COMP1406 - Assignment #6

(Due: **Mon. Mar 26th @ 12 noon**)

In this assignment, you will simulate an on-line music centre called the **MusicExchangeCenter** where **Users** log in and download **Songs** from other user's computers. It is similar to the operation of the original Napster program that operated a few years ago where users shared songs. You won't be doing any downloading or internet programming. Instead, you will just simulate what happens in real life. The assignment will give you familiarity with **ArrayLists**.

(1) The **Song/ User** Classes

Here are simple **Song** and **User** classes that represent a song that is available at the Music Exchange Center and a user of the Music Exchange Center that logs in to download music:

```
public class Song {
    private String      title;
    private String      artist;
    private int         duration;

    public Song()  {
        this("", "", 0, 0);
    }

    public Song(String t, String a, int m, int s)  {
        title = t;
        artist = a;
        duration = m * 60 + s;
    }

    public String getTitle() { return title; }
    public String getArtist() { return artist; }
    public int getDuration() { return duration; }

    public int getMinutes() {
        return duration / 60;
    }

    public int getSeconds() {
        return duration % 60;
    }

    public String toString()  {
        return("\"" + title + "\" by " + artist + " " +
                (duration / 60) + ":" + (duration%60));
    }
}
```

```
public class User {
    private String     userName;
    private boolean    online;

    public User()  { this(""); }

    public User(String u)  {
        userName = u;
        online = false;
    }

    public String getUserName() { return userName; }
    public boolean isOnline() { return online; }

    public String toString()  {
        String s = "" + userName + ": XXX songs (";
        if (!online) s += "not ";
            return s + "online)";
    }
}
```

Do the following in the **User** class:

- Add a **songList** attribute which is an **ArrayList** of **Song** objects. This list will contain all the songs that this user has on his/her hard drive to be made available to the Music Exchange Center community. Adjust the 2nd constructor to ensure that this attribute is initialized properly. Write a get method for the attribute as well.
- Adjust the **toString()** method so that the XXX is replaced by the number of songs available in his/her song list.
- Create a method called **addSong(Song s)** which adds a given song to the user's song list.
- Create a method called **totalSongTime()** that returns an integer indicating the total duration (i.e., amount of time) (in seconds) that all of the user's songs would require if played.

---

(2) The **MusicExchangeCenter** Class

Implement a class called **MusicExchangeCenter** which represents the company website that users log in and out of in order to download music. The class should have this attribute:

- **users** - an **ArrayList** of all registered **Users** (which may be either logged on or not logged on).

Create the following methods:

- A zero-parameter constructor that sets attributes properly.
- An **onlineUsers()** method that returns an **ArrayList** of all **Users** that are currently online. Note that this method creates and returns a new **ArrayList** each time it is called.
- An **allAvailableSongs()** method that returns a new **ArrayList** of all **Songs** currently available for download (i.e., all songs that are available from all logged-on users). Note that this method creates and returns a new **ArrayList** each time it is called.

- A **toString()** method that returns a string representation of the music center showing the number of users currently online as well as the number of songs currently available.

  (e.g., **"Music Exchange Center (3 users on line, 15 songs available)"**).

- A **userWithName(String s)** method that finds and returns the user object with the given name if it is in the list of users. If not there, **null** should be returned.
- A **registerUser(User x)** method that adds a given **User** to the music center's list of users, provided that there are no other users with the same userName. If there are other users with the same userName, then this method does nothing. Use the **userWithName()** method above.
- An **availableSongsByArtist(String artist)** method that returns a new **ArrayList** of all **Songs** currently available for download by the specified artist. Note that this method creates and returns a new **ArrayList** each time it is called.

Go back to the **User** class and add these methods:

- A **register(MusicExchangeCenter m)** that makes use of the **registerUser()** method that you just wrote to register the user into the given **MusicExchangeCenter m**. (Note that this should be a one-line method).
- A **logon(MusicExchangeCenter m)** that simulates a user going online with the given music center. (Assume that users can log onto at most one music center at a time). Make use of the **userWithName()** method you wrote earlier. Only allow the user to log on if he/she has already registered.
- A **logoff(MusicExchangeCenter m)** that simulates a user going offline from the given music center. Make use of the **userWithName()** method you wrote earlier.

