Candidate no: 180000870

Compilation, Execution and Usage

Compilation and Execution

Java, and Javafx in a maven framework were used to implement the user interface.

To run go to:
P2/GUI/GUI where P2 is the submission folder.
Execute in the commandline:
mvn clean javafx:run

If any errors occur add these libraries to the classpath:
javafx.controls:15.0.1, javafx.fxml:15.0.1 and mariadb-java-client:2.7.2

Without access to labs I was unable to test the application fully, so in the appendix are screenshots of the program functioning. Any errors are likely caused by javafx libraries not found, or an incorrect db_url in main. The commented out db_url was the url I used to test the program remotely with an ssh tunnel on port 3306.

Usage

The GUI loads without any league selected, so the table is empty.
A league may be selected, which will populate the table with relevant data.
Once a league is selected the ‘Add Match’ button is revealed.
Add Match hides the table and allows the user to add a new played_match record, if the data is valid. On successful addition an alert appears stating ‘Match Added’.
If the data is not valid an alert will be shown with the relevant error information.
A user may navigate back to the played_match table view with the ‘See Matches’ button, and the played_matches table will refresh to show any updates.

Overview

Section 1, creating a database

A new database called bp_cs3101_p2_db has been implemented on the university mariadb servers corresponding to the specification schema, and populated with data from the Sample Data section.

Section 2, creating SQL views

The three required SQL views ‘view_never_played’, ‘view_win_count’, ‘view_contact_details’ are implemented in the same database.

Section 3, enforcing integrity constraints

The three required constraints have been implemented, for phone_type, valid email addresses, valid matches and a procedure has been implemented called ‘proc_add_venue’ for adding a venue, and a number of associated courts.

Section 4, implementing a graphical interface

A GUI for the database has been implemented. It allows users to enter a new match into the database when a league is selected, and allows users to see all matches played in a chosen league.

Database Implementation

Summary

The length of all text values has been set to 256 characters to encompass all reasonable entries.

Each table is implemented as specified in the relational schema. Most values are set to ‘not null’ where the record should not exist without the value being known.

All implemented tables, views, triggers and procedures are implemented in the database, and recorded in Database Schema.txt without any database values. No functions have been implemented.

Tables

The player table has no significant properties.

The player_phone table uses an enum to store the phone_type value. This is because the enum ensures entries are of an appropriate type, and enum's are significantly more space efficient than a string.

The venue table has no significant properties.

The court table is as specified in the relational schema. Since court numbering starts from one, the number cannot be null.

The league table has a prize_money value. This is represented by a numeric type with two decimal places. The winner_email may be null because a league can be created before it is finished and a winner is decided. The year value is set as a key separately to avoid indexing issues when checking league_player records executing the two implemented triggers, although it is unclear why this specifically fixes the issue.

The league_player table is as specified in the relational schema.

The played_match table required several design decisions. Since there are no specific limitations on how many times players may repeat a match the id is automatically assigned, and uses auto_increment. This is because it is not directly relevant to a played match, but uniquely identifies when all other values may be identical. The score of games won for each player is stored as an int, with a default of 0 points. The database does not check for negative values, or values over 3 for either player's score. However since they are constrained to having exactly one player with 3 points, who must be the winner an irregular score in the other value is unlikely, and can be assumed to be an incorrect entry of the loser's score. The score may be null where a player scored no points. There is a constraint checking that exactly one player won three games. There is a constraint checking that the year of 'date_played' matches the league_year.

Triggers

There are two triggers, used together they ensure that players in a played_match record are also signed up for the same league. These are represented as triggers because, unlike checks, SELECT can be used to find a list of valid player emails for the league. The triggers execute before insert, and throw an error if they fail to block any invalid inserts. The players_registered_insert_trigger is used to prevent new records being added where a player is not signed up to the league. The players_registered_update_trigger is used to prevent existing records being updated to show a user that is not signed up participating in matches. Both triggers are based off example code from lecture 12.

