

SdPd/java Lab Exam 4

Trike Bike, Push Bike and Electric Push Bike Shop

Western Bikes sell a variety of bikes. Design an OO inheritance based class structure to model a collection of Bike, Trike Bike, Push Bike and Electric Push Bike bikes.

1. **Download** the lab exam 4 starter **zip** file and extract the folder, **Save** in your root network (u:) folder (**not** the desktop, 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 and 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** and **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. **Engine** class (embedded as an inner class subsequently):

private Member Variables	DEFAULT_WARRANTY (int) = 36 engineType (char) – 'E'/'P'/'D'	engineMonthsWarranty (int)
Member Methods	Default Constructor	All Parameter Constructor
	setEngine	toString
	setEngineType	getEngineType
	setEngineMonthsWarranty	getEngineMonthsWarranty
– setEngine () only changes existing Engine object details – Default warranty is 36 months if not provided & is defined as a static class constant		

5. **Bike** super class:

private Member Variables	bikeId (int) bikeModel (String)	bikeManufacturer (String) bikePrice (double)
Member Methods	Default Constructor	All Parameter Constructor
	Semi parameter Constructor	Copy Constructor (Bike)
	setBike	toString
	setBikeId	getBikeId
	setBikeManufacturer	getBikeManufacturer
	setBikeModel	getBikeModel
	setBikeModel () – overloaded setBikePrice	getBikePrice
– Semi parameter constructor with bike Id & Price but without Manufacturer & Model – setBike () only changes existing Bike object details – Overloaded setBikeModel () changes the model description to “#new#” – The copy constructor instantiates & initialises an object using an existing bike object		

6. Sub class **TrikeBike** inherits or is derived from the Super class **Bike**:

private Member Variables	DEFAULT_WHEEL (int) = 70	trikeWheelSize (int)
Member Methods	Default Constructor	All Parameter Constructor
		toString
	setTrikeWheelSize	getTrikeWheelSize
– Default Wheel Size is 70 if not provided and is defined as a static class constant		

7. Sub class **PushBike** inherits or is derived from the Super class **Bike**:

private Member Variables	bikeDescription (String)	bikeGender (char) – 'M'/'F'/'U'
Member Methods	Default Constructor	All Parameter Constructor
	setPushBike	toString
	setBikeDescription	getBikeDescription
	setBikeGender	getBikeGender
– setPushBike () only changes existing PushBike object details		

8. Sub class **ElectricPushBike** inherits or is derived from the Super class **PushBike (not the Bike class)** with an inner **Engine** embedded class instance:

private Member Variables	DEFAULT_RANGE (int) = 50 bikeRange (int)	engine (Engine)
Member Methods	Default Constructor	All Parameter Constructor
	setBikeRange	getBikeRange
	setBikeRange(do) overloaded	toString
	setEngine	getEngine
– setEngine () only changes existing Engine object details		
– Overloaded setBikeRange () increases the range by the double percentage given		

