

PDA : Software development

ERIC CARLES – E18

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1 Week 2

1.1 I.T 5

```
2 # Add a new word at the end of the array
3 def add_new_word(array_of_words, new_word)
4   if(array_of_words != nil && new_word != nil)
5     array_of_words.push(new_word)
6   end
7 end

1 require_relative("it5")
2
3
4 # "dictionary" is an array of words
5 dictionary = ["alive", "deliverance", "zoo", "slivering", "flower"]
6
7 # 3 new words are added
8 add_new_word(dictionary, "iron")
9 add_new_word(dictionary, "overlive")
10 add_new_word(dictionary, "life")
11
12 puts dictionary
```

```
→ pda_project ruby it5/test_it5.rb
alive
deliverance
zoo
slivering
flower
iron
overlive
life
```

1.2 I.T 6

```
1 # Add a new country to the hash with its details
2 ▼ def add_new_country(countries, new_country, country_details)
3 ▼   if(countries != nil && new_country != nil && country_details != nil)
4     countries[new_country] = country_details
5   end
6 end

1 require_relative("it6")
2
3 # An hash is set with a default list of countries
4 countries = {"Liechtenstein" => {"capital" => "Vaduz", "population" => 5248},  
5             "Mauritius"    => {"capital" => "Port Louis", "population" => 147251},  
6             "Bhutan"        => {"capital" => "Thimphu", "population" => 101259},  
7             "Honduras"       => {"capital" => "Tegucigalpa", "population" => 735982},  
8             "Congo"          => {"capital" => "Brazzaville", "population" => 1088044},  
9              "Fiji"          => {"capital" => "Suva", "population" => 84410},  
10            "Cape Verde"     => {"capital" => "Praia", "population" => 125464},  
11            "Vanuatu"        => {"capital" => "Port Vila", "population" => 38000},  
12            "Gambia"         => {"capital" => "Banjul", "population" => 34828},  
13            "Denmark"        => {"capital" => "Copenhagen", "population" => 1231166},  
14            "Burundi"        => {"capital" => "Bujumbura", "population" => 384461},  
15            "Ethiopia"        => {"capital" => "Addis Ababa", "population" => 3040740}  
16          }
17
18 # 3 new countries are added
19 add_new_country(countries, "Bahamas", {"capital" => "Nassau", "population" => 248948})
20 add_new_country(countries, "Sierra Leone", {"capital" => "Freetown", "population" => 1070200})
21 add_new_country(countries, "Armenia", {"capital" => "Yerevan", "population" => 1121900})
22
23 # The hash content is printed out
24 puts countries
```

```
[→ pda_project ruby it6/test_it6.rb
{"Liechtenstein"=>{"capital"=>"Vaduz", "population"=>5248}, "Mauritius"=>{"capital"=>"Port Louis", "population"=>147251}, "Bhutan"=>{"capital"=>"Thimphu", "population"=>101259}, "Honduras"=>{"capital"=>"Tegucigalpa", "population"=>735982}, "Congo"=>{"capital"=>"Brazzaville", "population"=>1088044}, "Fiji"=>{"capital"=>"Suva", "population"=>84410}, "Cape Verde"=>{"capital"=>"Praia", "population"=>125464}, "Vanuatu"=>{"capital"=>"Port Vila", "population"=>38000}, "Gambia"=>{"capital"=>"Banjul", "population"=>34828}, "Denmark"=>{"capital"=>"Copenhagen", "population"=>1231166}, "Burundi"=>{"capital"=>"Bujumbura", "population"=>384461}, "Ethiopia"=>{"capital"=>"Addis Ababa", "population"=>3040740}, "Bahamas"=>{"capital"=>"Nassau", "population"=>248948}, "Sierra Leone"=>{"capital"=>"Freetown", "population"=>1070200}, "Armenia"=>{"capital"=>"Yerevan", "population"=>1121900}]
```

2 Week 3

2.1 I.T 3

```
11 # Find in the dictionary the words with contain the given string pattern
12 # Return the array of the matching words
13 def find_matching_words(array_of_words, pattern)
14
15   matching_words = Array.new();
16
17   if(array_of_words != nil && pattern != nil)
18     array_of_words.each do |word|
19       matching_words.push(word) if word.include?(pattern)
20     end
21   end
22
23   return matching_words
24
25 end

1 require_relative("it5")
2
3
4 # "dictionary" is an array of words
5 dictionary = ["alive", "deliverance", "zoo", "slivering", "flower"]
6
7 # 3 new words are added
8 add_new_word(dictionary, "iron")
9 add_new_word(dictionary, "overlive")
10 add_new_word(dictionary, "life")
11
12 #puts dictionary
13
14 # "dictionary" is passed to the function "find_matching_words"
15 # to find the words which contain the string pattern "live"
16 matching_words = find_matching_words(dictionary, "live")
17
18 # the found words are printed in the console
19 puts matching_words
20 |
```

```
[→ pda_project ruby it5/test_it5.rb
alive
deliverance
slivering
overlive
-
```