Views

There were nine views used, as part of the specification requirements and for utility purposes.

view_court_details is used to add the venue_address to a court record.

view_never_played is used to show courts that have not been used in matches, as per the specification. It uses view_court_details to append the venue address to a returned court record.

view_all_won_matches is used to show a list of player emails for every time they have won a match. There are expected to be duplicate repeats where a player has won several matches. This makes counting matches won easier in view_win_count.

view_win_count is used to show all players who have won a match with their number of wins. It uses view_all_won_matches to find winning players and number of wins.

view_player_fullname is used to get a player's email, surname and a string representing their full name separated by spaces. This is used for view_contact_details.

view_player_phones is used to concatenate a user's various phone numbers.

view_contact_details is used to get a player's contact details as per the specification. It uses view_player_fullname and view_player_phones.

view_matches_with_p1_fullname is used to get a played_match record where the first player's email is replaced by their full name.

view_matches_with_fullname uses view_matches_with_p1_fullname. It replaces the second player's email with their full name. This is done in two views rather than a function for simplicity. The view is used for the GUI where the full name is displayed in place of email for a player_match.

Queries

In the Connect module of the GUI there are three queries. The first selects name and year from league for the selector. With it the user can select a specific league to view played_matches for.

The second query uses the view_matches_with_fullname view to get all relevant played_match records, with emails replaced by full names.

The third query tries to insert a new played_match record into played_match. It uses a PreparedStatement class to prevent sql injection.

Procedures

proc_add_venue is the procedure for adding a venue with a specified number of courts, as in the specification. The number of courts must be greater than zero, or no matches can be played at the new venue, so an error is thrown if it isn't. It uses a while loop to iterate over the number

of courts and add all necessary courts. A ‘for’ loop was attempted but using a for loop determined by a variable required extending mariadb to include Oracle. The loop is based off of code from the mariadb community forum.

GUI Implementation

Summary

The GUI was implemented using Java, JavaFX and maven. The program used a .fxml file as the basis of the GUI panel.

main

Used to start the application. The width and height are set to 1200, and 600 respectively due to how wide the table ends up.

Connect

Used to interact with the database. All three methods are loosely based off of example code from Lecture 13. The class uses custom Classes League and Match in arraylists to pass the league, and played_match data to the Controller class. The class uses PreparedStatement for addMatch to prevent SQL injection. addMatch throws any SQLExceptions to allow the Controller to show them as part of the error response in the GUI. Exceptions are caught in the other two methods, and an empty arraylist is returned to avoid unexpected errors crashing the GUI.

League

This class represents a simple league, consisting of only name and year. It implements toString() to be represented in a drop down selector, and to compare the selected result against each item in the league array.

Match

This class represents a played_match record, with the addition of full names of both players. Emails are, by default null because they are not displayed in the GUI, but can be set when inserting a new played_match record. The get methods are very specifically formatted to work with the PropertyValueFactory in Controller

Controller

This class implements the functionality of the JavaFX GUI. It keeps a record of leagues, but never updates it because the available leagues are generally expected to change annually. The GUI only lets the user select a league at first, before showing table data or allowing adding records because both require a selected league. The changeView button switches between

showing the played_match table and the add played_match form because neither need to be seen concurrently, and otherwise take up space. The error handling for adding a new played_match record is divided into three to allow specific handling of ‘blank field errors’, ‘incorrect type/formatting errors’, and ‘SQL insertion errors’.

FXMLMain

This class is the basis of the JavaFX panel and has several elements with specific id’s for the Controller to manipulate.

Appendix

References

Trigger code based off of example code from lecture 12
https://studres.cs.st-andrews.ac.uk/CS3101/Lectures/L12_SQL_FunctionsProceduresTriggers.pdf

Mariadb loop in proc_add_venue based off code from
https://mariadb.com/kb/en/mariadb-for-loop/

Combobox in Controller.java and FXML.fxml based off code from
https://stackoverflow.com/questions/49261423/how-to-get-item-index-from-combobox/49261622
and https://stackoverflow.com/questions/13032257/combo-box-javafx-with-fxml

Alerts in Controller.java based off code from
https://www.callicoder.com/javafx-registration-form-gui-tutorial/

Methods in Connect.java based off example code from Lecture 13
https://studres.cs.st-andrews.ac.uk/CS3101/Lectures/L13_DB_Connection.pdf

