DMBS Project – Music Library System

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1. INTRODUCTION

Our project aims to help users organize their music library. This is done by implementing playlists, which are collections of songs that users create themselves. For those who listen to a lot of music, the number of songs will increase rapidly. Playlist management will allow users to organize their music into groups with similar characteristics. Furthermore, users can only manipulate their own playlists and not others, ensuring playlist protection.

Our system has three main components. First, the user can add/remove songs into the database. Secondly, the user can create playlists out of the available songs in the database. Finally, users can further manipulate their playlists by updating or deleting them.

2. SYSTEM STUDY

2.1 Proposed System

The system we've created is fairly simple, easy to use, and not resource intensive. The GUI is basic but straightforward, and the program should be able to run on most systems/configurations. The music library system has the following features:

- Login – To verify the user account and to ensure users can't access other user's playlists
- Add/Insert Songs or Playlists
- Remove/Delete Songs or Playlists
- Search Songs
- Update Songs or Playlists

This allows users to quickly and easily create playlists for personal use. The basic functions required to manipulate playlists are present. However, the system does not have web-integration.

2.2 Introduction to the Front End

The music library system does not have web-integration. However, a basic graphical user interface (GUI) was created to help users navigate and use the system. The GUI was created using Java tools

- Window Builder, and Java AWT Swing to create the GUI itself. These tools allowed us to easily and efficiently create GUI elements (such as windows, buttons, lists, tables, and more) without having to build it from scratch.
- Eclipse IDE – Much of the coding was done in the Eclipse Neon.2 IDE. Eclipse allowed us to keep the source files organized. Eclipse was also helpful in writing the code since the IDE highlights syntax and lexical errors.

2.3 Introduction to the Back End

The DBMS resource used in the system was SQLite. SQLite was used because it is self-contained, easy to use, public-domain (i.e. free to use), and reliable. Furthermore, SQLite is one of the most common DBMS systems currently in use. For interacting with the database, we used SQLite Studio

- SQLite is a good choice for out system, and has enough features for our functions. Since our system is mainly built for personal use and not for business, we wanted something small, simple, fast, and reliable.
- SQLite Studio provides an easy-to-use and easy-to-navigate GUI to view, access, and manipulate our database. This was how we created the initial tables, relations, schema, etc.

3. <u>SYSTEM SPECIFICATION</u>

3.1 Hardware Requirements

- PC with intel core processor or above (e.g. Dual-core processors, etc)
- 1 GB RAM or above
- 100 GB Hard Disk or above

3.2 Software Requirements

- OS: Windows 7 or better
- Front End: Java
- IDE: Eclipse Neon.2
- Back End : SQLite (SQLite Studio)

4. <u>DATABASE DESIGN</u>

4.1 Conceptual Design

A) Requirement Analysis:

What data is needed?

List of Entities:

- Users
- Profiles
- Playlists
- Songs

List of Attributes:

<u>Users:</u>

- uID
- uname
- pass

<u>Profiles:</u>

- prID
- uID
- favorites

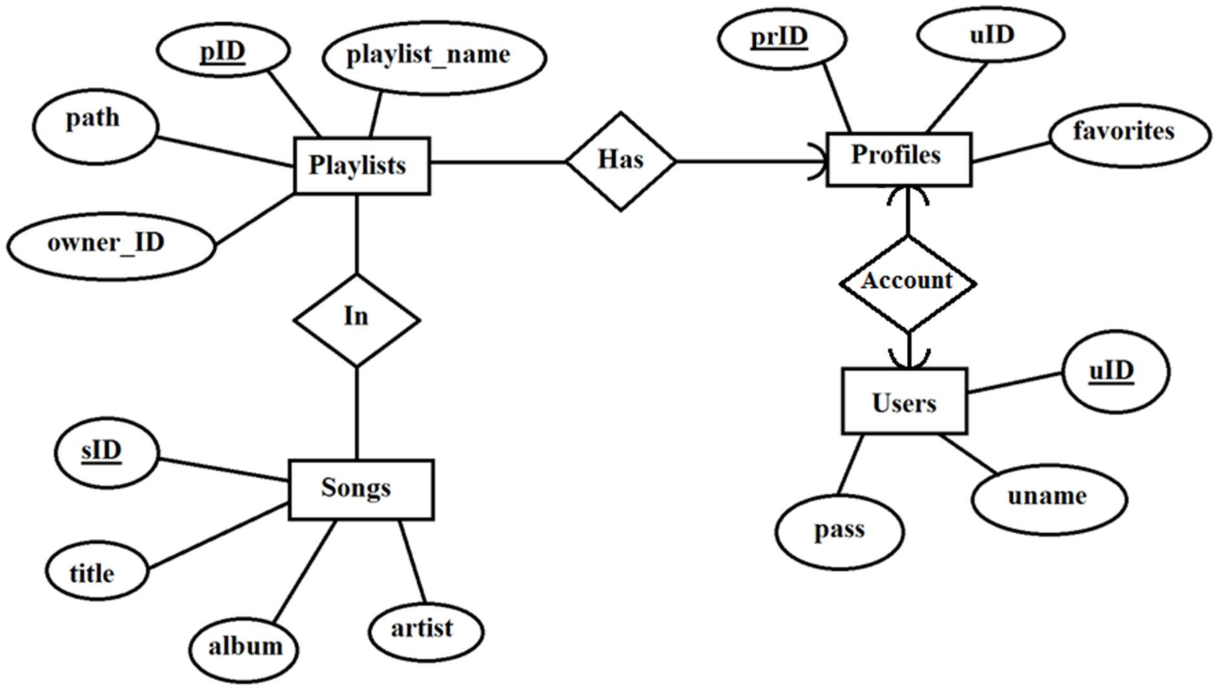
Songs:

- sID
- title
- artist
- album

Playlists:

- pID
- owner_ID
- playlist_name
- path

B) ER Diagram:



4.2 Logical Design

1. Users: Keeps record of people that are using the database system

	Field Name	**Data Type**	**Description**	**Constraints**
1	uID	Integer	User Identification Number	Primary Key
2	uname	String	Name of the User	
3	pass	String	User's Password	

Schema Definition:

CREATE TABLE Users(uID integer primary key, uname String, pass String);

2. Profiles: Each profile is associated with a certain user; keeps records of users' profiles and favorite playlists.

	Field Name	**Data Type**	**Description**	**Constraints**
1	prID	Integer	Profile Identification Number	Primary Key
2	uID	Integer	User Identification Number	Foreign Key
3	favorites	String	Favorite Playlists	Foreign Key

Schema Definition:

CREATE TABLE Profiles(prID Integer Primary Key, uID Integer, favorites String, foreign key (uID) references USERS(uID), foreign key (favorites) references PLAYLISTS(pID));