Now we will test our code. Since we will be testing our classes with the same users, you must add the following **static** methods to the **User** class (Each method creates and returns a unique user with some songs in their song list):

```
// Various Users for test purposes
public static User DiscoStew() {
    User  discoStew = new User("Disco Stew");
    discoStew.addSong(new Song("Hey Jude", "The Beatles", 4, 35));
    discoStew.addSong(new Song("Barbie Girl", "Aqua", 3, 54));
    discoStew.addSong(new Song("Only You Can Rock Me", "UFO", 4, 59));
    discoStew.addSong(new Song("Paper Soup Cats", "Jaw", 4, 18));
    return discoStew;
}

public static User SleepingSam() {
    User sleepingSam = new User("Sleeping Sam");
    sleepingSam.addSong(new Song("Meadows", "Sleepfest", 7, 15));
    sleepingSam.addSong(new Song("Calm is Good", "Waterfall", 6, 22));
    return sleepingSam;
}

public static User RonnieRocker() {
    User ronnieRocker = new User("Ronnie Rocker");
    ronnieRocker.addSong(new Song("Rock is Cool", "Yeah", 4, 17));
    ronnieRocker.addSong(new Song("My Girl is Mean to Me", "Can't Stand Up", 3, 29));
    ronnieRocker.addSong(new Song("Only You Can Rock Me", "UFO", 4, 52));
    ronnieRocker.addSong(new Song("We're Not Gonna Take It", "Twisted Sister", 3, 9));
    return ronnieRocker;
}

public static User CountryCandy() {
    User countryCandy = new User("Country Candy");
```

```
        countryCandy.addSong(new Song("If I Had a Hammer", "Long Road", 4, 15));
        countryCandy.addSong(new Song("My Man is a 4x4 Driver", "Ms. Lonely", 3, 7));
        countryCandy.addSong(new Song("This Song is for Johnny", "Lone Wolf", 4, 22));
        return countryCandy;
    }

    public static User PeterPunk() {
        User peterPunk = new User("Peter Punk");
        peterPunk.addSong(new Song("Bite My Arms Off", "Jaw", 4, 12));
        peterPunk.addSong(new Song("Where's My Sweater", "The Knitters", 3, 41));
        peterPunk.addSong(new Song("Is that My Toenail ?", "Clip", 4, 47));
        peterPunk.addSong(new Song("Anvil Headache", "Clip", 4, 34));
        peterPunk.addSong(new Song("My Hair is on Fire", "Jaw", 3, 55));
        return peterPunk;
    }
```