SQL Views results

```
select * from view_all_won_matches;
```

	email
1	gary_the_man@yahoo.co.uk
2	louis.payne@gmail.com
3	louis.payne@gmail.com
4	tabitha.stacey@gmail.com
5	butch@xyz.club
6	tasha.marsden@gmail.com
7	tasha.marsden@gmail.com
8	louis.payne@gmail.com
9	butch@xyz.club
10	final_fantasy_freak1993@hotmail.com
11	final_fantasy_freak1993@hotmail.com
12	sylvia.hathaway@gmail.com

```
select * from view_contact_details;
```

	fullname	email	phone_numbers
1	Jamie Eugene Korey Butcher	butch@xyz.club	079 6943 8448
2	Leighton Alan Buzzard	leighton.buzzard@gmail.com	0117 496 0714,0131 496 0962
3	Madeleine Daubney	mad_maddy@gmail.com	0115 496 0961,020 7946 0501
4	Sylvia Loraine Hathaway	sylvia.hathaway@gmail.com	07700 900939
5	Jeremy Wardell Huddleston	jwh@hotmail.com	0131 496 0470
6	Kirsten Aileen Louise Jackman	final_fantasy_freak1993@hotmail.com	07700 900909
7	Gary Carl Marsden	gary_the_man@yahoo.co.uk	0151 496 0777
8	Natasha Joy Bernardette Louise Marsden	tasha.marsden@gmail.com	078 8934 4229
9	Ulysses Marsden	u_marsden@gmail.com	0131 496 0745
10	Louis Kennard Payne	louis.payne@gmail.com	07700 900654
11	Sue Rosemary Rogers	srrogers@yahoo.co.uk	07700 900949
12	Tabitha Stacey	tabitha.stacey@gmail.com	07837 585417

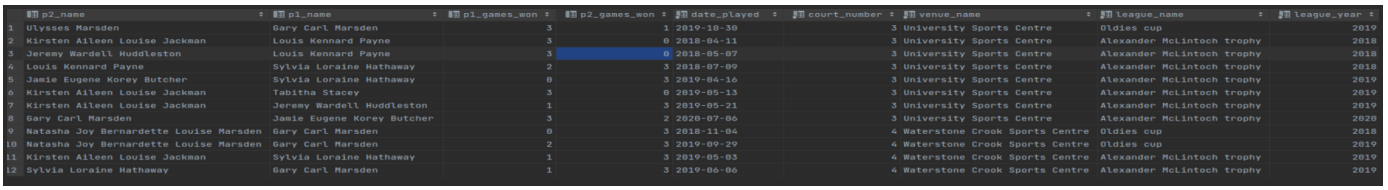
```
select * from view_court_details;
```

	number	venue_name	name	address
1	1	East Sands Leisure Centre	East Sands Leisure Centre	2 St Mary St, St Andrews KY16 8LH
2	2	East Sands Leisure Centre	East Sands Leisure Centre	2 St Mary St, St Andrews KY16 8LH
3	1	Forthill Squash Club	Forthill Squash Club	20 Forthill Road, Broughty Ferry, Dundee DD5 3SR
4	2	Forthill Squash Club	Forthill Squash Club	20 Forthill Road, Broughty Ferry, Dundee DD5 3SR
5	1	University Sports Centre	University Sports Centre	9 St Leonard's Rd, St Andrews KY16 9DY
6	2	University Sports Centre	University Sports Centre	9 St Leonard's Rd, St Andrews KY16 9DY
7	3	University Sports Centre	University Sports Centre	9 St Leonard's Rd, St Andrews KY16 9DY
8	1	Waterstone Crook Sports Centre	Waterstone Crook Sports Centre	69 Kirk Rd, Newport-on-Tay DD6 8HY
9	2	Waterstone Crook Sports Centre	Waterstone Crook Sports Centre	69 Kirk Rd, Newport-on-Tay DD6 8HY
10	3	Waterstone Crook Sports Centre	Waterstone Crook Sports Centre	69 Kirk Rd, Newport-on-Tay DD6 8HY
11	4	Waterstone Crook Sports Centre	Waterstone Crook Sports Centre	69 Kirk Rd, Newport-on-Tay DD6 8HY

```
select * from view_matches_with_fullname;
```