3. Songs: Keeps record of songs, including meta-data for songs such as song title, artist, and album.

	Field Name	Data Type	Description	Constraints
1	sID	Integer	Song Identification Number	Primary Key
2	title	String	Song Title	
3	artist	String	Artist/Group Name	
4	album	String	Album Name (if applicable)	

Schema Definition:
CREATE TABLE songs(sID integer primary Key, title String, artist String, album String);

4. Playlists: Keeps records of playlists, including what songs are in the playlists and who the playlist belongs to.

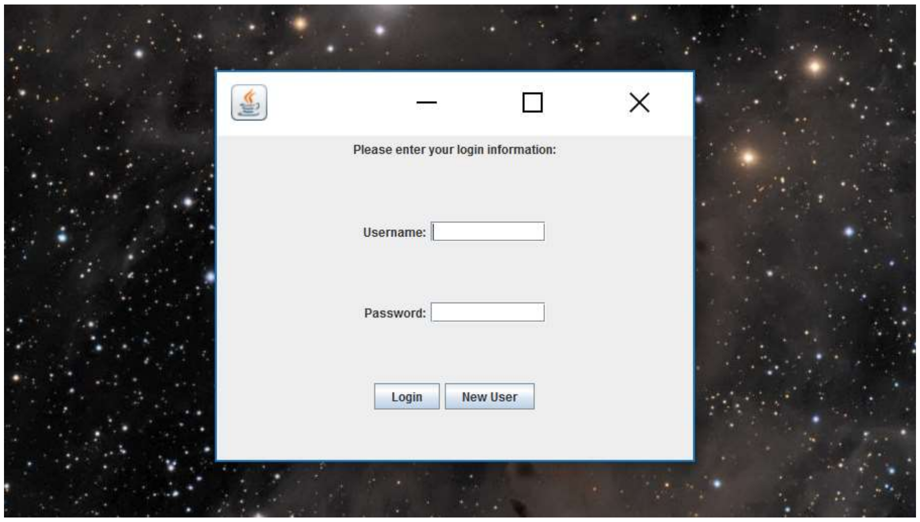
	Field Name	Data Type	Description	Constraints
1	pID	Integer	Playlist	Primary Key
2	Playlist_name	String	Name of the Playlist	
3	Path	String	Filepath to the .pl file	
4	Owner_ID	Int	ID number of playlist's owner	Foreign Key

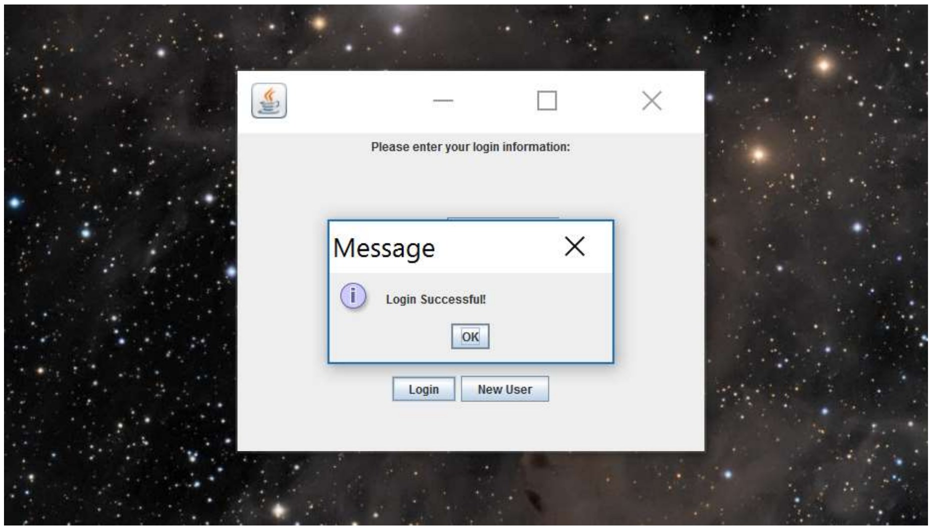
Schema Definition:
CREATE TABLE playlists(pID integer primary key, playlist_name String, path String, Owner_ID Int, foreign key (Owner_ID) references PROFILES(prID));

5. IMPLEMENTATION

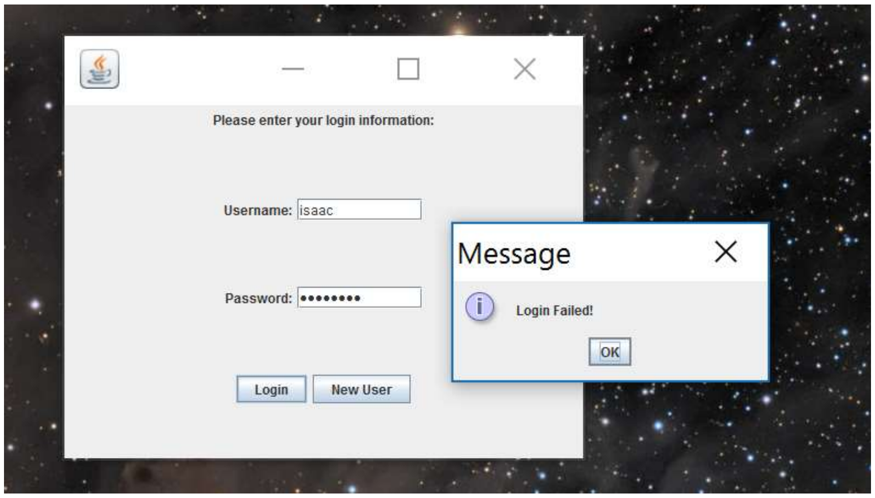
This section has a screenshot and a short description of each function.

Login Function: The first window the user sees. Upon inputting a valid username + password combination, the user will be logged in. If the user inputs an incorrect username + password combination, they cannot log in.





Login Successful!


