

## Task 10 (8 points)

The goal of the task is to implement a `Playlist` class that contains an STL list of `Song` objects. The task will require the usage of the `list<T>` container as well as some of its methods. Note that the solution should include the usage of various container methods, do not implement any helper methods or anything that is not already declared in headers (unless stated otherwise). In case of uncertainty, please check the example output at the very end of this document.

Please do not modify `main.cpp` except uncommenting parts of the task.

### Part 1 (2p.)

In the `Song` class, implement the constructor that assigns the given parameters to class fields. Additionally, overload both `operator==` and `operator<<`. Songs are considered equal when both title and author are exactly the same. Song should be printed in the following format:

`Song Author - Song title (MM:SS) [Genre]`

In the `Playlist` class implement the constructor that assigns the playlist name. The `operator<<` should print the playlist name and list down all the songs below (use an iterator to access list elements). If the playlist is empty, the operator should print the information about no songs in the playlist. Furthermore, implement 3 add methods: `add_song(Song)`, `add_songs(list<Song>&)`, `add_songs(Playlist&)`.

- `add_song(Song)` - adds a new song to the end of the list, but only if the list doesn't already contain it
- `add_songs(list<Song>&)` - transfers (no copying) the whole list of songs to the given playlist. Note that the parameter list should be empty after the transfer (use `list::splice()`)
- `add_songs(Playlist&)` - transfers the whole list of songs from one playlist to another. Same as above, parameter playlist should be empty after the transfer.

### Part 2 (1p.)

Implement `insert_song_by_genre(list<Song>)` in the `Playlist` class. It should pick the first song from the given list and insert (`list::insert()`) it before the first occurrence of a song with the same genre. For example, the first song from the parameter list is a pop song. Now iterate through the playlist and locate the first pop song and insert the new song right before it. If the playlist doesn't have any songs with given genre, place the song at the very end of the playlist.

### Part 3 (2p.)

Implement remove methods in the `Playlist` class. Each remove method should erase specific records from the list and utilize a different method:

- `remove_by_genre(Genre)` - this method should clear the list of all songs of a specific `Genre`. Please use an iterator and erase all necessary records using the `list::erase()` method
- `remove_by_author(string)` - this method should clear the list of all songs by an author. Using conditional remove (`list::remove_if()`) method and a lambda expression required
- `remove_by_length(int)` - this method should remove all records longer than the given time in the parameter. Please implement a `LengthCheck` functor (function object). Implement a constructor that takes one integer argument being the length and overload the `operator()`. When implemented, pass the functor as a predicate to a `list::remove_if()` method.

### Part 4 (1p.)

In the `Playlist` class implement a friend function `friend Playlist merge(string, Playlist[], int)` that takes an array of playlists and returns a new playlist containing all of the songs without duplicates. The first parameter is the merged playlist name, the second one is the playlist array, and the last one contains the size of the playlist array. Note that all necessary things for duplicate checks have already been implemented before, so there's no need to include any new helper functions.

### Part 5 (2p.)

Implement the `SortedPlaylist` class that derives from the `Playlist` class. Sorted playlist contains two new fields: `sortOrder` which tells the order in which the playlist is sorted and `sortLabel` which determines what the playlist will be sorted by. Both these fields are enums. Implement the constructor that assigns all the parameters, override all the following methods:

- `add_song(Song)`
- `add_songs(list<Song>&)`
- `add_songs(Playlist&)`
- `insert_song_by_genre(list<Song>)`

They should utilize the base class versions and use `sort_playlist()` afterwards. Additionally, implement the `set_sort_settings(SortOrder, SortLabel)` method that sets the new sorting criteria and sorts the playlist.

Finally, implement the `sort_playlist()` method that utilizes the `list::sort()` method for sorting the collection. Sorting takes a predicate as an argument, that returns a boolean value. You can either use a lambda expression or implement your own functor.

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*Example output:*

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\*\*\*\*\* STAGE 1 (2p) \*\*\*\*\*

Bon Jovi - Livin' On A Prayer (4:08) [Rock]  
Mark Ronson ft. Bruno Mars - Uptown Funk (4:31) [Pop]  
Camellia - Crystallized (4:37) [Electronic]  
B.B. King - The Thrill Is Gone (5:29) [Blues]  
Johnny Cash - Ring of Fire (2:35) [Country]

Playlist name: Sad, empty playlist  
There's no songs in this playlist!