	p2_name	p1_name	p1_games_won	p2_games_won	date_played	court_number	venue_name	league_name	league_year
1	Ulysses Marsden	Gary Carl Marsden	3	1	2019-10-30	3	University Sports Centre	Oldies cup	2019
2	Kirsten Aileen Louise Jackman	Louis Kennard Payne	3	0	2018-04-11	3	University Sports Centre	Alexander McLintoch trophy	2018
3	Jeremy Wardell Huddleston	Louis Kennard Payne	3	0	2018-05-07	3	University Sports Centre	Alexander McLintoch trophy	2018
4	Louis Kennard Payne	Sylvia Loraine Hathaway	2	3	2018-07-09	3	University Sports Centre	Alexander McLintoch trophy	2018
5	Jamie Eugene Korey Butcher	Sylvia Loraine Hathaway	0	3	2019-04-16	3	University Sports Centre	Alexander McLintoch trophy	2019
6	Kirsten Aileen Louise Jackman	Tabitha Stacey	3	0	2019-05-13	3	University Sports Centre	Alexander McLintoch trophy	2019
7	Kirsten Aileen Louise Jackman	Jeremy Wardell Huddleston	1	3	2019-05-21	3	University Sports Centre	Alexander McLintoch trophy	2019
8	Gary Carl Marsden	Jamie Eugene Korey Butcher	3	2	2020-07-06	3	University Sports Centre	Alexander McLintoch trophy	2020
9	Natasha Joy Bernardette Louise Marsden	Gary Carl Marsden	0	3	2018-11-04	4	Waterstone Crook Sports Centre	Oldies cup	2018
10	Natasha Joy Bernardette Louise Marsden	Gary Carl Marsden	2	3	2019-09-29	4	Waterstone Crook Sports Centre	Oldies cup	2019
11	Kirsten Aileen Louise Jackman	Sylvia Loraine Hathaway	1	3	2019-05-03	4	Waterstone Crook Sports Centre	Alexander McLintoch trophy	2019
12	Sylvia Loraine Hathaway	Gary Carl Marsden	1	3	2019-06-06	4	Waterstone Crook Sports Centre	Alexander McLintoch trophy	2019

```
select * from view_matches_with_p1_fullname;
```



	p2_name	p1_name	p1_games_won	p2_games_won	date_played	court_number	venue_name	league_name	league_year
1	Ulysses Marsden	Gary Carl Marsden	3	1	2019-10-30	3	University Sports Centre	Oldies cup	2019
2	Kirsten Aileen Louise Jackman	Louis Kennard Payne	3	0	2018-04-11	3	University Sports Centre	Alexander McLintoch trophy	2018
3	Jeremy Wardell Huddleston	Louis Kennard Payne	3	0	2018-05-07	3	University Sports Centre	Alexander McLintoch trophy	2018
4	Louis Kennard Payne	Sylvia Loraine Hathaway	2	3	2018-07-09	3	University Sports Centre	Alexander McLintoch trophy	2018
5	Jamie Eugene Korey Butcher	Sylvia Loraine Hathaway	0	3	2019-04-16	3	University Sports Centre	Alexander McLintoch trophy	2019
6	Kirsten Aileen Louise Jackman	Tabitha Stacey	3	0	2019-05-13	3	University Sports Centre	Alexander McLintoch trophy	2019
7	Kirsten Aileen Louise Jackman	Jeremy Wardell Huddleston	1	3	2019-05-21	3	University Sports Centre	Alexander McLintoch trophy	2019
8	Gary Carl Marsden	Jamie Eugene Korey Butcher	3	2	2020-07-06	3	University Sports Centre	Alexander McLintoch trophy	2020
9	Natasha Joy Bernardette Louise Marsden	Gary Carl Marsden	0	3	2018-11-04	4	Waterstone Crook Sports Centre	Oldies cup	2018
10	Natasha Joy Bernardette Louise Marsden	Gary Carl Marsden	2	3	2019-09-29	4	Waterstone Crook Sports Centre	Oldies cup	2019
11	Kirsten Aileen Louise Jackman	Sylvia Loraine Hathaway	1	3	2019-05-03	4	Waterstone Crook Sports Centre	Alexander McLintoch trophy	2019
12	Sylvia Loraine Hathaway	Gary Carl Marsden	1	3	2019-06-06	4	Waterstone Crook Sports Centre	Alexander McLintoch trophy	2019

```
select * from view_never_played;
```