Please enter your login information:

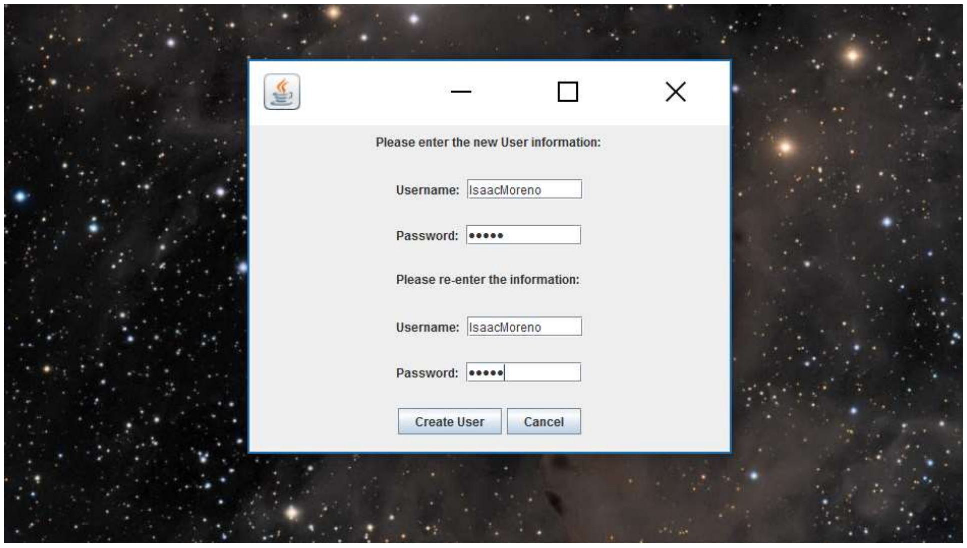
Username: isaac

Password: ••••••••

Message

Login Failed!

Create New User: If the user is not in the database, they can create a new user.


Please enter the new User information:

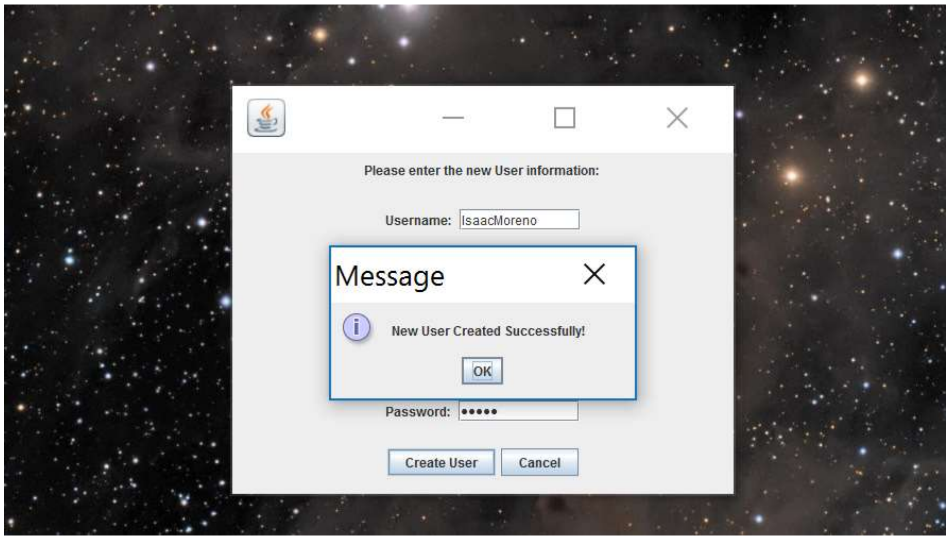
Username: IsaacMoreno

Password: •••••

Please re-enter the information:

Username: IsaacMoreno

Password: •••••


Please enter the new User information:

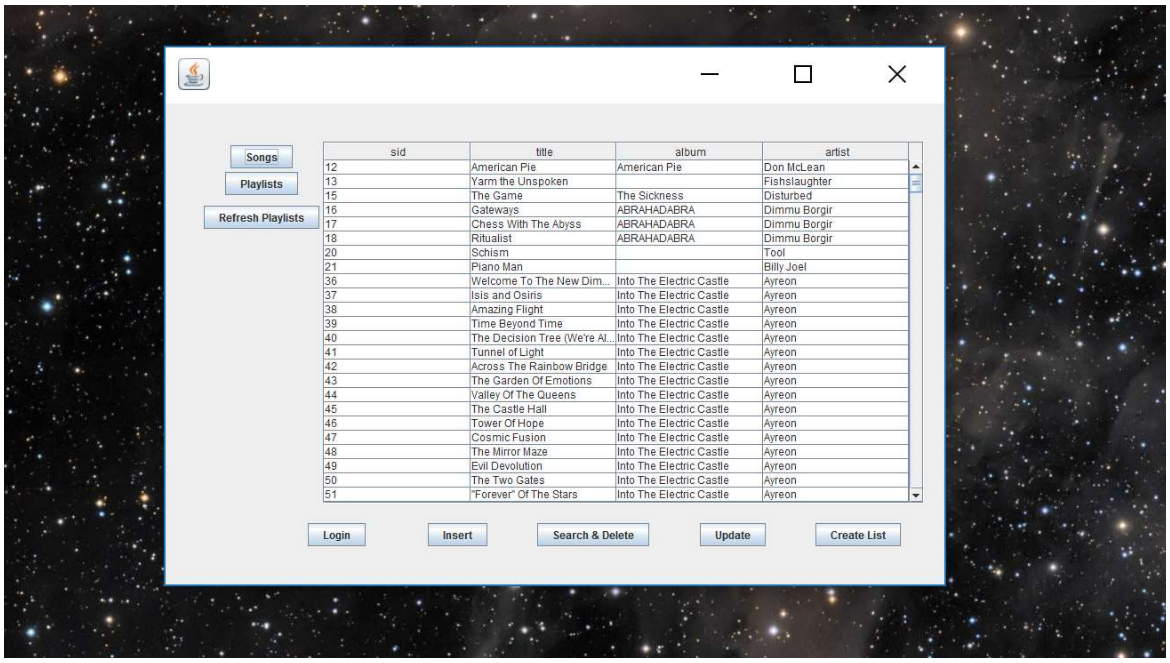
Username: IsaacMoreno

Message

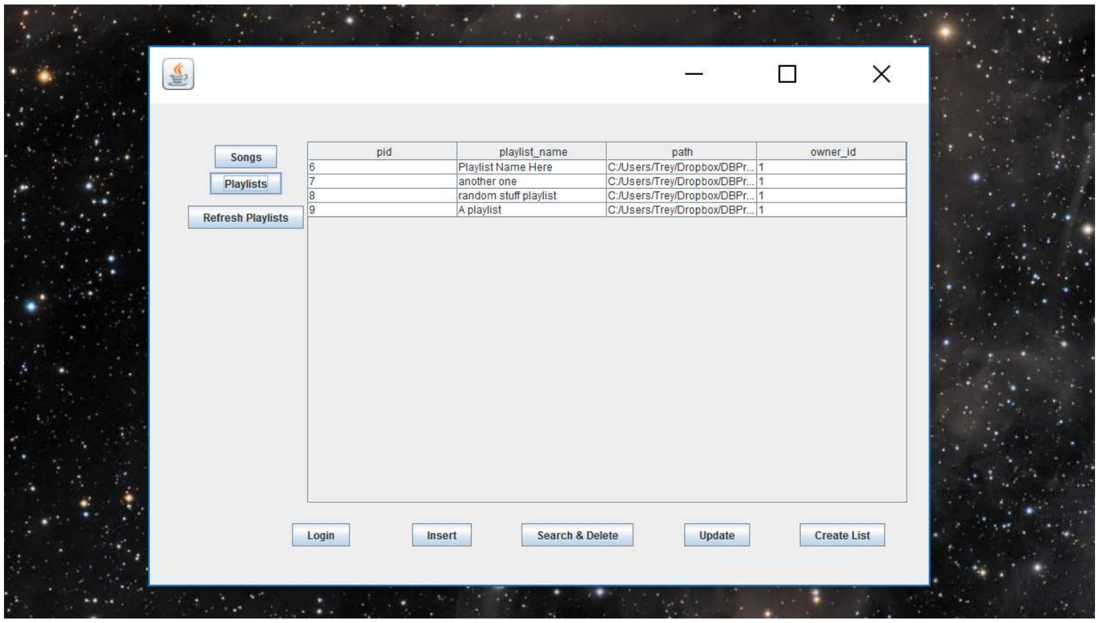
New User Created Successfully!

Password: •••••

Main Window: This is the window the user sees upon successful login. It allows the user to see all the songs currently in the database, as well as their playlists (if that user has any). The Main Window also has buttons for the other functions.

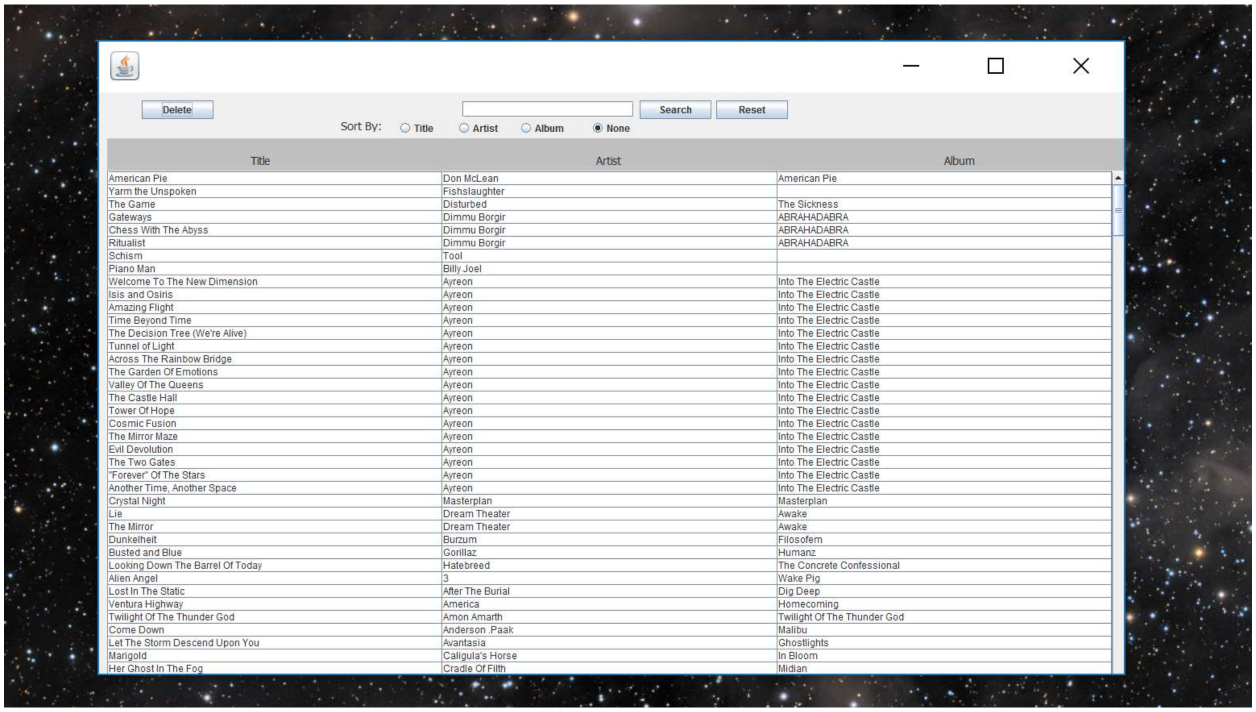


sid	title	album	artist
12	American Pie	American Pie	Don McLean
13	Yarm the Unspoken		Fishslaughter
15	The Game	The Sickness	Disturbed
16	Gateways	ABRAHADABRA	Dimmu Borgir
17	Chess With The Abyss	ABRAHADABRA	Dimmu Borgir
18	Ritualist	ABRAHADABRA	Dimmu Borgir
20	Schism		Tool
21	Piano Man		Billy Joel
36	Welcome To The New Dim...	Into The Electric Castle	Ayreon
37	Isis and Osiris	Into The Electric Castle	Ayreon
38	Amazing Flight	Into The Electric Castle	Ayreon
39	Time Beyond Time	Into The Electric Castle	Ayreon
40	The Decision Tree (We're Al...	Into The Electric Castle	Ayreon
41	Tunnel of Light	Into The Electric Castle	Ayreon
42	Across The Rainbow Bridge	Into The Electric Castle	Ayreon
43	The Garden Of Emotions	Into The Electric Castle	Ayreon
44	Valley Of The Queens	Into The Electric Castle	Ayreon
45	The Castle Hall	Into The Electric Castle	Ayreon
46	Tower Of Hope	Into The Electric Castle	Ayreon
47	Cosmic Fusion	Into The Electric Castle	Ayreon
48	The Mirror Maze	Into The Electric Castle	Ayreon
49	Evil Devolution	Into The Electric Castle	Ayreon
50	The Two Gates	Into The Electric Castle	Ayreon
51	"Forever" Of The Stars	Into The Electric Castle	Ayreon