2.2 I.T 4

```

9 # Return an array which contains the countries sorted by decreasing population
10 def sort_countries_by_population_desc(countries)
11
12   sorted_countries = Array.new()
13
14   if(countries != nil)
15
16     countries.each do |country, details|
17
18       if(sorted_countries.count() > 0)
19         insertion_index = sorted_countries.index(
20           sorted_countries.select { |country_sorted| country_sorted["population"] <= details["population"]}.first())
21       else
22         insertion_index = 0
23       end
24
25       sorted_countries.insert(insertion_index, {"country" => country,
26                                         "capital" => details["capital"],
27                                         "population" => details["population"]})
28     end
29   end
30
31   return sorted_countries
32 end

1 require_relative("it6")
2
3 # An hash is set with a default list of countries
4 countries = {"Liechtenstein" => {"capital" => "Vaduz", "population" => 5248},
5               "Mauritius" => {"capital" => "Port Louis", "population" => 147251},
6               "Bhutan" => {"capital" => "Thimphu", "population" => 101259},
7               "Honduras" => {"capital" => "Tegucigalpa", "population" => 735982},
8               "Congo" => {"capital" => "Brazzaville", "population" => 1088044},
9               "Fiji" => {"capital" => "Suva", "population" => 84410},
10              "Cape Verde" => {"capital" => "Praia", "population" => 125464},
11              "Vanuatu" => {"capital" => "Port Vila", "population" => 38000},
12              "Gambia" => {"capital" => "Banjul", "population" => 34828},
13              "Denmark" => {"capital" => "Copenhagen", "population" => 1231166},
14              "Burundi" => {"capital" => "Bujumbura", "population" => 384461},
15              "Ethiopia" => {"capital" => "Addis Ababa", "population" => 3040740}
16 }
17
18 # 3 new countries are added
19 add_new_country(countries, "Bahamas", {"capital" => "Nassau", "population" => 248948})
20 add_new_country(countries, "Sierra Leone", {"capital" => "Freetown", "population" => 1070200})
21 add_new_country(countries, "Armenia", {"capital" => "Yerevan", "population" => 1121900})
22
23 # The hash content is printed out
24 # puts countries
25
26 puts sort_countries_by_population_desc(countries)

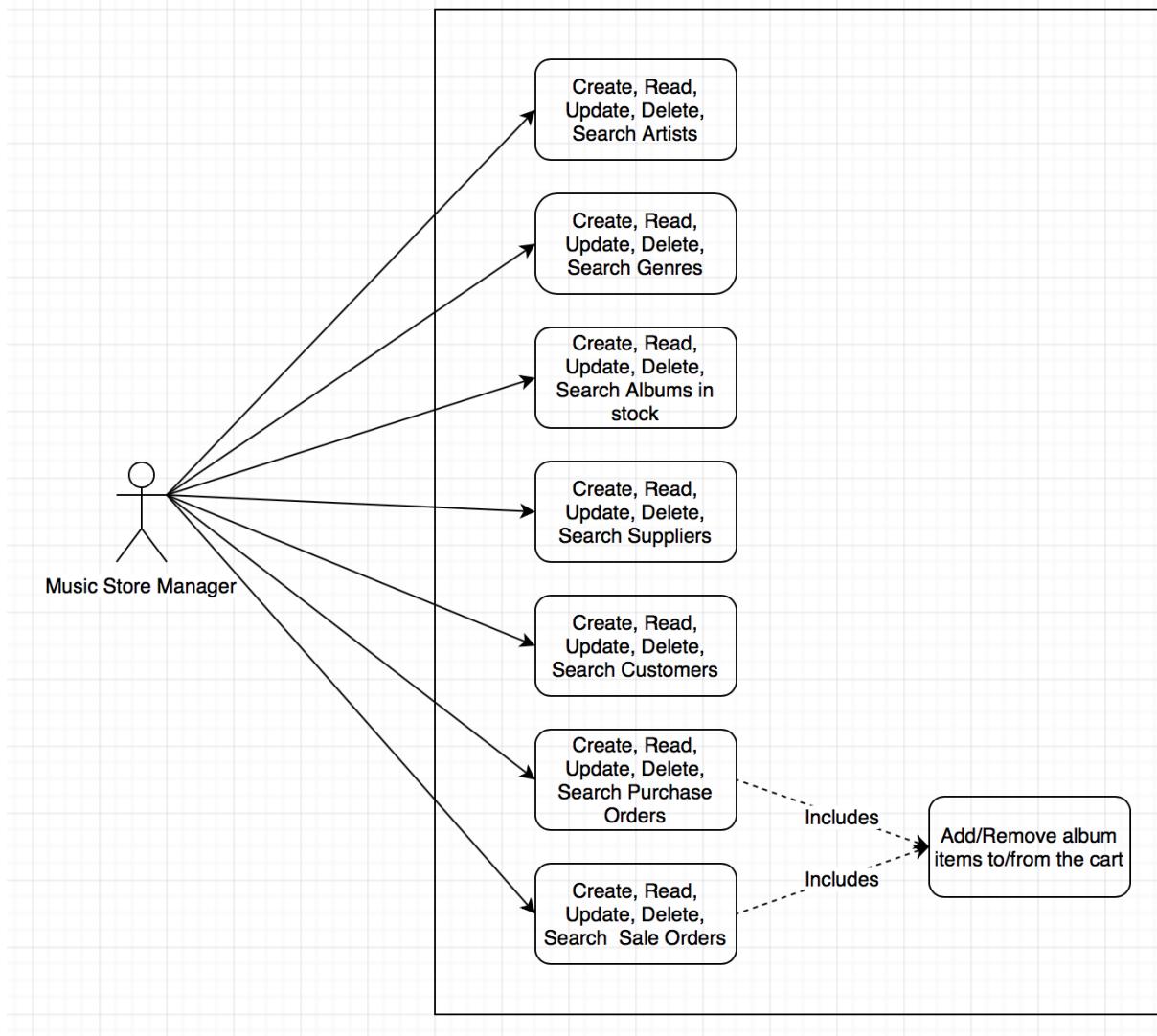
```

```
[→ pda_project ruby it6/test_it6.rb
{"country"=>"Ethiopia", "capital"=>"Addis Ababa", "population"=>3040740}
 {"country"=>"Denmark", "capital"=>"Copenhagen", "population"=>1231166}
 {"country"=>"Armenia", "capital"=>"Yerevan", "population"=>1121900}
 {"country"=>"Congo", "capital"=>"Brazzaville", "population"=>1088044}
 {"country"=>"Sierra Leone", "capital"=>"Freetown", "population"=>1070200}
 {"country"=>"Honduras", "capital"=>"Tegucigalpa", "population"=>735982}
 {"country"=>"Burundi", "capital"=>"Bujumbura", "population"=>384461}
 {"country"=>"Bahamas", "capital"=>"Nassau", "population"=>248948}
 {"country"=>"Mauritius", "capital"=>"Port Louis", "population"=>147251}
 {"country"=>"Cape Verde", "capital"=>"Praia", "population"=>125464}
 {"country"=>"Bhutan", "capital"=>"Thimphu", "population"=>101259}
 {"country"=>"Fiji", "capital"=>"Suva", "population"=>84410}
 {"country"=>"Vanuatu", "capital"=>"Port Vila", "population"=>38000}
 {"country"=>"Gambia", "capital"=>"Banjul", "population"=>34828}
 {"country"=>"Liechtenstein", "capital"=>"Vaduz", "population"=>5248}
```