Playlist name: Lil' mix  
Bon Jovi - Livin' On A Prayer (4:08) [Rock]  
Mark Ronson ft. Bruno Mars - Uptown Funk (4:31) [Pop]  
Camellia - Crystallized (4:37) [Electronic]  
B.B. King - The Thrill Is Gone (5:29) [Blues]  
Johnny Cash - Ring of Fire (2:35) [Country]  
The Verve - Bitter Sweet Symphony (4:37) [Pop]

List of rock songs (should be empty): EMPTY

Playlist name: Rock playlist  
Bon Jovi - Livin' On A Prayer (4:08) [Rock]  
R.E.M. - Losing My Religion (4:28) [Rock]  
Nirvana - Smells Like Teen Spirit (5:01) [Rock]  
Guns N' Roses - Welcome To The Jungle (4:34) [Rock]  
AC/DC - Highway To Hell (3:30) [Rock]  
The Rolling Stones - Paint It Black (3:44) [Rock]  
The Who - Baba O'Riley (5:04) [Rock]  
Deep Purple - Smoke On The Water (5:38) [Rock]  
Scorpions - Rock You Like A Hurricane (4:16) [Rock]  
Metallica - Master Of Puppets (8:36) [Rock]  
System Of A Down - Chop Suey! (3:30) [Rock]

Scorpions - Wind Of Change (5:13) [Rock]

Playlist name: Pop playlist

The Verve - Bitter Sweet Symphony (4:37) [Pop]

Miley Cyrus - Wrecking Ball (3:41) [Pop]

Carly Rae Jepsen - Call Me Maybe (3:13) [Pop]

Maroon 5 - One More Night (3:39) [Pop]

Maroon 5 - Animals (3:51) [Pop]

Adele - Rolling In The Deep (3:48) [Pop]

Ariana Grande - One Last Time (3:17) [Pop]

Playlist name: Temp playlist (should be empty)

There's no songs in this playlist!

Playlist name: Camellia Playlist

Camellia - Crystallized (4:37) [Electronic]

Camellia - Killerbeast (4:07) [Electronic]

Camellia - Blackmagik Blazing (4:32) [Electronic]

Camellia - Arche (5:22) [Electronic]

Camellia - SECRET BOSS (4:31) [Electronic]

Camellia - NUCLEAR-STAR (4:52) [Electronic]

Camellia - Darkness Overload (4:27) [Electronic]

\*\*\*\*\* STAGE 2 (1p) \*\*\*\*\*

Playlist name: Lil' mix

Bon Jovi - Livin' On A Prayer (4:08) [Rock]

Mark Ronson ft. Bruno Mars - Uptown Funk (4:31) [Pop]

Camellia - Crystallized (4:37) [Electronic]

B.B. King - The Thrill Is Gone (5:29) [Blues]

Johnny Cash - Ring of Fire (2:35) [Country]

The Verve - Bitter Sweet Symphony (4:37) [Pop]

Adding a pop song to Lil' mix:

...and an electronic one:

Playlist name: Lil' mix

Bon Jovi - Livin' On A Prayer (4:08) [Rock]

Miley Cyrus - Wrecking Ball (3:41) [Pop]

Mark Ronson ft. Bruno Mars - Uptown Funk (4:31) [Pop]

Camellia - Killerbeast (4:07) [Electronic]

Camellia - Crystallized (4:37) [Electronic]

B.B. King - The Thrill Is Gone (5:29) [Blues]

Johnny Cash - Ring of Fire (2:35) [Country]

The Verve - Bitter Sweet Symphony (4:37) [Pop]

Adding a pop song to Camellia playlist

Playlist name: Camellia Playlist

Camellia - Crystallized (4:37) [Electronic]

Camellia - Killerbeast (4:07) [Electronic]

Camellia - Blackmagik Blazing (4:32) [Electronic]

Camellia - Arche (5:22) [Electronic]

Camellia - SECRET BOSS (4:31) [Electronic]

Camellia - NUCLEAR-STAR (4:52) [Electronic]

Camellia - Darkness Overload (4:27) [Electronic]

Miley Cyrus - Wrecking Ball (3:41) [Pop]

\*\*\*\*\* STAGE 3 (2p) \*\*\*\*\*

Removing pop songs from Lil' mix:

Playlist name: Lil' mix

Bon Jovi - Livin' On A Prayer (4:08) [Rock]

Camellia - Killerbeast (4:07) [Electronic]

Camellia - Crystallized (4:37) [Electronic]

B.B. King - The Thrill Is Gone (5:29) [Blues]

Johnny Cash - Ring of Fire (2:35) [Country]

Removing Scorpions' songs from Rock playlist:

Playlist name: Rock playlist

Bon Jovi - Livin' On A Prayer (4:08) [Rock]  
R.E.M. - Losing My Religion (4:28) [Rock]  
Nirvana - Smells Like Teen Spirit (5:01) [Rock]  
Guns N' Roses - Welcome To The Jungle (4:34) [Rock]  
AC/DC - Highway To Hell (3:30) [Rock]  
The Rolling Stones - Paint It Black (3:44) [Rock]  
The Who - Baba O'Riley (5:04) [Rock]  
Deep Purple - Smoke On The Water (5:38) [Rock]  
Metallica - Master Of Puppets (8:36) [Rock]  
System Of A Down - Chop Suey! (3:30) [Rock]