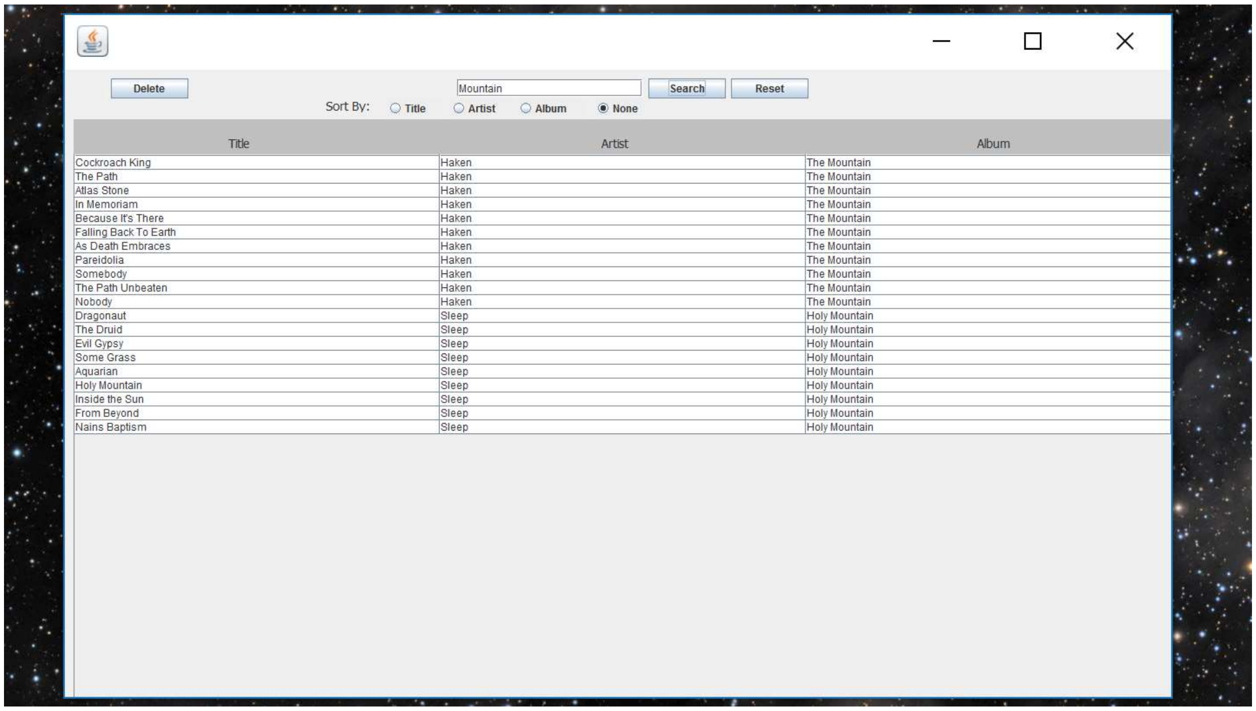
pid	playlist_name	path	owner_id
6	Playlist Name Here	C:/Users/Trey/Dropbox/DBPr...	1
7	another one	C:/Users/Trey/Dropbox/DBPr...	1
8	random stuff playlist	C:/Users/Trey/Dropbox/DBPr...	1
9	A playlist	C:/Users/Trey/Dropbox/DBPr...	1

Search/Delete Songs: The user can search the songs in the database by song title, artist, or album. The list of songs can also be sorted by those attributes. Furthermore, the user can delete a song from the playlist (upper left-hand corner).



Sort By: ( ) Title ( ) Artist ( ) Album [✓ None]

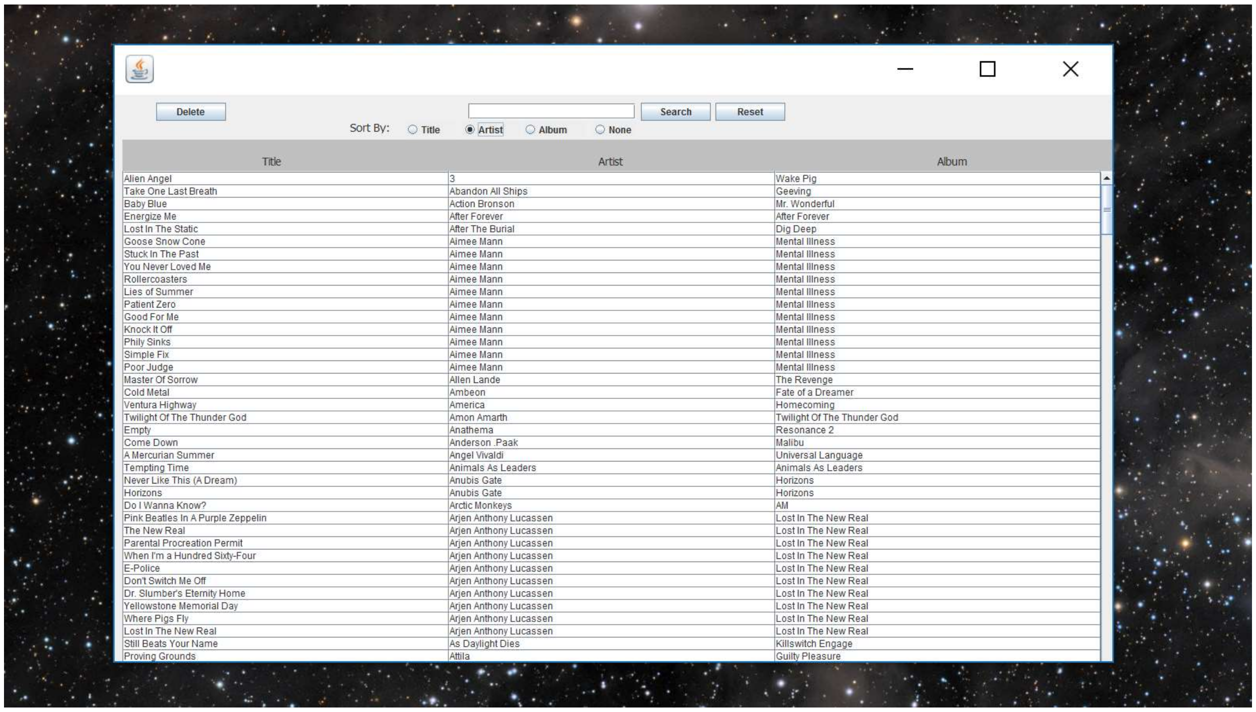
Title	Artist	Album
American Pie	Don McLean	American Pie
Yarm the Unspoken	Fishslaughter	
The Game	Disturbed	The Sickness
Gateways	Dimmu Borgir	ABRAHADABRA
Chess With The Abyss	Dimmu Borgir	ABRAHADABRA
Ritualist	Dimmu Borgir	ABRAHADABRA
Schism	Tool	
Piano Man	Billy Joel	
Welcome To The New Dimension	Ayreon	Into The Electric Castle
Isis and Osiris	Ayreon	Into The Electric Castle
Amazing Flight	Ayreon	Into The Electric Castle
Time Beyond Time	Ayreon	Into The Electric Castle
The Decision Tree (We're Alive)	Ayreon	Into The Electric Castle
Tunnel of Light	Ayreon	Into The Electric Castle
Across The Rainbow Bridge	Ayreon	Into The Electric Castle
The Garden Of Emotions	Ayreon	Into The Electric Castle
Valley Of The Queens	Ayreon	Into The Electric Castle
The Castle Hall	Ayreon	Into The Electric Castle
Tower Of Hope	Ayreon	Into The Electric Castle
Cosmic Fusion	Ayreon	Into The Electric Castle
The Mirror Maze	Ayreon	Into The Electric Castle
Evil Devolution	Ayreon	Into The Electric Castle
The Two Gates	Ayreon	Into The Electric Castle
"Forever" Of The Stars	Ayreon	Into The Electric Castle
Another Time, Another Space	Ayreon	Into The Electric Castle
Crystal Night	Masterplan	Masterplan
Lie	Dream Theater	Awake
The Mirror	Dream Theater	Awake
Dunkelheit	Burzum	Filosofem
Busted and Blue	Gorillaz	Humanz
Looking Down The Barrel Of Today	Hatebreed	The Concrete Confessional
Alien Angel	3	Wake Pig
Lost In The Static	After The Burial	Dig Deep
Ventura Highway	America	Homecoming
Twilight Of The Thunder God	Amon Amarth	Twilight Of The Thunder God
Come Down	Anderson .Paak	Malibu
Let The Storm Descend Upon You	Avantasia	Ghostlights
Marigold	Caligula's Horse	In Bloom
Her Ghost In The Fog	Cradle Of Filth	Midian



