Lab Exercise 1: Array List, Composite Classes

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- This lab exercise is divided into four stages – Stage 1, Stage 2, Stage 3 and Stage 4.

- You need to complete Stage 1 without errors before you can proceed to Stage 2, and complete Stage 2 without errors before you can proceed to Stage 3 and Stage 4.

- For reference (e.g., list of methods in ArrayList class that you can use), you may refer to the following Java documentation:

    o ArrayList (Java Platform SE 8):

    https://docs.oracle.com/javase/8/docs/api/java/util/ArrayList.html

Question:

Akim has a large collection of song albums passed down by his grandfather and uncles plus his own collection. The albums collection consists of different genres that ranges from Melayu Asli, Keroncong, Sentimental Ballad, Pop, Rock, Hip Hop, Blues, R & B, Nasyid, etc. Each album usually has a few tracks of songs. The attributes for an album are title, year released, record company, genre and singer. Attributes for a song consists of song title, composer, lyricist, and length (in minutes).

Task:

Akim is a close friend of yours and ask a favor from you to develop program so that he can keep track of information on his large album collections. He would like to find out the number of albums released before the year 1970 since the old albums are rare collections and might be auctioned at a high price.

Stage 1:

1. Create a Java project named `Lab1-C-Stage1`.

2. Copy file `AlbumTester1.java` into your project.

Define a class named `Song` (in file Song.java) that has:

  i. *Instance variables* to represent a song's *title*, the *composer*, the *lyricist*, and its *length*.

Define a class named `Album` (in file Album.java) that has:

  i. *Instance variables* to represent an album's *title*, the *year released*, *label* (the recording company), *genre*, *singer* and a list of song *tracks*.
  ii. *Constructor* method which receives five parameters, and
      - assigns the parameters to the instance variables of class `Album`.

- creates an array list of *Song* objects and assigns the array list to the instance variable that represents the track list.

Define a class named `AlbumCollectionRegister` (in file named AlbumCollectionRegister.java) that has:

i.   *Instance variable* to represent a list of Albums collection (declare an array list of `Album` objects).

ii. *Constructor* method which will create an array list to register `Album` objects

Check your answer by invoking the `main` method in class `AlbumTester1` (just run project as Java Application) and your output should be as follows:

```
Total number of Albums collections : 0
```

*Proceed to Stage 2 only after you have completed Stage 1 without errors.

Stage 2:

1. Create a Java project named `Lab1-C-Stage2`.

2. Copy file `AlbumTester2.java` into your project.

3. Copy files `Song.java`, `Album.java` and `AlbumCollectionRegister.java` from Stage 1 into your Stage 2 Java project.

Add into the `Song` class:

i.   A method named `getTitle` that returns the instance variable that represents a song's *title*.

ii. A method named `getComposer` that returns the instance variable that represents the song's *composer*.

iii. A method named `getLyricist` that returns the instance variable that represents the song's *lyricist*.

iv. A method named `getLength` that returns the instance variable that represents the song's *length*.

Add into the `Album` class:

i.   A method named `getTitle` that returns the instance variable that represents a album's *title*.

ii.   A method named `getYearReleased` that returns the instance variable that represents album's *year released.*

iii.   A method named `getGenre` that returns the instance variable that represents album's *genre.*

iv.   A method named `getLabel` that returns the instance variable that represents the album's *label.*

v.   A method named `getSinger` that returns the instance variable that represents the album's *singerl.*

vi.   A method named `getTrackList` that returns the instance variable that represents list of songs in an album.

Check your answer by invoking the `main` method in class `SongTester2` and your output should be as follows:

```
Album title : Bunyi Gitar
Year released : 1964
Label : Parlophone
Genre : Folk, World & Country
Singer : P.Ramlee

Album title : Coast To Coast
Year released : 2000
Label : RCA, BMG UK & Ireland
Genre : Pop
Singer : Westlife

Album title : Edcoustic Hits 1 Dekade
Year released : 2012
Label : AlfaRecords
Genre : World
Singer : Edcoustic

Album title : Chapters
Year released : 2016
Label : Verve Records
Genre : Pop, R&B
Singer : Yuna
```

*Proceed to Stage 3 only after you have completed Stage 2 without errors.