Now test your code with the following test program:

```
    public class MusicExchangeTestProgram {
        public static void main(String args[]) {
            // Create a new music exchange center
            MusicExchangeCenter   mec = new MusicExchangeCenter();

            // Create some users and give them some songs
            User discoStew = User.DiscoStew();
            User sleepingSam = User.SleepingSam();
            User ronnieRocker = User.RonnieRocker();
            User countryCandy = User.CountryCandy();
            User peterPunk = User.PeterPunk();

            // Register the users, except SleepingSam
            discoStew.register(mec);
            ronnieRocker.register(mec);
            countryCandy.register(mec);
            peterPunk.register(mec);

            // Display the state of things before anyone logs on
            System.out.println("Status: " + mec);
            System.out.println("On-Line Users: " + mec.onlineUsers());
            System.out.println("Available Songs: " + mec.allAvailableSongs() + "\n");

            // Attempt to log on two registered users and one unregistered user
            discoStew.logon(mec);
            sleepingSam.logon(mec); // Should not work
            ronnieRocker.logon(mec);
            System.out.println("Status: " + mec);
            System.out.println("On-Line Users: " + mec.onlineUsers());
            System.out.println("Available Songs: " + mec.allAvailableSongs() + "\n");

            // Log on two more users
            countryCandy.logon(mec);
            peterPunk.logon(mec);
            System.out.println("Status: " + mec);
            System.out.println("On-Line Users: " + mec.onlineUsers());
            System.out.println("Available Songs: " + mec.allAvailableSongs());
            System.out.println("Available Songs By Jaw: " +
                               mec.availableSongsByArtist("Jaw") + "\n");

            // Log off three users (one is not even logged in)
            countryCandy.logoff(mec);
            discoStew.logoff(mec);
            sleepingSam.logoff(mec);
            System.out.println("Status: " + mec);
            System.out.println("On-Line Users: " + mec.onlineUsers());
            System.out.println("Available Songs: " + mec.allAvailableSongs());
            System.out.println("Available Songs By Jaw: " +
```

```
                                mec.availableSongsByArtist("Jaw") + "\n");

            // Log off the last two users
            peterPunk.logoff(mec);
            ronnieRocker.logoff(mec);
            System.out.println("Status: " + mec);
            System.out.println("On-Line Users: " + mec.onlineUsers());
            System.out.println("Available Songs: " + mec.allAvailableSongs());
            System.out.println("Available Songs By Jaw: " +
                                mec.availableSongsByArtist("Jaw") + "\n");
        }
    }
```

Here is the output that you should see:

```
Status: Music Exchange Center (0 users on-line, 0 songs available)
On-Line Users: []
Available Songs: []

Status: Music Exchange Center (2 users on-line, 8 songs available)
On-Line Users: [Disco Stew: 4 songs (online), Ronnie Rocker: 4 songs (online)]
Available Songs: ["Hey Jude" by The Beatles 4:35, "Barbie Girl" by Aqua 3:54, "Only You Can Rock
Me" by UFO 4:59, "Paper Soup Cats" by Jaw 4:18, "Rock is Cool" by Yeah 4:17, "My Girl is Mean to
Me" by Can't Stand Up 3:29, "Only You Can Rock Me" by UFO 4:52, "We're Not Gonna Take It" by
Twisted Sister 3:9]

Status: Music Exchange Center (4 users on-line, 16 songs available)
On-Line Users: [Disco Stew: 4 songs (online), Ronnie Rocker: 4 songs (online), Country Candy: 3
songs (online), Peter Punk: 5 songs (online)]
Available Songs: ["Hey Jude" by The Beatles 4:35, "Barbie Girl" by Aqua 3:54, "Only You Can Rock
Me" by UFO 4:59, "Paper Soup Cats" by Jaw 4:18, "Rock is Cool" by Yeah 4:17, "My Girl is Mean to
Me" by Can't Stand Up 3:29, "Only You Can Rock Me" by UFO 4:52, "We're Not Gonna Take It" by
Twisted Sister 3:9, "If I Had a Hammer" by Long Road 4:15, "My Man is a 4x4 Driver" by Ms. Lonely
3:7, "This Song is for Johnny" by Lone Wolf 4:22, "Bite My Arms Off" by Jaw 4:12, "Where's My
Sweater" by The Knitters 3:41, "Is that My Toenail ?" by Clip 4:47, "Anvil Headache" by Clip 4:34,
"My Hair is on Fire" by Jaw 3:55]
Available Songs By Jaw: ["Paper Soup Cats" by Jaw 4:18, "Bite My Arms Off" by Jaw 4:12, "My Hair is
on Fire" by Jaw 3:55]

Status: Music Exchange Center (2 users on-line, 9 songs available)
On-Line Users: [Ronnie Rocker: 4 songs (online), Peter Punk: 5 songs (online)]
Available Songs: ["Rock is Cool" by Yeah 4:17, "My Girl is Mean to Me" by Can't Stand Up 3:29,
"Only You Can Rock Me" by UFO 4:52, "We're Not Gonna Take It" by Twisted Sister 3:9, "Bite My Arms
Off" by Jaw 4:12, "Where's My Sweater" by The Knitters 3:41, "Is that My Toenail ?" by Clip 4:47,
"Anvil Headache" by Clip 4:34, "My Hair is on Fire" by Jaw 3:55]
Available Songs By Jaw: ["Bite My Arms Off" by Jaw 4:12, "My Hair is on Fire" by Jaw 3:55]

Status: Music Exchange Center (0 users on-line, 0 songs available)
On-Line Users: []
Available Songs: []
Available Songs By Jaw: []
```