Mountain

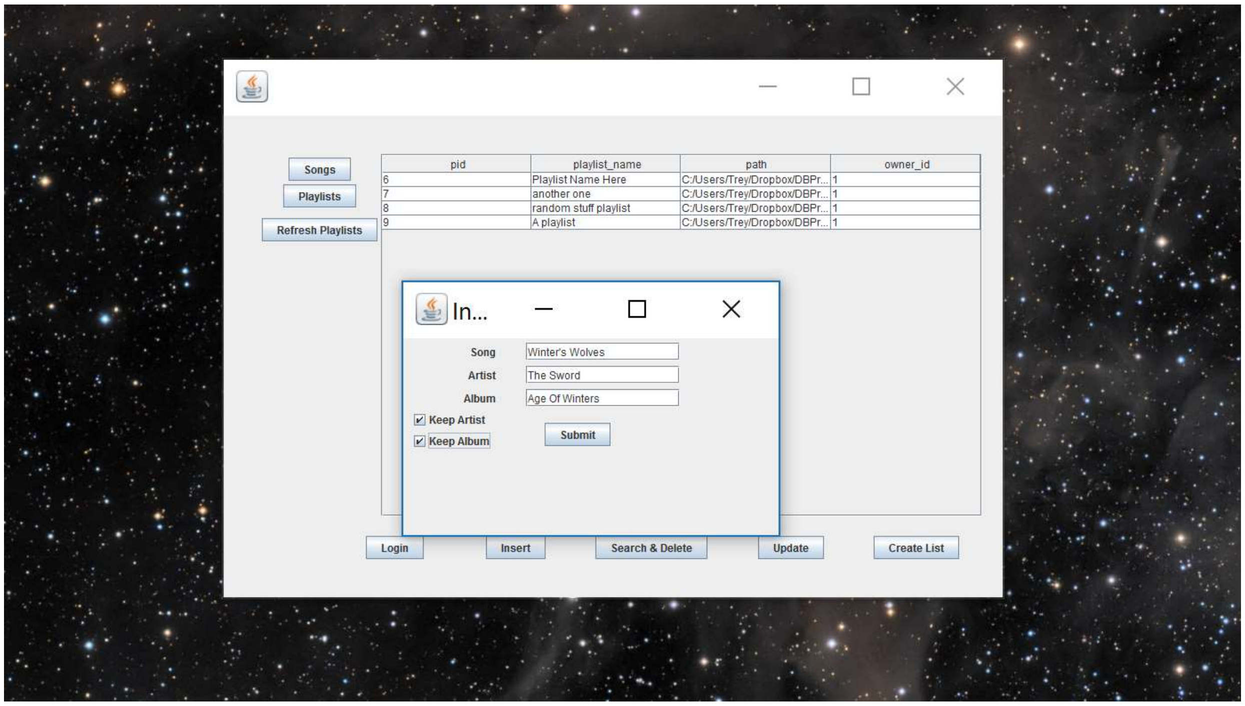
Sort By: ( ) Title ( ) Artist ( ) Album [✓ None]

Title	Artist	Album
Cockroach King	Haken	The Mountain
The Path	Haken	The Mountain
Atlas Stone	Haken	The Mountain
In Memoriam	Haken	The Mountain
Because It's There	Haken	The Mountain
Falling Back To Earth	Haken	The Mountain
As Death Embraces	Haken	The Mountain
Pareidolia	Haken	The Mountain
Somebody	Haken	The Mountain
The Path Unbeaten	Haken	The Mountain
Nobody	Haken	The Mountain
Dragonaut	Sleep	Holy Mountain
The Druid	Sleep	Holy Mountain
Evil Gypsy	Sleep	Holy Mountain
Some Grass	Sleep	Holy Mountain
Aquarian	Sleep	Holy Mountain
Holy Mountain	Sleep	Holy Mountain
Inside the Sun	Sleep	Holy Mountain
From Beyond	Sleep	Holy Mountain
Nains Baptism	Sleep	Holy Mountain



Title	Artist	Album
Alien Angel	3	Wake Pig
Take One Last Breath	Abandon All Ships	Geeving
Baby Blue	Action Bronson	Mr. Wonderful
Energize Me	After Forever	After Forever
Lost In The Static	After The Burial	Dig Deep
Goose Snow Cone	Aimee Mann	Mental Illness
Stuck In The Past	Aimee Mann	Mental Illness
You Never Loved Me	Aimee Mann	Mental Illness
Rollercoasters	Aimee Mann	Mental Illness
Lies of Summer	Aimee Mann	Mental Illness
Patient Zero	Aimee Mann	Mental Illness
Good For Me	Aimee Mann	Mental Illness
Knock It Off	Aimee Mann	Mental Illness
Phily Sinks	Aimee Mann	Mental Illness
Simple Fix	Aimee Mann	Mental Illness
Poor Judge	Aimee Mann	Mental Illness
Master Of Sorrow	Allen Lande	The Revenge
Cold Metal	Ambeon	Fate of a Dreamer
Ventura Highway	America	Homecoming
Twilight Of The Thunder God	Amon Amarth	Twilight Of The Thunder God
Empty	Anathema	Resonance 2
Come Down	Anderson .Paak	Malibu
A Mercurian Summer	Angel Vivaldi	Universal Language
Tempting Time	Animals As Leaders	Animals As Leaders
Never Like This (A Dream)	Anubis Gate	Horizons
Horizons	Anubis Gate	Horizons
Do I Wanna Know?	Arctic Monkeys	AM
Pink Beatles In A Purple Zeppelin	Arjen Anthony Lucassen	Lost In The New Real
The New Real	Arjen Anthony Lucassen	Lost In The New Real
Parental Procreation Permit	Arjen Anthony Lucassen	Lost In The New Real
When I'm a Hundred Sixty-Four	Arjen Anthony Lucassen	Lost In The New Real
E-Police	Arjen Anthony Lucassen	Lost In The New Real
Don't Switch Me Off	Arjen Anthony Lucassen	Lost In The New Real
Dr. Slumber's Eternity Home	Arjen Anthony Lucassen	Lost In The New Real
Yellowstone Memorial Day	Arjen Anthony Lucassen	Lost In The New Real
Where Pigs Fly	Arjen Anthony Lucassen	Lost In The New Real
Lost In The New Real	Arjen Anthony Lucassen	Lost In The New Real
Still Beats Your Name	As Daylight Dies	Killswitch Engage
Proving Grounds	Attila	Guilty Pleasure