3 Week 5

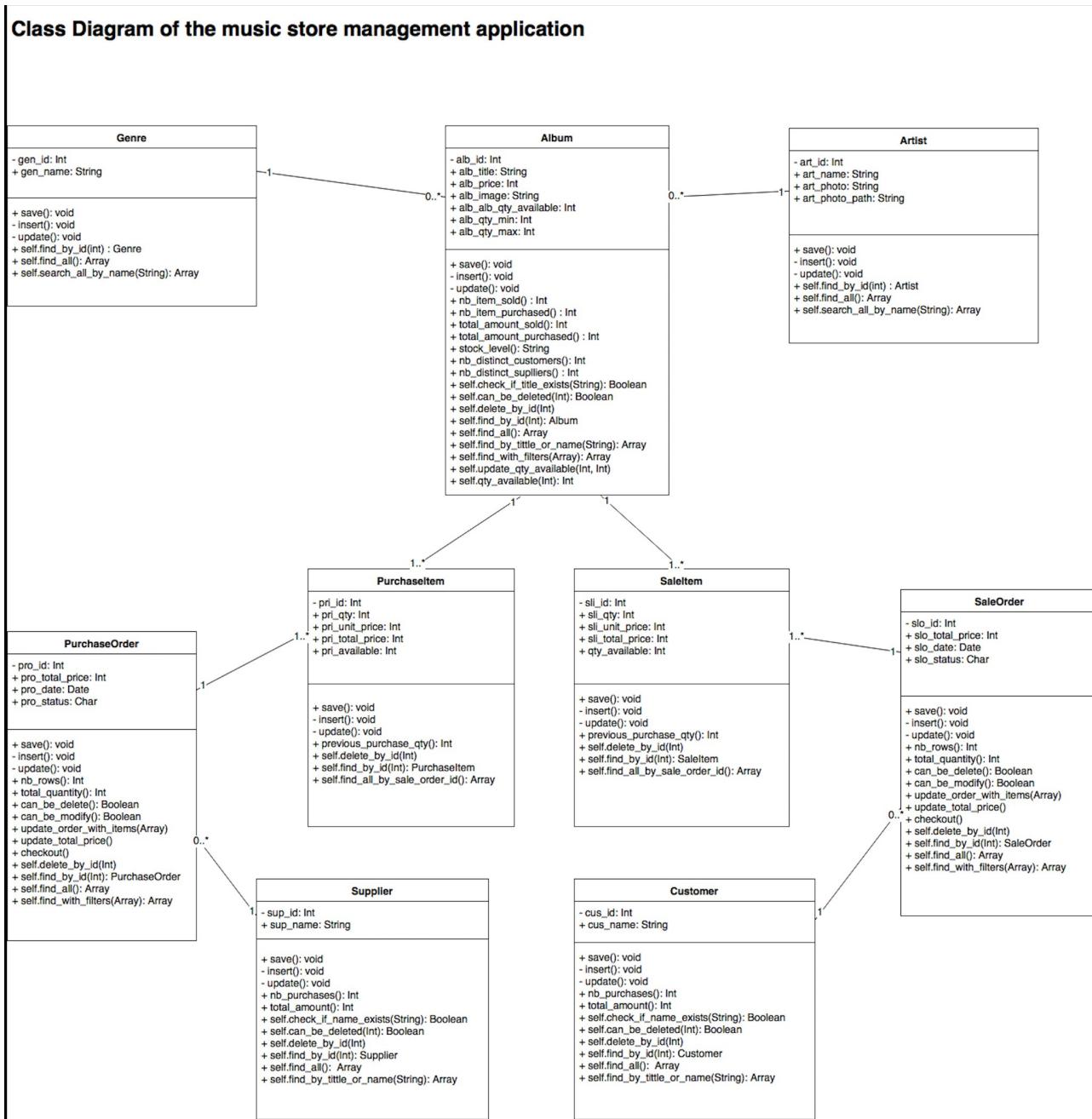
3.1 A.D 1

Use Cases for the manager of a music store

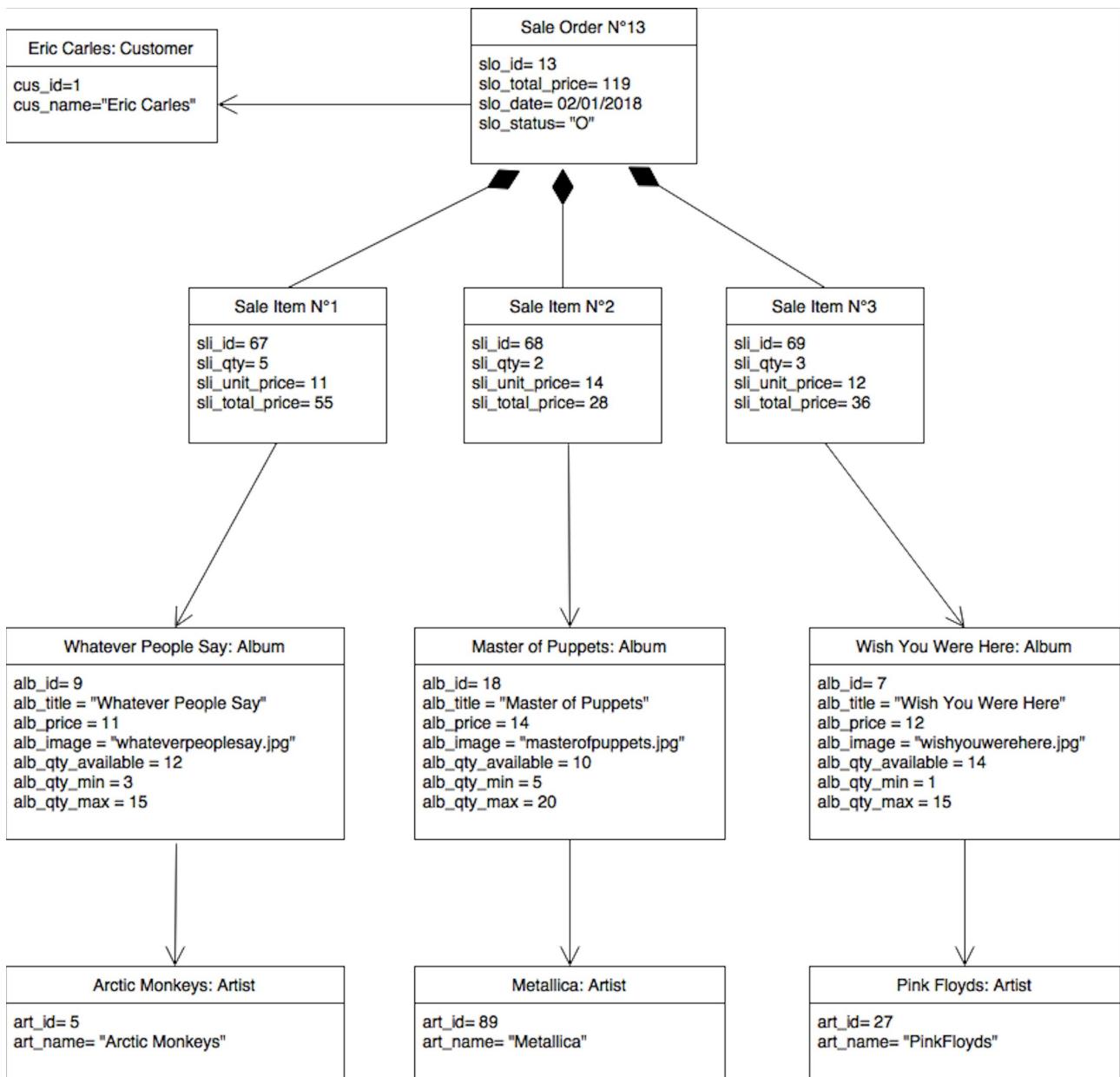


