: 7

  Enter Pilot Hours Range (int, int): 2000 5000

Class    Id  Make/Model  AW    Range   Pilot        Hours
=================================================================
Heli   2222  Green Heli   F  20002.20  202 Pilot B    2002
Heli   3333   Blue Heli   T  30003.30  303 Pilot C    3003
Ambul  4444 Orange Heli   T  40004.40  404 Pilot D    4004

3 Pilots in range 2000 to 5000 hours
```

Menu Option 8: Increase Helicopter Range Screenshot 11

```
Enter option: 8

  Enter Range increase amount(double, 0) or Range percent % increase (0.00, int): 0.0 10

Class    Id  Make/Model  AW    Range   Pilot        Hours
=================================================================
Heli   1111    Red Heli   T  10001.10  101 Pilot A    1001
Heli   1111    Red Heli   T  11001.21  101 Pilot A    1001
Heli   2222  Green Heli   F  20002.20  202 Pilot B    2002
Heli   2222  Green Heli   F  22002.42  202 Pilot B    2002
Heli   3333   Blue Heli   T  30003.30  303 Pilot C    3003
Heli   3333   Blue Heli   T  33003.63  303 Pilot C    3003
Ambul  4444 Orange Heli   T  40004.40  404 Pilot D    4004
Ambul  4444 Orange Heli   T  44004.84  404 Pilot D    4004
Ambul  5555  Brown Heli   F  50005.50  505 Pilot E    5005
Ambul  5555  Brown Heli   F  55006.05  505 Pilot E    5005
Taxi   6666   Grey Heli   T  60006.60  606 Pilot F    6006    Pass: 7
Taxi   6666   Grey Heli   T  66007.26  606 Pilot F    6006    Pass: 7
Taxi   7777  White Heli   T  70007.70  707 Pilot G    7007    Pass: 8
Taxi   7777  White Heli   T  77008.47  707 Pilot G    7007    Pass: 8
Cargo  8888 Purple Heli   F  80008.80  808 Pilot H    8008    Cap: 8.8 Wght: 888
Cargo  8888 Purple Heli   F  88009.68  808 Pilot H    8008    Cap: 8.8 Wght: 888
Cargo  9999  Black Heli   T  90009.90  909 Pilot I    9009    Cap: 9.9 Wght: 999
Cargo  9999  Black Heli   T  99010.89  909 Pilot I    9009    Cap: 9.9 Wght: 999

9 Helicopter ranges changed
```

Menu Option 9: Increase Air Cargo Capacity Screenshot 12

```
Enter option: 9

   Enter Air Cargo Capacity increase %: 40

Class   Id   Make/Model AW      Range   Pilot         Hours
===================================================================
Cargo 8888 Purple Heli   F   80008.80   808 Pilot H    8008     Cap: 8.8 Wght: 888
Cargo 8888 Purple Heli   F   80008.80   808 Pilot H    8008     Cap: 12.32 Wght: 888
Cargo 9999 Black Heli    T   90009.90   909 Pilot I    9009     Cap: 9.9 Wght: 999
Cargo 9999 Black Heli    T   90009.90   909 Pilot I    9009     Cap: 13.86 Wght: 999

2 Air Cargo Capacity changed
```

Menu Option 10: Set Helicopter Make/Model Screenshot 13

```
Enter option: 10

   Enter Helicopter Id: 1234

   Helicopter Id not found - please try again

   Enter Helicopter Id: 1111

   Enter new Make/Model: new-MakMod

Class    Id   Make/Model AW      Range   Pilot       Hours
===================================================================
Heli   1111    Red Heli   T   10001.10   101 Pilot A   1001
Heli   1111  new-MakMod   T   10001.10   101 Pilot A   1001
```

Menu Option 11: Add Air Taxi Passengers Screenshot 14

```
Enter option: 11

   Enter Helicopter Id: 1234

   Helicopter Id not found - please try again
   Enter Helicopter Id: 1111

   Not an Air Taxi - please try again
   Enter Helicopter Id: 6666

   Enter Passengers to be added: 3

Class   Id  Make/Model AW      Range   Pilot       Hours
===================================================================
Taxi   6666   Grey Heli   T   60006.60   606 Pilot F   6006     Pass: 7
Taxi   6666   Grey Heli   T   60006.60   606 Pilot F   6006     Pass: 10
```

Menu Option 12: Rename Air Ambulance Pilot Screenshot 15

```
Enter option: 12

   Enter Helicopter Id: 1234

   Helicopter Id not found - please try again
   Enter Helicopter Id: 1111

   Not an Air Ambulance - please try again

   Enter Helicopter Id: 5555

   Enter new Pilot Name (not blank): Pilot New

Class   Id   Make/Model AW      Range   Pilot       Hours
===================================================================
Ambul 5555   Brown Heli   F   50005.50   505 Pilot E     5005
Ambul 5555   Brown Heli   F   50005.50   505 Pilot New   5005
```