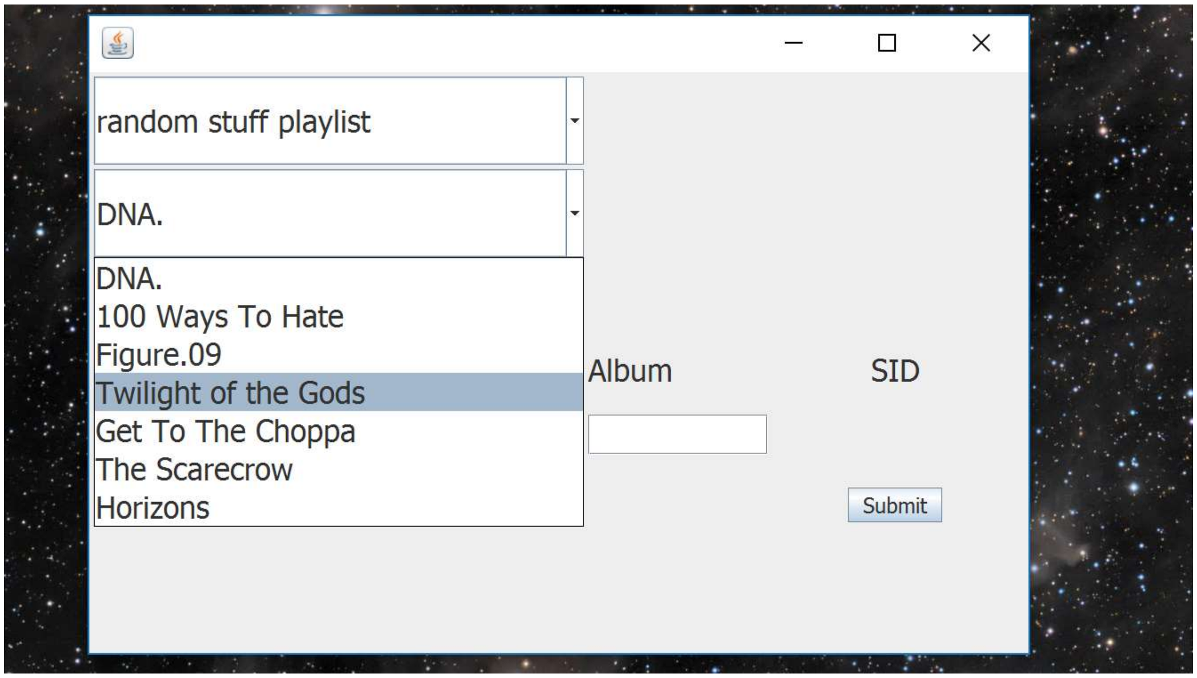
Insert Song: The User can also insert songs into the database. Song Title and Artist are required fields, while Album is optional. Furthermore, the user can specify the function to preserve the album and/or artist field in order to make insertion more convenient.



pid	playlist_name	path	owner_id
6	Playlist Name Here	C:/Users/Trey/Dropbox/DBPr...	1
7	another one	C:/Users/Trey/Dropbox/DBPr...	1
8	random stuff playlist	C:/Users/Trey/Dropbox/DBPr...	1
9	A playlist	C:/Users/Trey/Dropbox/DBPr...	1

Song: Winter's Wolves
Artist: The Sword
Album: Age Of Winters
[✓] Keep Artist
[✓] Keep Album

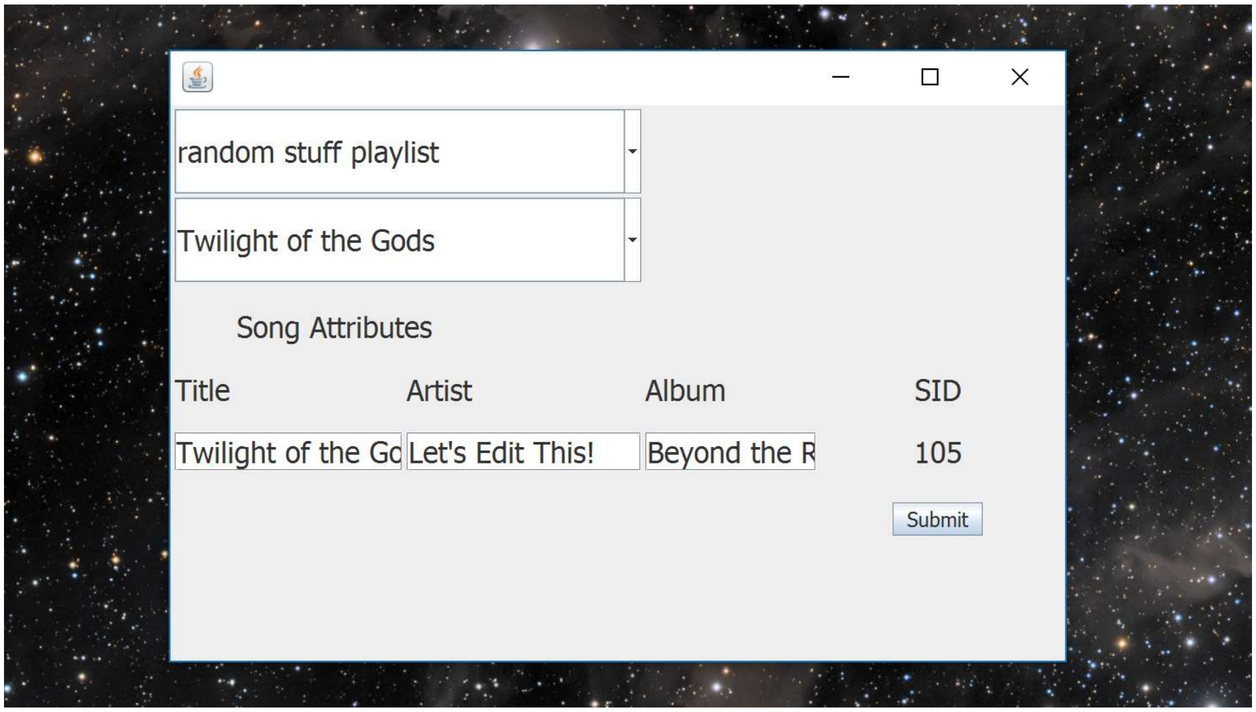
Update Function: The user can also update their playlists/songs. First the user must choose one of their playlists, then choose a song from that playlist. They can edit the song name, artist, and/or album.



random stuff playlist

DNA.