3.2 A.D 2

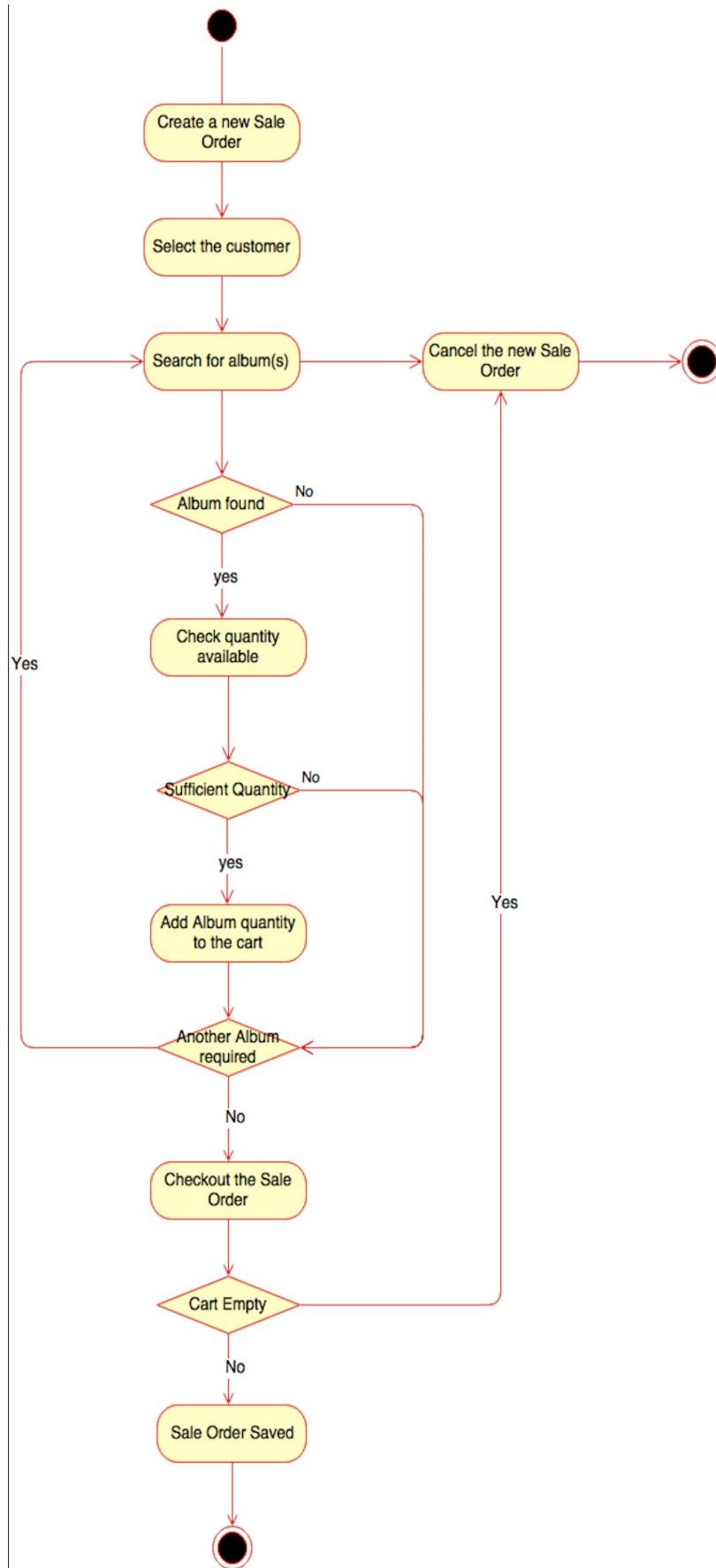
Class Diagram of the music store management application