	number	venue_name	address
1	1	East Sands Leisure Centre	2 St Mary St, St Andrews KY16 8LH
2	2	East Sands Leisure Centre	2 St Mary St, St Andrews KY16 8LH
3	1	Forthill Squash Club	20 Forthill Road, Broughty Ferry, Dundee DD5 3SR
4	2	Forthill Squash Club	20 Forthill Road, Broughty Ferry, Dundee DD5 3SR
5	1	University Sports Centre	9 St Leonard's Rd, St Andrews KY16 9DY
6	2	University Sports Centre	9 St Leonard's Rd, St Andrews KY16 9DY
7	1	Waterstone Crook Sports Centre	69 Kirk Rd, Newport-on-Tay DD6 8HY
8	2	Waterstone Crook Sports Centre	69 Kirk Rd, Newport-on-Tay DD6 8HY
9	3	Waterstone Crook Sports Centre	69 Kirk Rd, Newport-on-Tay DD6 8HY

```
select * from view_player_fullname;
```

	email	surname	fullname
1	u_marsden@gmail.com	Marsden	Ulysses Marsden
2	tasha.marsden@gmail.com	Marsden	Natasha Joy Bernardette Louise Marsden
3	tabitha.stacey@gmail.com	Stacey	Tabitha Stacey
4	sylvia.hathaway@gmail.com	Hathaway	Sylvia Loraine Hathaway
5	srrogers@yahoo.co.uk	Rogers	Sue Rosemary Rogers
6	mad_maddy@gmail.com	Daubney	Madeleine Daubney
7	louis.payne@gmail.com	Payne	Louis Kennard Payne
8	leighton.buzzard@gmail.com	Buzzard	Leighton Alan Buzzard
9	jwh@hotmail.com	Huddleston	Jeremy Wardell Huddleston
10	gary_the_man@yahoo.co.uk	Marsden	Gary Carl Marsden
11	final_fantasy_freak1993@hotmail.com	Jackman	Kirsten Aileen Louise Jackman
12	butch@xyz.club	Butcher	Jamie Eugene Korey Butcher

```
select * from view_player_phones;
```

	email	phone_numbers
1	butch@xyz.club	079 6943 8448
2	final_fantasy_freak1993@hotmail.com	07700 900909
3	gary_the_man@yahoo.co.uk	0151 496 0777
4	jwh@hotmail.com	0131 496 0470
5	leighton.buzzard@gmail.com	0117 496 0714,0131 496 0962
6	louis.payne@gmail.com	07700 900654
7	mad_maddy@gmail.com	0115 496 0961,020 7946 0501
8	srrogers@yahoo.co.uk	07700 900949
9	sylvia.hathaway@gmail.com	07700 900939
10	tabitha.stacey@gmail.com	07837 585417
11	tasha.marsden@gmail.com	078 8934 4229
12	u_marsden@gmail.com	0131 496 0745

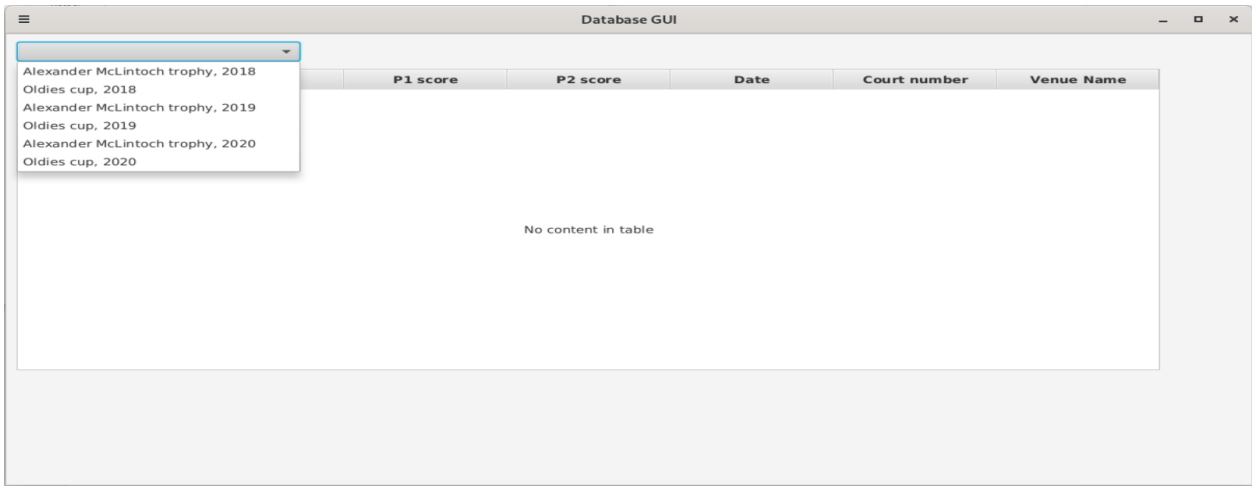
```
select * from view_win_count;
```

	email	matches_won
1	butch@xyz.club	2
2	final_fantasy_freak1993@hotmail.com	2
3	gary_the_man@yahoo.co.uk	1
4	louis.payne@gmail.com	3
5	sylvia.hathaway@gmail.com	1
6	tabitha.stacey@gmail.com	1
7	tasha.marsden@gmail.com	2