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

- Code a test/driver class that creates 2, 3 or 4 simple object instances of each of the above classes (without an object array) using the sample data provided
- Which calls both default and parameter constructors and the associated setBike/setEngine, etc. 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 Bike, Trike Bike, Push Bike and Electric Push Bike object instances using the same sample data created in the first test program (Test 1)
- Output the object array contents for each bike 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 Bike, Trike Bike, Push Bike and Electric Push Bike object instances using the same sample data created in the second test program (Test 2)
- Display the Western Bikes 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 Bikes** (menu option 1/see page 4 **Screenshot 4**)
 - List details for all Bike objects prefixed by the class abbreviation (same as for Test 2)
13. **List Trike Bikes** (menu option 2/see page 5 **Screenshot 5**)
 - List details for all Trike Bike objects prefixed by the class abbreviation
14. **List Push Bikes** (menu option 3/see page 5 **Screenshot 6**)
 - List details for Push Bike objects only prefixed by the class abbreviation
15. **List Electric Push Bikes** (menu option 4/see page 5 **Screenshot 7**)
 - List details for all Electric Push Bike objects prefixed by the class abbreviation
16. **List All Push/Electric Bikes** (menu option 5/see page 5 **Screenshot 8**)
 - List details for **all** Push Bikes/Electric Push Bikes objects prefixed by the class abbreviation
17. **List only Bikes** (menu option 6/see page 5 **Screenshot 9**)
 - List details for all ordinary Bikes (i.e. **not** Trike, Push or Electric bikes)
18. **Increase Bike Prices** (menu option 7/see page 5 **Screenshot 10**)
 - Prompt/input a bike Price increase double amount to be added
 - Increase **all** Bike object Prices by the amount provided
 - Showing both the before and after (toString) object contents (i.e. before/after Prices)
 - With a footer count of the number of bike Prices changed
19. **Increase Electric Bike Ranges** (menu option 8/see page 6 **Screenshot 11**)
 - Prompt/Input/Apply a double Range percentage increase for all electric bikes
 - Showing both the before and after (toString) object contents (i.e. before/after Ranges)
 - With a footer count of the number of bike Ranges changed
20. **Change a Bike Price** (menu option 9/see page 6 **Screenshot 12**)
 - Prompt/Input a Bike Id and search for that bike using a while loop
 - Prompt/Input/Apply the new Price (double) provided if found
 - Showing both the before and after (toString) object contents (i.e. before/after Prices)
 - Otherwise, display: Bike Id not found – try again error message
21. **Change an Electric Bike Range** (menu option 10/see page 6 **Screenshot 13**)
 - Prompt/Input a Bike Id and search for that bike using a while loop
 - Prompt/Input/Apply the new Range (int) or increase Range percentage (double) provided
 - Showing both the before and after (toString) object contents (i.e. before/after Ranges)
 - Otherwise, display: Bike Id not found – try again error message
 - Otherwise, display: Not an Electric Push Bike – try again error message
22. **Change an Electric Bike Engine Warranty** (menu option 11/see page 6 **Screenshot 14**)
 - Prompt/Input a Bike Id and search for that bike using a while loop
 - Prompt/Input/Apply the new Engine Warranty in months if found (new method needed?)
 - Showing both the before and after (toString) object contents (i.e. before/after Engine details)
 - Otherwise, display: Bike Id not found – try again error message
 - Otherwise, display: Not an Electric Push Bike – try again error message
23. **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
 - Leave your unmodified **SurnameFirstNameLabEx4** folder in your root network folder

```

Your Name - Lab Exam 4 2017
=====
eng1: Eng: ?36
eng1: Eng: P12
eng2: Eng: D24

    Id    Manufact Model    Price
=====
b1:      0 noManu    noModel    0.00
b1: 1111 Aaaa      Aaaa      199.99
b2: 2222 Bbbb      Bbbb      299.99
b3: 3333 noManu    noModel    399.99
b3.setBikeModel( ):
b3: 3333 noManu    #new#      399.99
Bike b4 = Bike b1; // copy constructor
b4: 1111 Aaaa      Aaaa      199.99
t1:      0 noManu    noModel    0.00 wheel: 70
t1: 4444 Dddd      Dddd      499.99 wheel: 100
t2: 5555 Eeee      Eeee      599.99 wheel: 99
p1:      0 noManu    noModel    0.00 Desc: noDesc Gend: U
p1: 6666 Ffff      Ffff      699.99 Desc: Racing Gend: M
p2: 7777 Gggg      Gggg      799.99 Desc: Mountain Gend: F
e1:      0 noManu    noModel    0.00 Desc: noDesc Gend: U Rge: 50 Eng: ?36
e1: 8888 Hhhh      Hhhh      899.99 Desc: Sports Gend: M Rge: 77 Eng: E36
e2: 9999 Iiii      Iiii      999.99 Desc: Racing Gend: F Rge: 88 Eng: E18
e2.setBikeRange (0.10):
e2: 9999 Iiii      Iiii      999.99 Desc: Racing Gend: F Rge: 97 Eng: E18