3.3 A.D 3

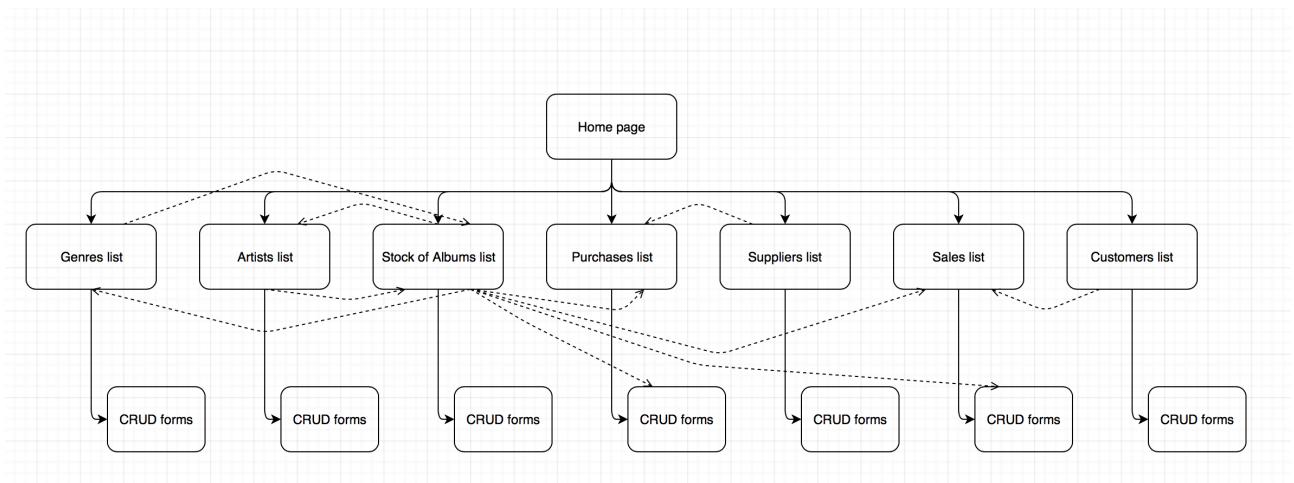


3.4 A.D 4

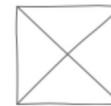
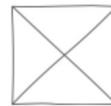
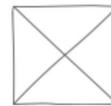
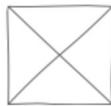
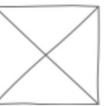


3.5 A.D 6

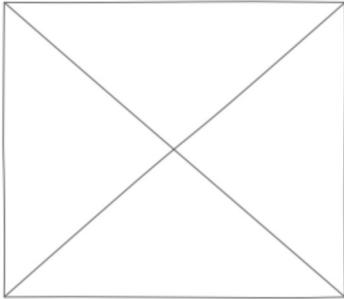
3.6 P 5



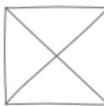
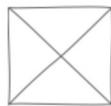
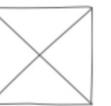
3.7 P 6

						
Genres	Artists	Stock of Albums	Purchases	Suppliers	Sales	Customers

Add a new album in the stock

	Artist	U2
	Genre	POP/ROCK
	Title	Song of innocence
	Stock quantity	30
	Stock min.	5
	Stock max.	40
	Unit. Sale Price	£ 14
		<input type="button" value="Save"/>

Wireframe N°1/2 : Create/Modify an album

						
Genres	Artists	Stock of Albums	Purchases	Suppliers	Sales	Customers

Albums Nb results max. : 100 [Create new entry](#)

Cover	Title	Artist	Genre	Stock	Unit Sale Price	Sales		
	Song of innocence	U2	View	Pop/Rock View	Available 10 Purchase Min. 3 Max. 20	£14 Sale Total quantity 50 Sales Modify Delete Turnover £600		

Wireframe N°2/2 : List of albums in stock

3.8 P 10

```
# Pseudocode to find all the albums which match with the provided filters
# find_albums_with_filters(filters, limit)
# - Initialize the sql query for albums
# - For each filter in filters
#       if the filter value is not null
#           then add the filter to the WHERE clause of the query
#       end if
#   end for
# - Add the clause ORDER BY title to the sql query
# - if limit > 0
#     then add the statement LIMIT to the sql query
# end if
# - Return the result of the sql query execution
```

3.9 P 13

The manager creates a new stock entry for the album “Wish You Were Here” :

[Genres](#) [Artists](#) [Albums](#) [Customers](#) [Suppliers](#) [Sale Orders](#) [Purchase Orders](#)

Add a new Album in the Stock

Artist	<input type="text" value="Pink Floyd"/>
Genre	<input type="text" value="Rock"/>
Title	<input type="text" value="Wish You Were Here"/>
Quantity in stock	<input type="text" value="10"/>
Min. Stock	<input type="text" value="3"/>
Max. Stock	<input type="text" value="20"/>
Sale Price per unit (£)	<input type="text" value="14"/>

[Save](#)

As a result, the new album is now present in the stock :

Genres	Artists	Albums	Customers	Suppliers	Sale Orders	Purchase Orders
		Albums				
			<input type="text" value="Wish You Were Here"/>	<input type="text" value="Artist"/>	<input type="text" value="Genres"/>	<input type="text" value="Stock Level"/>

Create a new Album

Cover	Title & Artist	Genre	Stock	Purchases	Price/Unit	Sales	Modify	Delete
	Wish You Were Here Pink Floyd	Rock	Avail. Min. Max. 10 3 20	Qty Pur. Total Nb. Sup. 0 £0 0	£14	Qty Sold Total Nb. Cus. 0 £0 0	Modify	Delete