Stage 3:

1. Create a Java project named `Lab1-C-Stage3`.

2. Copy file `AlbumTester3.java` into your project.

3. Copy files `Song.java`, `Album.java` and `AlbumCollectionRegister.java` from Stage 2 into your Stage 3 Java project.

Add into the Album class:

    i.   A void method named `addSong` that receives a `Song` object as a parameter, and add it to the end of the album's track list.

   ii.   A method named `listSongs` that will print a list of Song's details

Check your answer by invoking the `main` method in class `AlbumTester3` and your output should be as follows:

```
Album title : Mencheche Bujang Lapok
Year released : 1961
Label : Parlophone
Genre : Film Soundtrack
Singer : P.Ramlee/Saloma
      Song title : Mencheche Bujang Lapok
      Composer    : P.Ramlee
      Lyricist    : S.Sudarmaji
      Length      : 3
      Song title : Embun Menitik
      Composer    : P.Ramlee
      Lyricist    : S.Sudarmaji
      Length      : 4

Album title : Coast To Coast
Year released : 2000
Label : RCA, BMG UK & Ireland
Genre : Pop
Singer : Westlife
      Song title : My Love
      Composer    : Jörgen Elofsson David Kreuger Per Magnusson Pelle Nylén
      Lyricist    : Jörgen Elofsson David Kreuger Per Magnusson Pelle Nylén
      Length      : 3

Album title : Edcoustic Hits 1 Dekade
Year released : 2012
Label : Kreavisi
Genre : World
Singer : Edcoustic
      Song title : Muhasabah Cinta
      Composer    : Aden
      Lyricist    : Aden
      Length      : 3
      Song title : Sebiru Hari Ini
      Composer    : Aden
      Lyricist    : Aden
      Length      : 4

Album title : Chapters
Year released : 2016
Label : Verve Records
Genre : Pop, R&B
Singer : Yuna
      Song title : Crush
      Composer    : Zarai, Robinson, Warfield
      Lyricist    : Zarai, Robinson, Warfield
```

```
        Length       : 4
        Song title : Best of Me
        Composer     : Zarai, Braun, Salva
        Lyricist     : Zarai, Braun, Salva
        Length       : 5
        Song title : All I Do
        Composer     : Zarai, David Foster
        Lyricist     : Zarai, David Foster
        Length       : 3
```

*Proceed to Stage 3 only after you have completed Stage 2 without errors.

Stage 4: (Bonus)

1. Create a Java project named `Lab1-C-Stage4`.

2. Copy file `AlbumTester4.java` into your project. Copy files `Song.java`, `Album.java` and `AlbumCollectionRegister.java` in Stage 3 into your Stage 4 Java project.

Add into the `AlbumTester4.java` program :

In method `printRareAlbum()` add a for loop to find the total number of rare albums and print their details.

Add the code at the specified place as follows:

```java
public static void printRareAlbum(ArrayList<Album> albumList){
      int numRareAlbum = 0;
      System.out.println("\nRare Albums");

      /* add for loop here to check album released before the year 1970 */

      System.out.println("Number of rare albums : " + numRareAlbum);
}
```

Check your answer by invoking the `main` method in class `AlbumTester4` and your output should be as follows:

```
Album title : Mencheche Bujang Lapok
Year released : 1961
Label : Parlophone
Genre : Film Soundtrack
Singer : P.Ramlee/Saloma
      Song title : Mencheche Bujang Lapok
      Composer     : P.Ramlee
      Lyricist     : S.Sudarmaji
      Length       : 3
      Song title : Embun Menitik
      Composer     : P.Ramlee
      Lyricist     : S.Sudarmaji
```

```
      Length       : 4

Album title : Coast To Coast
Year released : 2000
Label : RCA, BMG UK & Ireland
Genre : Pop
Singer : Westlife
      Song title : My Love
      Composer    : Jörgen Elofsson David Kreuger Per Magnusson Pelle Nylén
      Lyricist    : Jörgen Elofsson David Kreuger Per Magnusson Pelle Nylén
      Length      : 3

Album title : Edcoustic Hits 1 Dekade
Year released : 2012
Label : Kreavisi
Genre : World
Singer : Edcoustic
      Song title : Muhasabah Cinta
      Composer    : Aden
      Lyricist    : Aden
      Length      : 3
      Song title : Sebiru Hari Ini
      Composer    : Aden
      Lyricist    : Aden
      Length      : 4

Album title : Chapters
Year released : 2016
Label : Verve Records
Genre : R&B
Singer : Yuna
      Song title : Crush
      Composer    : Zarai, Robinson, Warfield
      Lyricist    : Zarai, Robinson, Warfield
      Length      : 4
      Song title : Best of Me
      Composer    : Zarai, Braun, Salva
      Lyricist    : Zarai, Braun, Salva
      Length      : 5
      Song title : All I Do
      Composer    : Zarai, David Foster
      Lyricist    : Zarai, David Foster
      Length      : 3

Album title : Help!
Year released : 1965
Label : EMI Studios London
Genre : Baroque Pop
Singer : The Beatles

Rare Albums
Album : Mencheche Bujang Lapok - P.Ramlee/Saloma 1961
Album : Help! - The Beatles 1965
Number of rare albums : 2
```