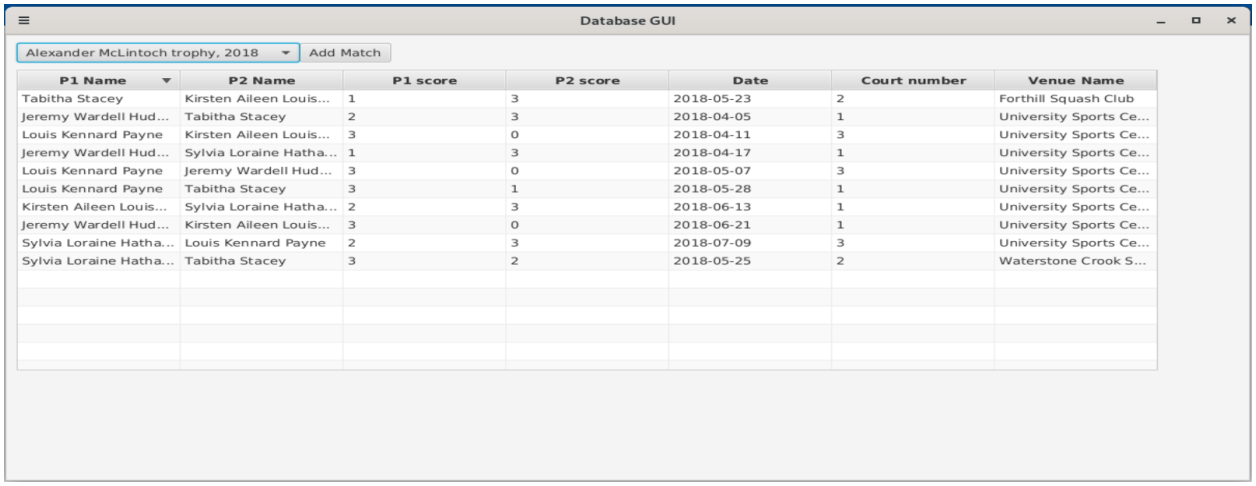
Images

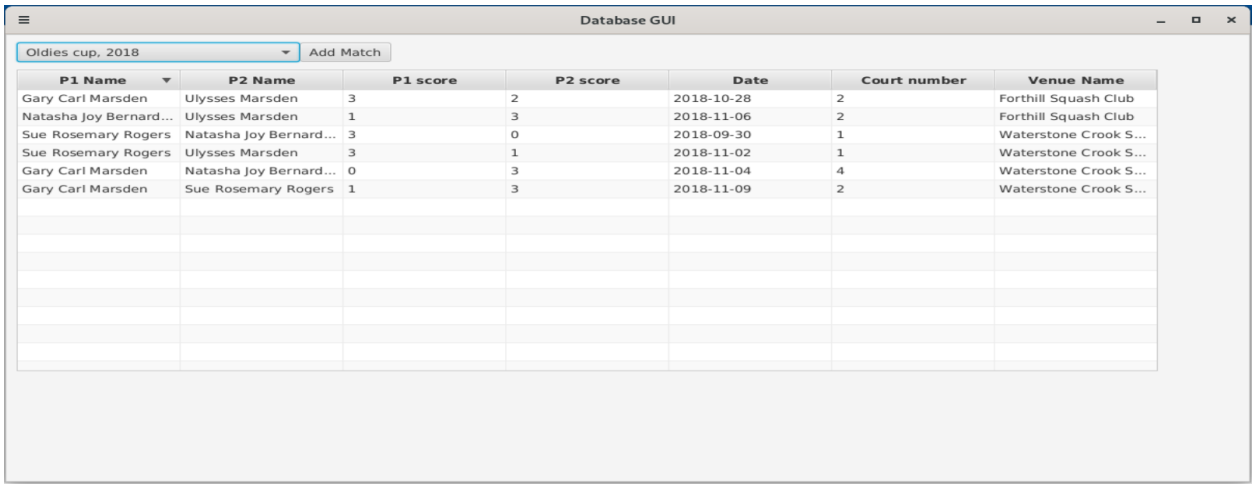
GUI Evidence

GUI with no league selected

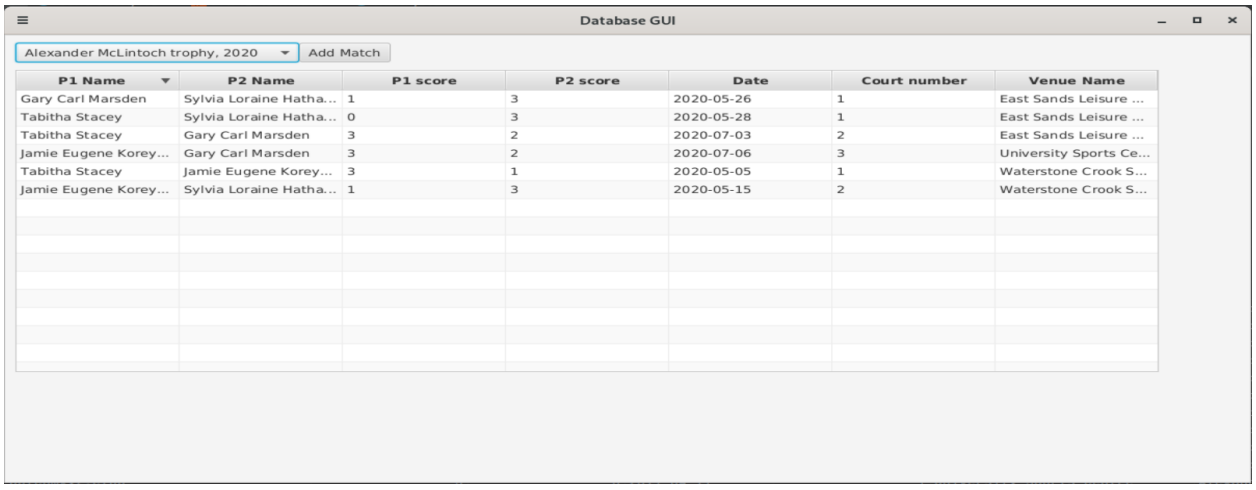