---

(3) Downloading Music

Go back to the **Song** class and add to it an attribute called **owner** which will be a **User** object representing the user who happens to own this copy of this song. Note that a **Song** object may only be owned by one **User** and that many users can have copies of the same song. Set it to **null** initially. In the **User** class, adjust the **addSong()** method so that it sets the owner properly.

In the **User** class, add a method called **requestCompleteSonglist(MusicExchangeCenter m)**. This method should gather the list of all available songs from all users that are online at the given music exchange center (i.e., the union of all of their local song lists), and then return an **ArrayList<String>** formatted as follows:

```
   TITLE                          ARTIST           TIME   OWNER

1. Hey Jude                       The Beatles      4:35   Disco Stew
2. Barbie Girl                    Aqua             3:54   Disco Stew
3. Only You Can Rock Me           UFO              4:59   Disco Stew
4. Paper Soup Cats                Jaw              4:18   Disco Stew
5. Rock is Cool                   Yeah             4:17   Ronnie Rocker
6. My Girl is Mean to Me          Can't Stand Up   3:29   Ronnie Rocker
7. Only You Can Rock Me           UFO              4:52   Ronnie Rocker
8. We're Not Gonna Take It        Twisted Sister   3:09   Ronnie Rocker
etc..
```

Notice that the songs are numbered and that the title, artist, time and owner are all lined up nicely. You should use the **String.format()** method as described in the notes. Recall that **%-30s** in the format string will allow you to display a left-justified 30-character string. Also, **%2d** and **%02d** will allow you to display numbers so that they take 2 places, the 0 indicating that a leading zero character is desired.

In the **User** class, add a method called **requestSonglistByArtist(MusicExchangeCenter m, String artist)**. This method should gather the list of all available songs **by the given artist** from all users that are online at the given music exchange center (i.e., the union of all of their local song lists), and then return an **ArrayList<String>** formatted similar to that shown above.

In the **MusicExchangeCenter** class, add a method called **getSong(String title, String ownerName)** which returns the **Song** object with the given **title** owned by the user with the given **ownerName**, provided that the user is currently online and that the song exists. Return **null** otherwise. (Hint: you will need to search through the center's **users** to find **User** with the matching **ownerName** and then search through that user's songs to find the **Song** with the given **title**. It may be a good idea to write an extra helper method in the **User** class called **songWithTitle()** that you can make use of).

In the **User** class, add a **downloadSong(MusicExchangeCenter m, String title, String ownerName)** method that simulates the downloading of one of the songs in the catalog. It should use the **getSong()** method that you just wrote, and add the downloaded song to the user's **songList** (if not **null**).