Removing songs from Rock playlist that are longer than 5 minutes:

Playlist name: Rock playlist

Bon Jovi - Livin' On A Prayer (4:08) [Rock]  
R.E.M. - Losing My Religion (4:28) [Rock]  
Guns N' Roses - Welcome To The Jungle (4:34) [Rock]  
AC/DC - Highway To Hell (3:30) [Rock]  
The Rolling Stones - Paint It Black (3:44) [Rock]  
System Of A Down - Chop Suey! (3:30) [Rock]

\*\*\*\*\* STAGE 4 (1p) \*\*\*\*\*

Playlist name: Merged Playlist

Bon Jovi - Livin' On A Prayer (4:08) [Rock]  
Camellia - Killerbeast (4:07) [Electronic]  
Camellia - Crystallized (4:37) [Electronic]  
B.B. King - The Thrill Is Gone (5:29) [Blues]  
Johnny Cash - Ring of Fire (2:35) [Country]  
R.E.M. - Losing My Religion (4:28) [Rock]  
Guns N' Roses - Welcome To The Jungle (4:34) [Rock]  
AC/DC - Highway To Hell (3:30) [Rock]  
The Rolling Stones - Paint It Black (3:44) [Rock]  
System Of A Down - Chop Suey! (3:30) [Rock]  
The Verve - Bitter Sweet Symphony (4:37) [Pop]  
Miley Cyrus - Wrecking Ball (3:41) [Pop]  
Carly Rae Jepsen - Call Me Maybe (3:13) [Pop]

Maroon 5 - One More Night (3:39) [Pop]  
Maroon 5 - Animals (3:51) [Pop]  
Adele - Rolling In The Deep (3:48) [Pop]  
Ariana Grande - One Last Time (3:17) [Pop]

\*\*\*\*\* STAGE 5 (2p) \*\*\*\*\*

Sorted by AUTHOR, ASCENDING:

Playlist name: Ascending by author

B.B. King - The Thrill Is Gone (5:29) [Blues]  
Bon Jovi - Livin' On A Prayer (4:08) [Rock]  
Camellia - Crystallized (4:37) [Electronic]  
Mark Ronson ft. Bruno Mars - Uptown Funk (4:31) [Pop]

Sorted by TITLE, ASCENDING:

Playlist name: Sorted Merged Playlist

Maroon 5 - Animals (3:51) [Pop]  
The Verve - Bitter Sweet Symphony (4:37) [Pop]  
Carly Rae Jepsen - Call Me Maybe (3:13) [Pop]  
System Of A Down - Chop Suey! (3:30) [Rock]  
Camellia - Crystallized (4:37) [Electronic]  
AC/DC - Highway To Hell (3:30) [Rock]  
Camellia - Killerbeast (4:07) [Electronic]  
Bon Jovi - Livin' On A Prayer (4:08) [Rock]  
R.E.M. - Losing My Religion (4:28) [Rock]  
Ariana Grande - One Last Time (3:17) [Pop]  
Maroon 5 - One More Night (3:39) [Pop]  
The Rolling Stones - Paint It Black (3:44) [Rock]  
Johnny Cash - Ring of Fire (2:35) [Country]  
Adele - Rolling In The Deep (3:48) [Pop]  
B.B. King - The Thrill Is Gone (5:29) [Blues]  
Guns N' Roses - Welcome To The Jungle (4:34) [Rock]  
Miley Cyrus - Wrecking Ball (3:41) [Pop]

Sorted by AUTHOR, DESCENDING:

Playlist name: Sorted Merged Playlist

The Verve - Bitter Sweet Symphony (4:37) [Pop]

The Rolling Stones - Paint It Black (3:44) [Rock]

System Of A Down - Chop Suey! (3:30) [Rock]

R.E.M. - Losing My Religion (4:28) [Rock]

Miley Cyrus - Wrecking Ball (3:41) [Pop]

Maroon 5 - Animals (3:51) [Pop]

Maroon 5 - One More Night (3:39) [Pop]

Johnny Cash - Ring of Fire (2:35) [Country]

Guns N' Roses - Welcome To The Jungle (4:34) [Rock]

Carly Rae Jepsen - Call Me Maybe (3:13) [Pop]

Camellia - Crystallized (4:37) [Electronic]

Camellia - Killerbeast (4:07) [Electronic]

Bon Jovi - Livin' On A Prayer (4:08) [Rock]

B.B. King - The Thrill Is Gone (5:29) [Blues]

Ariana Grande - One Last Time (3:17) [Pop]

Adele - Rolling In The Deep (3:48) [Pop]

AC/DC - Highway To Hell (3:30) [Rock]