GUI with a league selected

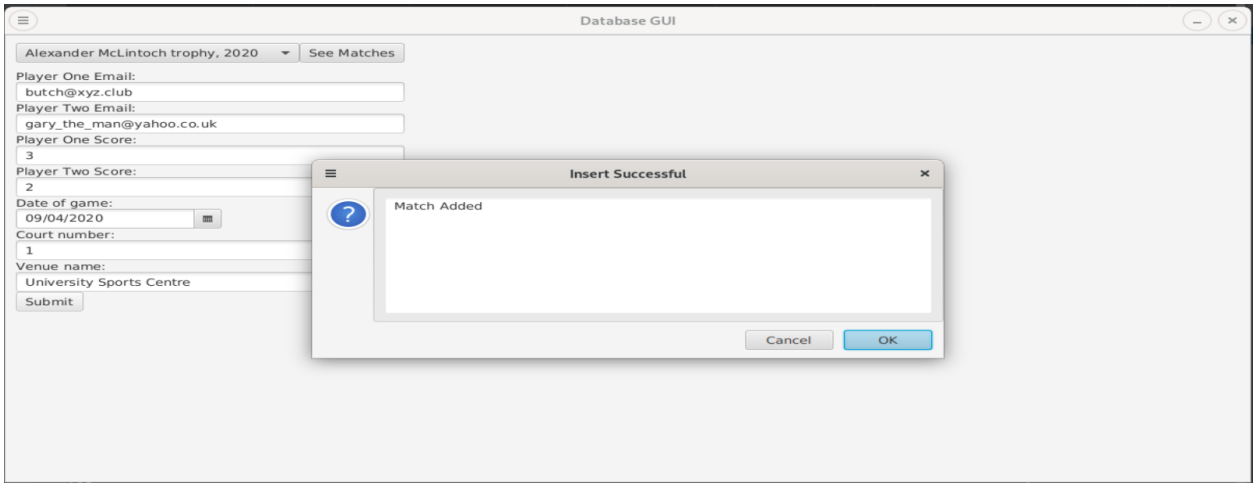




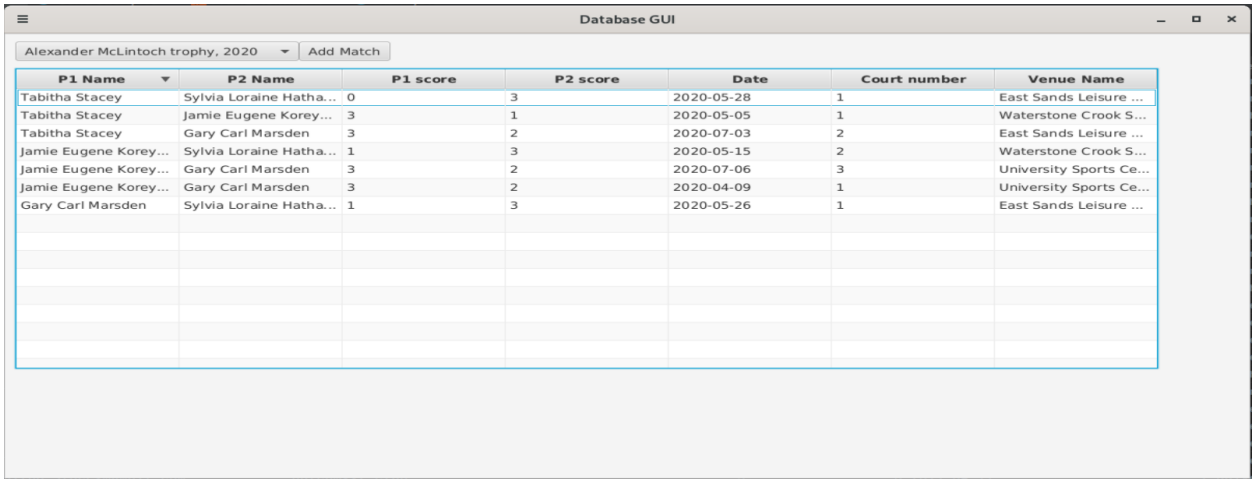
GUI Alexander McLintoch trophy, 2020 before insert



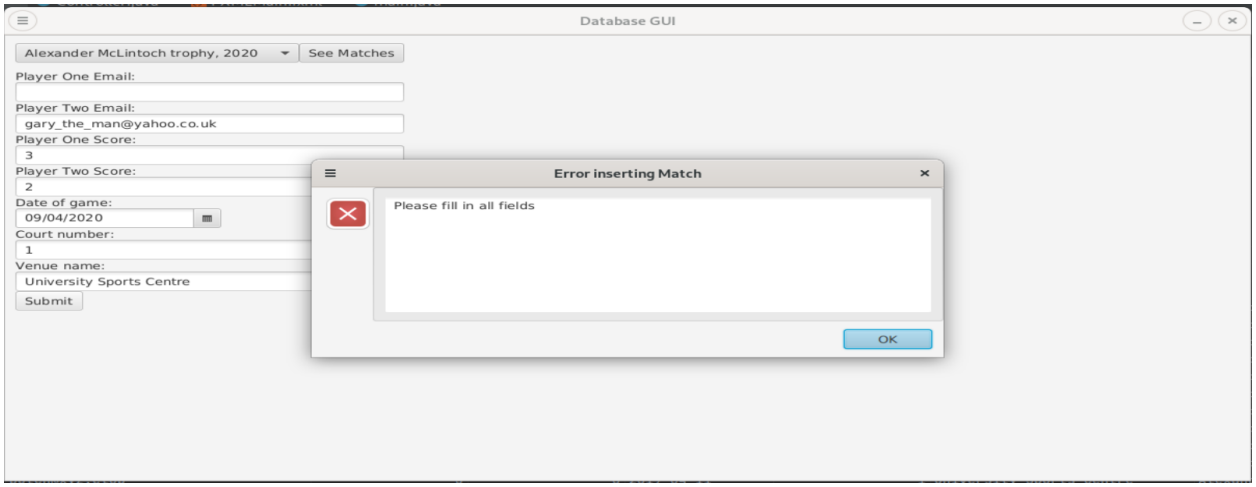
GUI using ‘Add Match’ button to add a record to played_match



GUI Alexander McLintoch trophy, 2020 after insert



GUI using ‘Add Match’, blank field error



Word Count:

1728