Test your code now with the following program:

```
import java.util.ArrayList;

public class MusicExchangeTestProgram2 {
    public static void main(String args[]) {
        ArrayList<String> catalog;

        // Create a new music exchange center
        MusicExchangeCenter   mec = new MusicExchangeCenter();

        // Create some users and give them some songs
        User discoStew = User.DiscoStew();
        User sleepingSam = User.SleepingSam();
        User ronnieRocker = User.RonnieRocker();
        User countryCandy = User.CountryCandy();
        User peterPunk = User.PeterPunk();

        // Register the users
        discoStew.register(mec);
        ronnieRocker.register(mec);
        sleepingSam.register(mec);
        countryCandy.register(mec);
        peterPunk.register(mec);

        // Log on all users
```

```
        discoStew.logon(mec);
        sleepingSam.logon(mec);
        ronnieRocker.logon(mec);
        countryCandy.logon(mec);
        peterPunk.logon(mec);
        System.out.println("Status: " + mec);

        // Simulate a user requesting a list of songs
        catalog = discoStew.requestCompleteSonglist(mec);
        System.out.println("Complete Song List: ");
        for (String s: catalog)
            System.out.println("  " + s);

        // Simulate a user downloading 3 songs from the list
        System.out.println("\nDisco Stew before downloading: " + discoStew);
        discoStew.downloadSong(mec, "Bite My Arms Off", "Peter Punk");
        discoStew.downloadSong(mec, "Meadows", "Sleeping Sam");
        discoStew.downloadSong(mec, "If I Had a Hammer", "Country Candy");
        discoStew.downloadSong(mec, "Sandy Toes", "Country Candy");
        ronnieRocker.logoff(mec); // log off Ronnie, next download should fail
        discoStew.downloadSong(mec, "Only You Can Rock Me", "Ronnie Rocker");
        System.out.println("Disco Stew after downloading: " + discoStew);

        ronnieRocker.logon(mec); // log on Ronnie, next download should work
        discoStew.downloadSong(mec, "Only You Can Rock Me", "Ronnie Rocker");
        System.out.println("Disco Stew after downloading Ronnie's: " + discoStew + "\n");

        // Simulate a user requesting a list of songs by a specific artist
        catalog = discoStew.requestSonglistByArtist(mec, "Jaw");
        System.out.println("Song's by Jaw: ");
        for (String s: catalog)
            System.out.println("  " + s);
    }
}
```

Here is the expected output:

```
Status: Music Exchange Center (5 users on-line, 18 songs available)
Complete Song List:
      TITLE                          ARTIST           TIME   OWNER

   1. Hey Jude                       The Beatles      4:35   Disco Stew
   2. Barbie Girl                    Aqua             3:54   Disco Stew
   3. Only You Can Rock Me           UFO              4:59   Disco Stew
   4. Paper Soup Cats                Jaw              4:18   Disco Stew
   5. Rock is Cool                   Yeah             4:17   Ronnie Rocker
   6. My Girl is Mean to Me          Can't Stand Up   3:29   Ronnie Rocker
   7. Only You Can Rock Me           UFO              4:52   Ronnie Rocker
   8. We're Not Gonna Take It        Twisted Sister   3:09   Ronnie Rocker
   9. Meadows                        Sleepfest        7:15   Sleeping Sam
  10. Calm is Good                   Waterfall        6:22   Sleeping Sam
  11. If I Had a Hammer              Long Road        4:15   Country Candy
  12. My Man is a 4x4 Driver         Ms. Lonely       3:07   Country Candy
  13. This Song is for Johnny        Lone Wolf        4:22   Country Candy
  14. Bite My Arms Off               Jaw              4:12   Peter Punk
  15. Where's My Sweater             The Knitters     3:41   Peter Punk
  16. Is that My Toenail ?           Clip             4:47   Peter Punk
  17. Anvil Headache                 Clip             4:34   Peter Punk
  18. My Hair is on Fire             Jaw              3:55   Peter Punk

Disco Stew before downloading: Disco Stew: 4 songs (online)
Disco Stew after downloading: Disco Stew: 7 songs (online)
Disco Stew after downloading Ronnie's: Disco Stew: 8 songs (online)

Song's by Jaw:
      TITLE                          ARTIST           TIME   OWNER

   1. Paper Soup Cats                Jaw              4:18   Disco Stew
   2. Bite My Arms Off               Jaw              4:12   Disco Stew
```

```
3. Bite My Arms Off          Jaw          4:12   Peter Punk
4. My Hair is on Fire        Jaw          3:55   Peter Punk
```

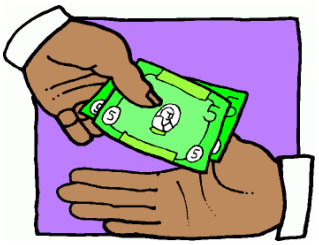
---

(4) Paying the Price

Now....in order to make all of this legal, we must have a way to compensate the musical artists for their hard work and wonderful music. The compensation depends on many factors. An artist should receive 25 cents each time one of their songs is downloaded. Hence, for each artist, we will keep track of how much money in royalties they have. Add the following attributes to the **MusicExchangeCenter** class:

> **royalties** - a **HashMap** with the artist's name as the keys and the values are floats representing the total amount of royalties for that artist so far. It should only contain artists who have had songs downloaded.
>
> **downloadedSongs** – an **ArrayList<Song>** containing all of the songs that have been downloaded. This list will, in general, contain duplicate **Song** objects.