3.10 P 14

```
75 # Collect all the sale items whose quantity > 0 and add them to the sale order
76 post NavSaleOrders::POST_ADD_ITEMS do
77
78   sale_item_from_params = params.select { |key, value| key.match(/qty_alb_id_*/)}
79   sale_items_to_add      = []
80   sale_item_from_params.each do |key, value|
81     if(value.to_i) > 0
82       sale_item           = SaleItem.new(nil)
83       sale_item.sli_alb_id = key.sub("qty_alb_id_", "").to_i
84       sale_item.sli_qty    = params["qty_alb_id_#{sale_item.sli_alb_id}"].to_i
85       sale_items_to_add.push(sale_item)
86     end
87   end
88
89   sale_order_id = params['slo_id'].to_i
90   customer_id   = params["slo_cus_id"].to_i
91
92   if(sale_order_id == 0)
93     @sale_order = SaleOrder.new({ "slo_cus_id"      => customer_id,
94                               "slo_total_price" => 0,
95                               "slo_date"        => Time.now,
96                               "slo_status"      => SaleOrder::STATUS_ONGOING})
97   else
98     @sale_order = SaleOrder.find_by_id(sale_order_id)
99     @sale_order.slo_cus_id = customer_id
100  end
101
102  @sale_order.save()
103  @sale_order.update_order_with_items(sale_items_to_add)
104
105  redirect(:#{NavSaleOrders.nav_get_edit_by_id(@sale_order.slo_id)})
106 end
107
108 # Perform an insert or an update depending on the value of art_id
109 def save()
110   if(@slo_id) #if the row already exists
111     update()
112   else
113     insert()
114   end
115 end
```

```

279  def insert()
280      query = "INSERT INTO sale_orders (slo_cus_id, slo_total_price, slo_date, slo_status)
281          VALUES ($1, $2, $3, $4) RETURNING slo_id"
282      @slo_id = DBHelper.run_sql_return_first_row_column_value(query,
283          [@slo_cus_id, @slo_total_price, @slo_date, @slo_status], 'slo_id')
284  end
285
286  def update()
287      query   = "UPDATE sale_orders SET (slo_cus_id, slo_total_price, slo_date, slo_status) =
288                  ($1, $2, $3, $4) WHERE slo_id = $5"
289      DBHelper.run_sql(query, [@slo_cus_id, @slo_total_price, @slo_date,@slo_status, @slo_id])
290  end
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3.11 P 15

The manager of the music albums store wants to select the albums whose kind is “Pop” and which are running low :

Genres	Artists	Albums	Customers	Suppliers	Sale Orders	Purchase Orders
Albums <input type="text" value="Title"/> <input type="text" value="Artist"/> <input type="button" value="Pop"/> <input type="button" value="Low"/> <input type="button" value="List"/> <input type="button" value="GO !"/> Create a new Album						
Cover	Title & Artist	Genre	Stock	Purchases	Price/Unit	Sales
	A Hard Day's Night The Beatles	Pop	Avail. Min. Max. 9 5 15	Qty Pur. Total Nb. Sup. 18 £66 4	£16	Qty. Sold Total Nb. Cus. 14 £224 3
	A Quick One The Who	Pop	Avail. Min. Max. 5 0 15	Qty Pur. Total Nb. Sup. 7 £40 3	£24	Qty. Sold Total Nb. Cus. 13 £312 3
	Abraxas Santana	Rock	Avail. Min. Max. 6 5 18	Qty Pur. Total Nb. Sup. 3 £8 2	£11	Qty. Sold Total Nb. Cus. 2 £22 1
	Achtung Baby U2	Death Metal	Avail. Min. Max. 10 3 17	Qty Pur. Total Nb. Sup. 5 £35 3	£37	Qty. Sold Total Nb. Cus. 14 £518 3
	Aladdin Sane David Bowie	Rock	Avail. Min. Max. 7 5 17	Qty Pur. Total Nb. Sup. 7 £42 1	£19	Qty. Sold Total Nb. Cus. 4 £76 1

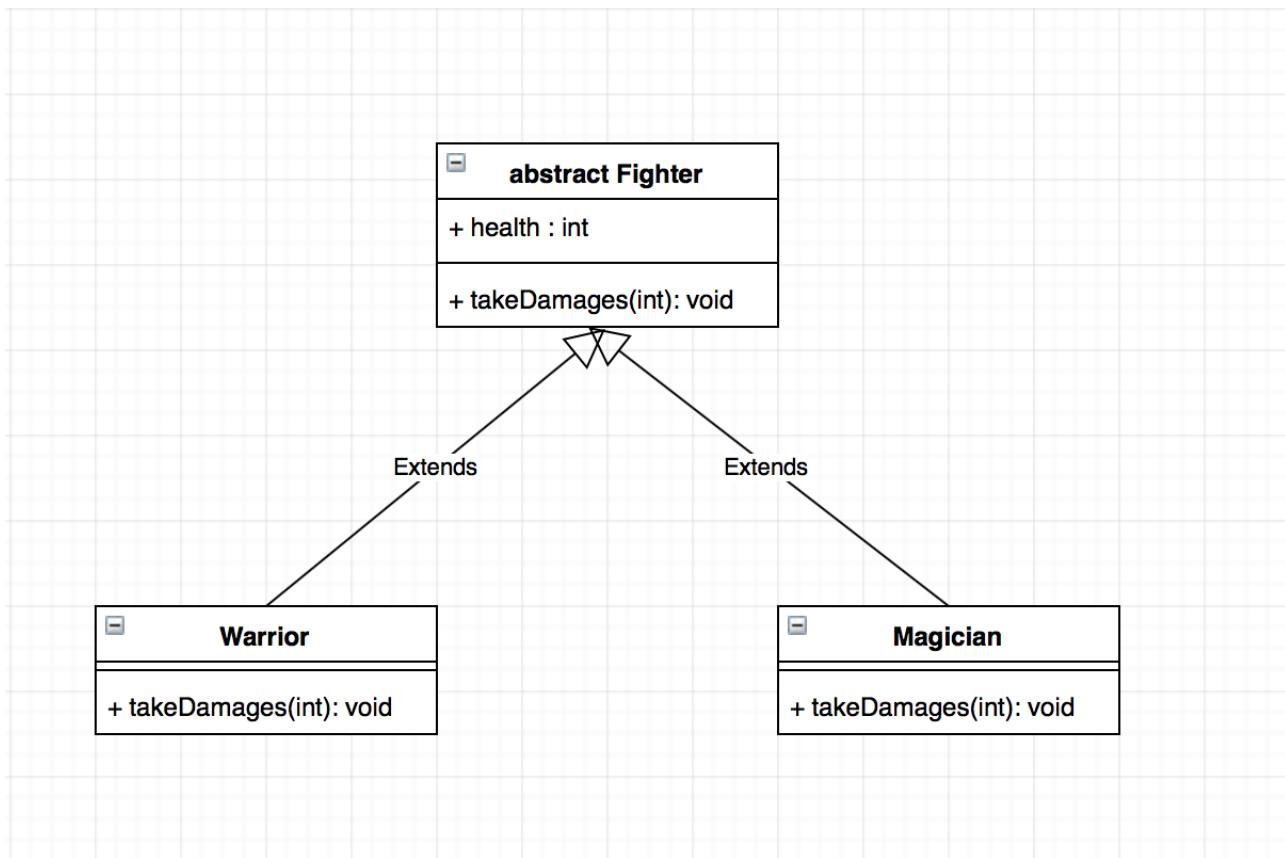
As a result, the list of the matching albums is displayed :

Genres	Artists	Albums	Customers	Suppliers	Sale Orders	Purchase Orders
Albums <input type="text" value="Title"/> <input type="text" value="Artist"/> <input type="button" value="Pop"/> <input type="button" value="Low"/> <input type="button" value="List"/> <input type="button" value="GO !"/> Create a new Album						
Cover	Title & Artist	Genre	Stock	Purchases	Price/Unit	Sales
	Brothers in Arms Dire Straits	Pop	Avail. Min. Max. 0 1 15	Qty Pur. Total Nb. Sup. 0 £0 0	£50	Qty. Sold Total Nb. Cus. 0 £0 0
	LA Woman The Doors	Pop	Avail. Min. Max. 1 3 17	Qty Pur. Total Nb. Sup. 0 £0 0	£27	Qty. Sold Total Nb. Cus. 0 £0 0
	The Who Sings My Generation The Who	Pop	Avail. Min. Max. 2 2 18	Qty Pur. Total Nb. Sup. 3 £6 1	£27	Qty. Sold Total Nb. Cus. 1 £27 1

3.12 I.T Task A

4 Week 6

4.1 I.T 7



In this example I'm using an abstract class "Fighter" and 2 sub-classes : "Warrior" and "Magician".

The abstract class "Fighter" has an abstract method "takeDamages".