```

Your Name - Lab Exam 4 2017						
	ID	Manufact	Model	Price		
Bike	1111	Aaaa	Aaaa	199.99		
Bike	2222	Bbbb	Bbbb	299.99		
Bike	3333	noManu	noModel	399.99		
TriK	4444	Dddd	Dddd	499.99	Wheel: 100	
TriK	5555	Eeee	Eeee	599.99	Wheel: 99	
Push	6666	Ffff	Ffff	699.99	Desc: Racing	Gend: M
Push	7777	Gggg	Gggg	799.99	Desc: Mountain	Gend: F
Elec	8888	Hhhh	Hhhh	899.99	Desc: Sports	Gend: M Rge: 77 Eng: E36
Elec	9999	Iiii	Iiii	999.99	Desc: Racing	Gend: F Rge: 88 Eng: E18

```
===== Western Bikes Menu Options =====
1: List All Bikes          2: List Trike Bikes
3: List Push Bikes        4: List Electric Push Bikes
5: List All Push Bikes    6: List only Bikes
7: Increase Bike Prices   8: Increase Electric Bike Ranges
9: Change a Bike Price    10: Change an Electric Bike Range
11: Set Engine Warranty   0: Quit

Enter option:
```

Enter option: 1									
	Id	Manufact	Model	Price					
Bike	1111	Aaaa	Aaaa	199.99					
Bike	2222	Bbbb	Bbbb	299.99					
Bike	3333	noManu	noModel	399.99					
Trik	4444	Dddd	Dddd	499.99	Wheel:	100			
Trik	5555	Eeee	Eeee	599.99	Wheel:	99			
Push	6666	Ffff	Ffff	699.99	Desc:	Racing	Gender:	M	
Push	7777	Gggg	Gggg	799.99	Desc:	Mountain	Gender:	F	
Elec	8888	Hhhh	Hhhh	899.99	Desc:	Sports	Gender:	M	Range: 77 Eng: E36
Elec	9999	Iiii	Iiii	999.99	Desc:	Racing	Gender:	F	Range: 88 Eng: E18

Menu Option 2: List Trike Bikes Screenshot 5

Enter option: 2

	Id	Manufact	Model	Price	
=====					
Trike	4444	Dddd	Dddd	499.99	wheel: 100
Trike	5555	Eeee	Eeee	599.99	wheel: 99

Menu Option 3: List Push Bikes Screenshot 6

Enter option: 3

	Id	Manufact	Model	Price	
=====					
Push	6666	Ffff	Ffff	699.99	Desc: Racing Gender: M
Push	7777	Gggg	Gggg	799.99	Desc: Mountain Gender: F

Menu Option 4: List Electric Push Bikes Screenshot 7

Enter option: 4

	Id	Manufact	Model	Price	
=====					
Elec	8888	Hhhh	Hhhh	899.99	Desc: Sports Gender: M Range: 77 Eng: E36
Elec	9999	Iiii	Iiii	999.99	Desc: Racing Gender: F Range: 88 Eng: E18

Menu Option 5: List All Push/Electric Bikes Screenshot 8

Enter option: 5

	Id	Manufact	Model	Price	
=====					
Push	6666	Ffff	Ffff	699.99	Desc: Racing Gender: M
Push	7777	Gggg	Gggg	799.99	Desc: Mountain Gender: F
Elec	8888	Hhhh	Hhhh	899.99	Desc: Sports Gender: M Range: 77 Eng: E36
Elec	9999	Iiii	Iiii	999.99	Desc: Racing Gender: F Range: 88 Eng: E18

Menu Option 6: List only Bikes Screenshot 9

Enter option: 6

	Id	Manufact	Model	Price	
=====					
Bike	1111	Aaaa	Aaaa	199.99	
Bike	2222	Bbbb	Bbbb	299.99	
Bike	3333	noManu	noModel	399.99	