Write a method in the **MusicExchangeCenter** class called **displayRoyalties()** that displays the royalties for all artists who have had at least one of their songs downloaded. It should display a two-line header and then one line per artist showing the royalty amount as well as the artist name as follows:



```
Amount  Artist
---------------
$0.75   Sleepfest
$1.50   Clip
$0.25   Jaw
$0.50   Long Road
$0.25   Yeah
$0.25   UFO
```

In the **getSong()** method in the **MusicExchangeCenter**, adjust the code so that if the song is found (i.e., able to be downloaded), then it is added to the **downloadedSongs** list. Write the get method for the **downloadedSongs** attribute.

Write a method in the **MusicExchangeCenter** class called **uniqueDownloads()** that returns (i.e., not displays) a **TreeSet** of all downloaded **Song** objects such that the set is sorted alphabetically by song title. There should be no duplicates songs in this set.

Write a method in the **MusicExchangeCenter** class called **songsByPopularity()** that returns (i.e., not displays) an **ArrayList** of **Pair** objects where the key of the pair is an **Integer** and the value is the **Song** object. The integer key should represent the number of times that that song was downloaded. The list returned should be sorted in decreasing order according to the number of times the song was downloaded. To sort a list of Pair objects, you can use the following code:

```
Collections.sort(popular, new Comparator<Pair<Integer, Song>>() {
    public int compare(Pair<Integer, Song> p1, Pair<Integer, Song> p2) {
        // PUT YOUR CODE IN HERE
    }
});
```

Just insert the missing code so that it returns an appropriate integer indicating whether pair **p1** comes before or after pair **p2** in the sort order (see notes page 281).

Here is a test program … make sure it works with your code:

```
import javafx.util.Pair;

public class MusicExchangeTestProgram3 {
    public static void main(String args[]) {
        // Create a new music exchange center
        MusicExchangeCenter   mec = new MusicExchangeCenter();

        // Create some users and give them some songs
        User discoStew = User.DiscoStew();
        User sleepingSam = User.SleepingSam();
        User ronnieRocker = User.RonnieRocker();
        User countryCandy = User.CountryCandy();
        User peterPunk = User.PeterPunk();

        // Register the users
        discoStew.register(mec);
        ronnieRocker.register(mec);
        sleepingSam.register(mec);
        countryCandy.register(mec);
        peterPunk.register(mec);

        // Log on all users
        discoStew.logon(mec);
        sleepingSam.logon(mec);
        ronnieRocker.logon(mec);
        countryCandy.logon(mec);
        peterPunk.logon(mec);
        System.out.println("Status: " + mec);

        // Simulate users downloading various songs
        discoStew.downloadSong(mec, "Bite My Arms Off", "Peter Punk");
        discoStew.downloadSong(mec, "Meadows", "Sleeping Sam");
        discoStew.downloadSong(mec, "If I Had a Hammer", "Country Candy");
        discoStew.downloadSong(mec, "Is that My Toenail ?", "Peter Punk");
        sleepingSam.downloadSong(mec, "Anvil Headache", "Peter Punk");
        sleepingSam.downloadSong(mec, "Is that My Toenail ?", "Disco Stew");
        sleepingSam.downloadSong(mec, "If I Had a Hammer", "Country Candy");
        countryCandy.downloadSong(mec, "Anvil Headache", "Peter Punk");
        countryCandy.downloadSong(mec, "Meadows", "Sleeping Sam");
        countryCandy.downloadSong(mec, "If I Had a Hammer", "Peter Punk");
        countryCandy.downloadSong(mec, "Only You Can Rock Me", "Ronnie Rocker");
        countryCandy.downloadSong(mec, "Is that My Toenail ?", "Disco Stew");
        peterPunk.downloadSong(mec, "Is that My Toenail ?", "Country Candy");
        peterPunk.downloadSong(mec, "Rock is Cool", "Ronnie Rocker");
        peterPunk.downloadSong(mec, "What?", "Ronnie Rocker");
        peterPunk.downloadSong(mec, "Meadows", "Sleeping Sam");

        // Display the downloaded songs
        System.out.println("\nHere are the downloaded songs: ");
        for (Song s: mec.getDownloadedSongs())
            System.out.println(s);

        // Display the downloaded songs alphabetically
        System.out.println("\nHere are the unique downloaded songs alphabetically: ");
        for (Song s: mec.uniqueDownloads())
            System.out.println(s);

        // Display the downloaded songs in order of popularity
        System.out.println("\nHere are the downloaded songs by populariry: ");
        for (Pair<Integer,Song> p: mec.songsByPopularity())
            System.out.println("(" + p.getKey() + " downloads) " + p.getValue());

        // Display the royalties
        System.out.println("\nHere are the royalties:\n");
        mec.displayRoyalties();
    }
}
```