```
1
2 ① public abstract class Fighter {
3
4      protected String name;
5      protected int health;
6
7
8      public Fighter(String name, int health){
9          this.name = name;
10         this.health = health;
11     }
12
13 ①     public abstract void takeDamages(int damages);
14
15 }
```

Both sub-classes has a different implementation of this method :

The damages taken by the "Warrior" are reduced by its armor.

```
1  public class Warrior extends Fighter {  
2  
3      private int armor;  
4  
5      public Warrior(String name, int health, int armor){  
6          super(name, health);  
7          this.armor = armor;  
8      }  
9  
10     @Override  
11     public void takeDamages(int damages) {  
12         this.health -= Math.max(0, damages - armor);  
13     }  
14 }  
15 }
```

While the Wizard does not have any protection to reduce the damages :

```
1  public class Wizard extends Fighter {  
2  
3  
4  
5      public Wizard(String name, int health) {  
6          super(name, health);  
7      }  
8  
9      @Override  
10     public void takeDamages(int damages) {  
11         this.health -= damages;  
12     }  
13 }  
14 }
```

In the runner file a “Warrior” and a “Wizard” objects are created and both are added in an array of “Fighter” objects. Both have an initial health of 10 points. Then the “takeDamages” is called on both with a damage value of 5 points.

```
5 ► public class Runner {  
6  
7 ►   public static void main(String[] args){  
8  
9     Warrior warrior = new Warrior( name: "Conan", health: 10, armor: 3);  
10    Wizard wizard = new Wizard( name: "Harry Potter", health: 10);  
11  
12    ArrayList<Fighter> fighters = new ArrayList<>();  
13    fighters.add(warrior);  
14    fighters.add(wizard);  
15  
16  
17    for(Fighter fighter : fighters){  
18      fighter.takeDamages(5);  
19    }  
20  
21    for(Fighter fighter : fighters){  
22      System.out.println(String.format("%s health is : %s", fighter.name, fighter.health));  
23    }  
24  }
```

The result shows that the damages of the “Warrior” have been reduced by 3 points thanks to his armor while the “Wizard” has lost 5 points.

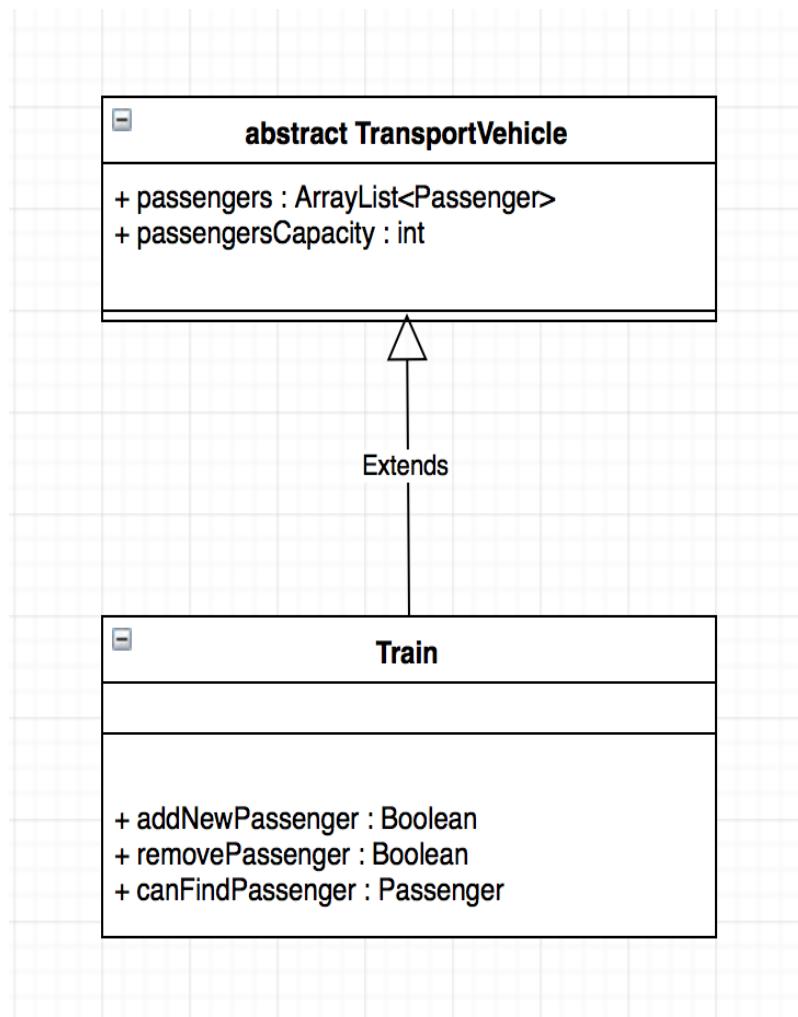
```
Conan's health is : 8  
Harry Potter's health is : 5  
  
Process finished with exit code 0
```

To conclude, “Warrior” and “Wizard” objects can have different forms, they can be considered as “Fighter” objects. However, even under a “Fighter” form they behave specifically depending on their class “Warrior” and “Wizard”, this feature is an illustration of polymorphism.

5 Week N°9

5.1 A.D 5

In this example, the class "Train" inherits from the abstract class "TransportVehicle"



5.2 I.T1

The “TransportVehicle” class is an abstract class whose properties passengerCapacity and passengers are declared “protected”. Thus, only classes which extend TransportVehicle can see them.