Menu Option 7: Increase Bike Prices Screenshot 10

Enter option: 7

Enter Price Increase: 1.01

	Id	Manufact	Model	Price	
=====					
Bike	1111	Aaaa	Aaaa	199.99	
Bike	1111	Aaaa	Aaaa	201.00	
Bike	2222	Bbbb	Bbbb	299.99	
Bike	2222	Bbbb	Bbbb	301.00	
Bike	3333	noManu	noModel	399.99	
Bike	3333	noManu	noModel	401.00	
Trike	4444	Dddd	Dddd	499.99	wheel: 100
Trike	4444	Dddd	Dddd	501.00	wheel: 100
Trike	5555	Eeee	Eeee	599.99	wheel: 99
Trike	5555	Eeee	Eeee	601.00	wheel: 99
Push	6666	Ffff	Ffff	699.99	Desc: Racing Gender: M
Push	6666	Ffff	Ffff	701.00	Desc: Racing Gender: M
Push	7777	Gggg	Gggg	799.99	Desc: Mountain Gender: F
Push	7777	Gggg	Gggg	801.00	Desc: Mountain Gender: F
Elec	8888	Hhhh	Hhhh	899.99	Desc: Sports Gender: M Range: 77 Eng: E36
Elec	8888	Hhhh	Hhhh	901.00	Desc: Sports Gender: M Range: 77 Eng: E36
Elec	9999	Iiii	Iiii	999.99	Desc: Racing Gender: F Range: 88 Eng: E18
Elec	9999	Iiii	Iiii	1001.00	Desc: Racing Gender: F Range: 88 Eng: E18

9 bikes increased by 1.01

Menu Option 8: Increase Electric Bike Ranges Screenshot 11

```

Enter option: 8
Enter Electric Bike Range % increase: 0.10

  Id    Manufact Model    Price
=====
Elec 8888 Hhhh      Hhhh      899.99 Desc: Sports Gend: M Rge: 77 Eng: E36
Elec 8888 Hhhh      Hhhh      899.99 Desc: Sports Gend: M Rge: 85 Eng: E36
Elec 9999 Iiii      Iiii      999.99 Desc: Racing Gend: F Rge: 88 Eng: E18
Elec 9999 Iiii      Iiii      999.99 Desc: Racing Gend: F Rge: 97 Eng: E18

2 electric Bike ranges increased by: 10.0%
  
```

Menu Option 9: Change a Bike Price Screenshot 12

```

Enter option: 9
Enter Bike Id: 2222
Enter new Price: 123.45

  Id    Manufact Model    Price
=====
Bike 2222 Bbbb      Bbbb      299.99
Bike 2222 Bbbb      Bbbb      123.45
Enter Bike Id: 1234

Bike Id not found - try again
  
```

Menu Option 10: Change an Electric Bike Range Screenshot 13

```

Enter option: 10
Enter Bike Id: 8888
Enter new Range (int, 0.0) or Range increase % (0, double): 0 0.10

  Id    Manufact Model    Price
=====
Elec 8888 Hhhh      Hhhh      899.99 Desc: Sports Gender: M Range: 77 Eng: E36
Elec 8888 Hhhh      Hhhh      899.99 Desc: Sports Gender: M Range: 84 Eng: E36

Enter new Range (int, 0.0) or Range increase % (0, double): 89 0.00

  Id    Manufact Model    Price
=====
Elec 8888 Hhhh      Hhhh      899.99 Desc: Sports Gender: M Range: 84 Eng: E36
Elec 8888 Hhhh      Hhhh      899.99 Desc: Sports Gender: M Range: 89 Eng: E36
Enter Bike Id: 1234

Bike Id not found - try again
Enter Bike Id: 1111

Not an Electric Push Bike - try again
  
```

Menu Option 11: Change an Electric Bike Engine Warranty Screenshot 14

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Enter option: 11
Enter Bike Id: 9999
Enter new Engine Warranty: 60

  Id    Manufact Model    Price
=====
Elec 9999 Iiii      Iiii      999.99 Desc: Racing Gender: F Range: 88 Eng: E18
Elec 9999 Iiii      Iiii      999.99 Desc: Racing Gender: F Range: 88 Eng: E60
Enter Bike Id: 1234

Bike Id not found - try again
Enter Bike Id: 1111

Not an Electric Push Bike - try again
  
```