Here is the expected output:

```
Status: Music Exchange Center (5 users on-line, 18 songs available)

Here are the downloaded songs:
"Bite My Arms Off" by Jaw 4:12
"Meadows" by Sleepfest 7:15
"If I Had a Hammer" by Long Road 4:15
"Is that My Toenail ?" by Clip 4:47
"Anvil Headache" by Clip 4:34
"Is that My Toenail ?" by Clip 4:47
"If I Had a Hammer" by Long Road 4:15
"Anvil Headache" by Clip 4:34
"Meadows" by Sleepfest 7:15
"Only You Can Rock Me" by UFO 4:52
"Is that My Toenail ?" by Clip 4:47
"Is that My Toenail ?" by Clip 4:47
"Rock is Cool" by Yeah 4:17
"Meadows" by Sleepfest 7:15

Here are the unique downloaded songs alphabetically:
"Anvil Headache" by Clip 4:34
"Bite My Arms Off" by Jaw 4:12
"If I Had a Hammer" by Long Road 4:15
"Is that My Toenail ?" by Clip 4:47
"Meadows" by Sleepfest 7:15
"Only You Can Rock Me" by UFO 4:52
"Rock is Cool" by Yeah 4:17

Here are the downloaded songs by populariry:
(4 downloads) "Is that My Toenail ?" by Clip 4:47
(3 downloads) "Meadows" by Sleepfest 7:15
(2 downloads) "Anvil Headache" by Clip 4:34
(2 downloads) "If I Had a Hammer" by Long Road 4:15
(1 downloads) "Bite My Arms Off" by Jaw 4:12
(1 downloads) "Only You Can Rock Me" by UFO 4:52
(1 downloads) "Rock is Cool" by Yeah 4:17

Here are the royalties:

Amount  Artist
---------------
$0.75   Sleepfest
$1.50   Clip
$0.25   Jaw
$0.50   Long Road
$0.25   Yeah
$0.25   UFO

Process finished with exit code 0
```

IMPORTANT SUBMISSION INSTRUCTIONS:

Submit your ZIPPED **IntelliJ project file** as you did during the first tutorial for assignment 0.

- YOU WILL LOSE MARKS IF YOU ATTEMPT TO USE ANY OTHER COMPRESSION FORMATS SUCH AS **.RAR**, **.ARC, .TGZ**, **.JAR**, **.PKG**, **.PZIP**.

- If your internet connection at home is down or does not work, we will not accept this as a reason for handing in an assignment late ... so make sure to submit the assignment WELL BEFORE it is due !

- You WILL lose marks on this assignment if any of your files are missing. So, make sure that you hand in the correct files and version of your assignment. You will also lose marks if your code is not written neatly with proper indentation. See examples in the notes for proper style.