```
import java.util.ArrayList;  
  
public abstract class TransportVehicle {  
  
    protected int passengerCapacity;  
    protected ArrayList<Passenger> passengers;  
}
```

In this second example, the property “name” is declared as private thus it's visibility is limited to the class itself. The public method “getName” provides a way to other classes to get the name of the passenger.

```
public class Passenger {  
  
    private String name;  
  
    public Passenger(String name){  
        this.name = name;  
    }  
  
    public String getName(){  
        return this.name;  
    }  
}
```

5.3 I.T2

The “TransportVehicle” class is an abstract class.

```
import java.util.ArrayList;  
  
public abstract class TransportVehicle {  
  
    protected int passengerCapacity;  
    protected ArrayList<Passenger> passengers;  
}
```

The “Train” class inherits from TransportVehicle with the keyword “extends”

```
import java.util.ArrayList;

public class Train extends TransportVehicle {

    public Train(int passengerCapacity) {
        super(passengerCapacity);
        this.passengers = new ArrayList<>();
    }

    public Passenger findPassenger(String passengerName){
        for(Passenger passenger : this.passengers){
            if(passenger.getName().equals(passengerName)){
                return passenger;
            }
        }
        return null;
    }

    public boolean addNewPassenger(Passenger newPassenger){
        if(this.passengers.size() < this.passengerCapacity){
            this.passengers.add(newPassenger);
            return true;
        }
        else{
            return false;
        }
    }

    public boolean removePassenger(Passenger passenger){
        if(this.passengers.contains(passenger)){
            this.passengers.remove(passenger);
            return true;
        }
        else{
            return false;
        }
    }
}
```

The “Train” class uses the property “passengerCapacity” and “passengers” inherited from the “TransportVehicle” class to manage the passengers who get on or off the train.

The list of passengers is encapsulated in the class “Train” : it is not visible from outside the class. However, the “Train” class provides methods to manage the list of passengers :

- findPassenger : find a passenger by his name
- addNewPassenger : add a new passenger onboard
- removePassenger : remove a passenger from the list when he gets off the train.

Thus, for other classes, the management of the list of passengers is a blackbox.

5.4 P 11

https://github.com/BlueMorning/music_store_project

6 Week N°11

6.1 P.18

The test code is the “getProposition” method which is expected to return a proposition as a String depending on the type of question answered :

```
21 public String getProposition(){  
22  
23     switch(enumQuestionType){  
24         case DEFINITION_WORD:  
25             this.label = this.meaningModel.getWordModel().getWordEntity().getSpelling();  
26  
27         case WORD_EXAMPLE:  
28             this.label = this.meaningModel.getMeaningEntity().getExample();  
29  
30         case EXAMPLE_WORD:  
31             this.label = this.meaningModel.getWordModel().getWordEntity().getSpelling();  
32  
33         case WORD_DEFINITION:  
34             this.label = this.meaningModel.getMeaningEntity().getMeaning();  
35  
36         default:  
37             this.label = this.meaningModel.getWordModel().getWordEntity().getSpelling();  
38  
39     }  
40  
41     return this.label;  
42 }
```

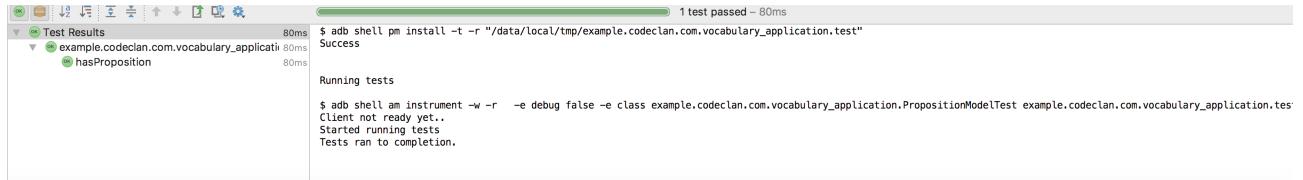
The test fails because the expected proposition does not match with the current proposition returned by the method “getProposition”



The “getProposition” method is fixed by adding the break statements which were missing for each “case” :

```
21 public String getProposition(){  
22  
23     switch(enumQuestionType){  
24         case DEFINITION_WORD:  
25             this.label = this.meaningModel.getWordModel().getWordEntity().getSpelling();  
26             break;  
27  
28         case WORD_EXAMPLE:  
29             this.label = this.meaningModel.getMeaningEntity().getExample();  
30             break;  
31  
32         case EXAMPLE_WORD:  
33             this.label = this.meaningModel.getWordModel().getWordEntity().getSpelling();  
34             break;  
35  
36         case WORD_DEFINITION:  
37             this.label = this.meaningModel.getMeaningEntity().getMeaning();  
38             break;  
39  
40         default:  
41             this.label = this.meaningModel.getWordModel().getWordEntity().getSpelling();  
42             break;  
43  
44     }  
45  
46     return this.label;  
47 }
```

The test is passing after the correction :



A screenshot of the Android Studio Test Results window. The title bar shows "1 test passed - 80ms". The main area displays the command line output of the test run:

```
$ adb shell pm install -t -r "/data/local/tmp/example.codeclan.com.vocabulary_application.test"
Success
Running tests
$ adb shell am instrument -w -r -e debug false -e class example.codeclan.com.vocabulary_application.PropositionModelTest example.codeclan.com.vocabulary_application.test
Client not ready yet..
Started running tests
Tests ran to completion.
```