



ITCS 209 Object Oriented Programming	Name:	Lab Score	Challenge Bonus
	ID:		
	Section:		

Lab05: Array and ArrayList

This lab tests your understanding of Java and Object-Oriented Programming. You can only use certain features of Java like loops, arrays, and data types like Double and String. **You can't use math libraries, except for `Math.sqrt()` and `Math.pow()`, and must do all computations using only loops and arrays or ArrayLists.** You also can't use other container libraries or third-party Java libraries. Your code should be able to run without the need for any additional files to be installed.

Task 1: Song Application

You are provided with the **SongApp** class and **Song** class. Do not modify these classes. The main method is already provided in SongApp class. Your task is to Create a **Playlist** class and implement the following attributes and methods:

Attributes or instance variables:

- A playlist's name (String)
- A list of songs (using ArrayList to store Song objects)

Constructor method:

- Takes a string name as an argument and assigns it to the playlist's name
- Constructs an ArrayList of songs

Instance methods:

1. `boolean addSong(Song song)`
 - Adds a new song into the playlist. (The song with the same title can be added only once)
 - Returns true if the song is a new song and can be added to the playlist. If the song already exists, does nothing, and returns false.
2. `boolean addSongAtIndex(Song song, int index)`
 - Adds a new song into the playlist at a given position.
 - Returns true if the song is a new song and can be added to the playlist. If the song already exists, does nothing and returns false. If the index is invalid, displays an error message and returns false. (**Note:** the index in the playlist starts at '0')
3. `boolean removeSongByIndex(int index)`
 - Removes an existing song from the playlist at a given index.
 - Returns true if there was a song at the given index. If there is no song at the given index, displays an error message and returns false.
4. `Song removeSongByTitle(String title)`
 - Remove an existing song from the playlist by looking at the song title.
 - Returns a song corresponding to the title, or null if there is no such a song.
5. `double getPlaylistDuration()`
 - Returns the total duration of the playlist. Each minute has 60 seconds, so 3.30 minutes + 3.40 minutes = 7.10 minutes (not 6.70 minutes)
6. `ArrayList<Song> getTooLongSongs (double minute)`
 - Returns all songs in the playlist that are too long based on the user's preference in minutes.
7. `void showPlaylist()`
 - Prints the playlist on the console in the following format:

```
playlist name
[0] title (duration)
[1] title (duration)
....
```

Remark: For the add and remove methods, display an error message when the given index or title does not exist in the playlist. The Expected Output are as follows:

```
Welcome to SongAPP
Add songs -----
My Favorite Songs Playlist
[0] End Game (4.11)
[1] Perfect (4.21)
[2] Anywhere (3.35)
[3] How long (3.30)
Remove songs -----
My Favorite Songs Playlist
[0] Perfect (4.21)
[1] Anywhere (3.35)
Check error -----
Add duplicate song: Perfect already in the playlist.
Add song at invalid index (at most index now is 2): Invalid Index
Remove not found song: Not found.
Remove song at invalid index: Invalid Index
```

Challenge Bonus:

- `void moveUp(int position)`
 - Rearranges the position of songs in the playlist by moving the song at the given index up by one position.
- `void moveDown(int position)`
 - Rearranges the position of songs in the playlist by moving the song at the given index down by one position.

Expected Output:

```
***** BONUS *****
Bonus Playlist
[0] End Game (4.11)
[1] Perfect (4.21)
[2] Anywhere (3.35)
[3] How long (3.30)
```

Additional Exercise (no point)

Write a Java program to check palindrome. A palindrome is a word, phrase, number, or other sequence of characters which can be read the same way from backward or forward. For example, “madam”, “mom”, “abcba”, and “123321” are single word palindrome. “Don’t nod.”, “Top spot” and “No lemon, no melon” are multiple words palindrome. (*Punctuation and spaces between the words or letter is allowed.*) “Java”, and “Array” are NOT palindrome. The longest palindrome in Oxford dictionary is “tattarrattat”.

- a. You may write a Class or simply have everything in the `main(String[] args)` method.
- b. Your program has to accept input `String` from users and check whether the input `String` is a palindrome or not. An example output is shown in the box below:

```
Enter a word or phrase to check if it is a palindrome: tattarrattat The input word "tattarrattat" is a palindrome.
Enter a word or phrase to check if it is a palindrome: I love java The input phrase "I love Java" is not a
palindrome.
```