DNA.
100 Ways To Hate
Figure.09
Twilight of the Gods
Get To The Choppa
The Scarecrow
Horizons



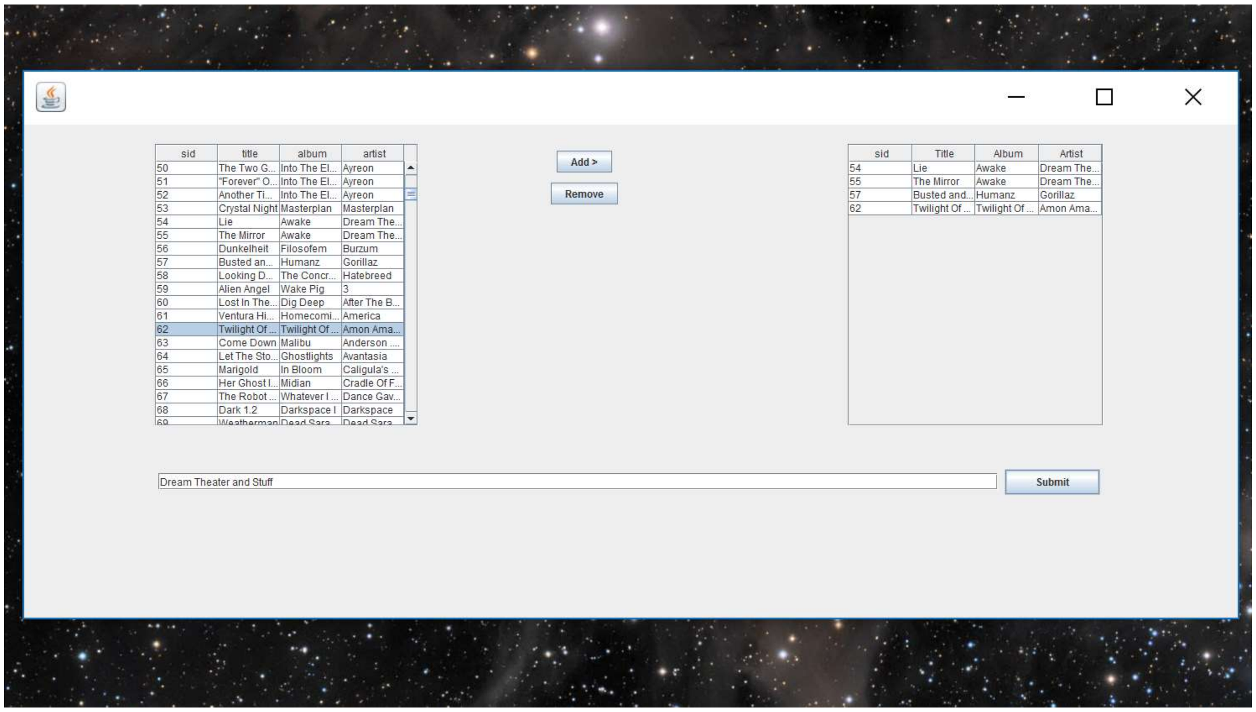
random stuff playlist

Twilight of the Gods

Song Attributes

Title	Artist	Album	SID
Twilight of the Go	Let's Edit This!	Beyond the R	105

Playlist Writer: The User can create a new playlist by adding songs to the playlist writer. The User can specify the name of their new playlist.



sid	title	album	artist
50	The Two G...	Into The El...	Ayreon
51	"Forever" O...	Into The El...	Ayreon
52	Another Ti...	Into The El...	Ayreon
53	Crystal Night	Masterplan	Masterplan
54	Lie	Awake	Dream The...
55	The Mirror	Awake	Dream The...
56	Dunkelheit	Filosofem	Burzum
57	Busted an...	Humanz	Gorillaz
58	Looking D...	The Concr...	Hatebreed
59	Alien Angel	Wake Pig	3
60	Lost In The...	Dig Deep	After The B...
61	Ventura Hi...	Homecomi...	America
62	Twilight Of ...	Twilight Of ...	Amon Ama...
63	Come Down	Malibu	Anderson ....
64	Let The Sto...	Ghostlights	Avantasia
65	Marigold	In Bloom	Caligula's ...
66	Her Ghost I...	Midian	Cradle Of F...
67	The Robot ...	Whatever I ...	Dance Gav...
68	Dark 1.2	Darkspace I	Darkspace
69	Weatherman	Dead Sara	Dead Sara

sid	Title	Album	Artist
54	Lie	Awake	Dream The...
55	The Mirror	Awake	Dream The...
57	Busted and...	Humanz	Gorillaz
62	Twilight Of ...	Twilight Of ...	Amon Ama...

Dream Theater and Stuff

6. <u>ADDITIONAL COMMENTS</u>

We believe that the program we've created is a good start for a music library database. We have a solid foundation that we can improve on further in order to make it into a viable product. However, there are places we can improve on:

- Better GUI – The system is very basic and barebones. A better GUI will make the program more enjoyable to look at and use.
- Higher account security/verification – Due to time constraints, we were unable to implement password encryption (ex, MD5 of SHA). Thus, we should improve this to ensure the security of user accounts.
- Program stability – Each function was coded by different people, and there were some initial difficulties in getting everything to work together. The system can be improved by ensuring that each function works properly without crashing the system or producing incorrect results.
- Music player – One long term goal would be to implement a music player, so that the system would go from a simple music library organizer into a full-fledged music player.

- Web integration – Though out team does not have any experience with web integration, having the system attached to a web server would allow the user to access their music from any location, and not just the local system they are using.

7. <u>SOURCE CODE</u>

- MainWindow.java
- DBIO.java
- LoginDriver.java
- InsertWNDW.java
- MusicDatabase.java
- Playlist.java
- PlaylistEditor.java
- PlaylistWriter.java
- SearchWindow.java
- Song.java
- UpdateWindow.java