

# **COMP132: Advanced Programming**

## **Programming Project Report**

**NBA Game Simulator**

**Kerem Burak Yılmaz, 83349**

**Fall, 2023**



# Part 1 General Information

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## General Demo Information:

- List of users (nickname, password, type)

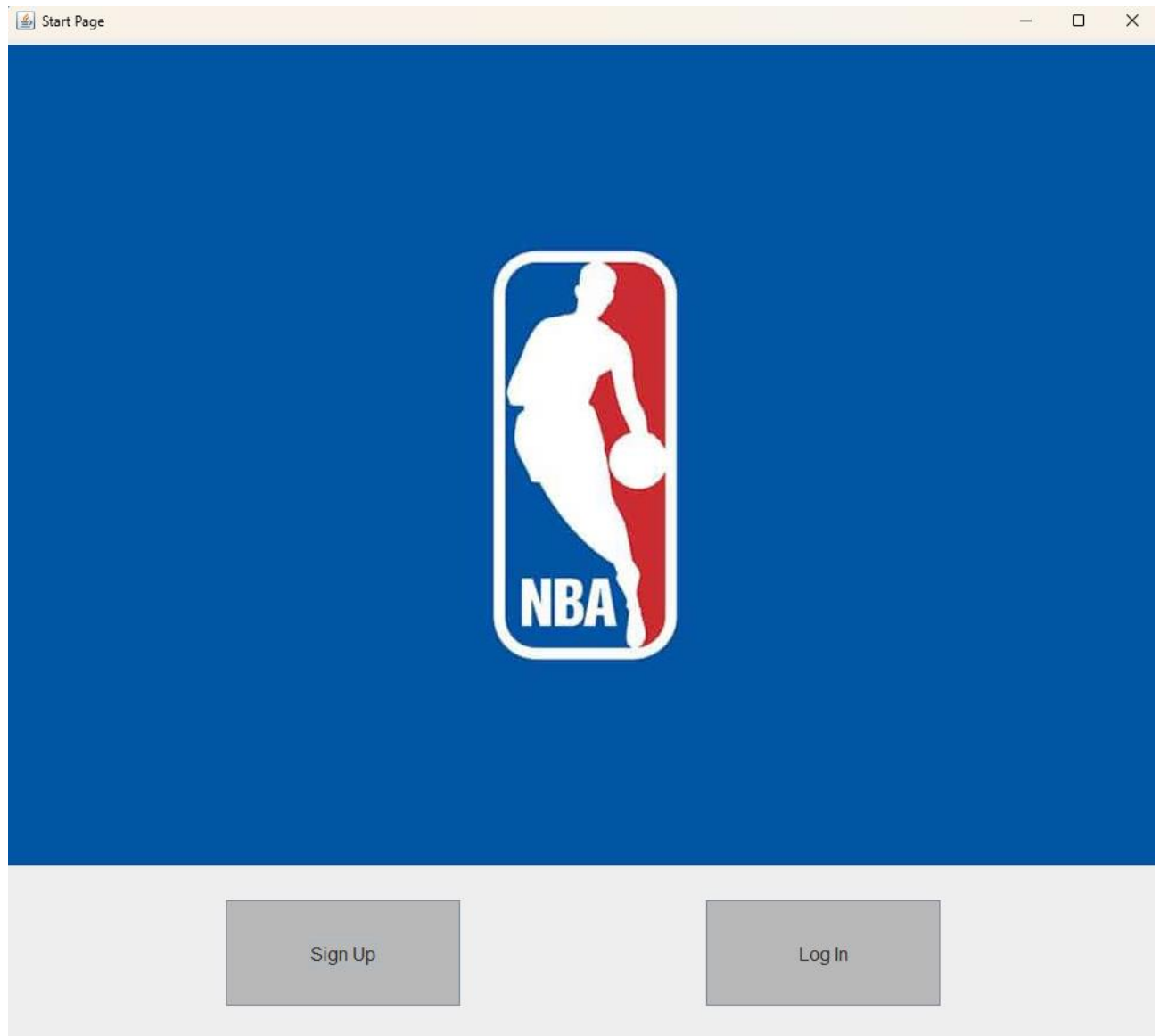
Nickname ▾	Password ▾	Name ▾	Surname ▾	Age ▾	Email ▾
kevembuvak	HhhHhh6+	Kerem Burak	Yilmaz	36	<a href="mailto:k.burak02@outlook.com">k.burak02@outlook.com</a>
keremm	KkkKkk6-	Mustafa	Kaldirim	25	<a href="mailto:yilmazkeremburak@gmail.com">yilmazkeremburak@gmail.com</a>
denizz	denizharika8*	Deniz	Soylular	45	<a href="mailto:dsoylular22@gmail.com">dsoylular22@gmail.com</a>

Ex 1: List of users

## Application usage information

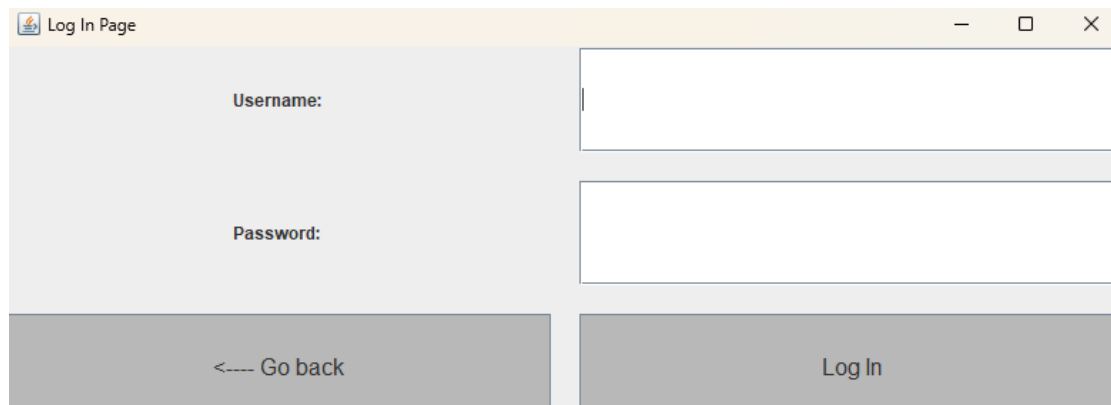
- **Sign up/Login Guide**

The application starts with the class “Main” under “src” directory. Only code inside this class, invokes “StartPage” class which is an extension of JFrame class. You can see the frame below:

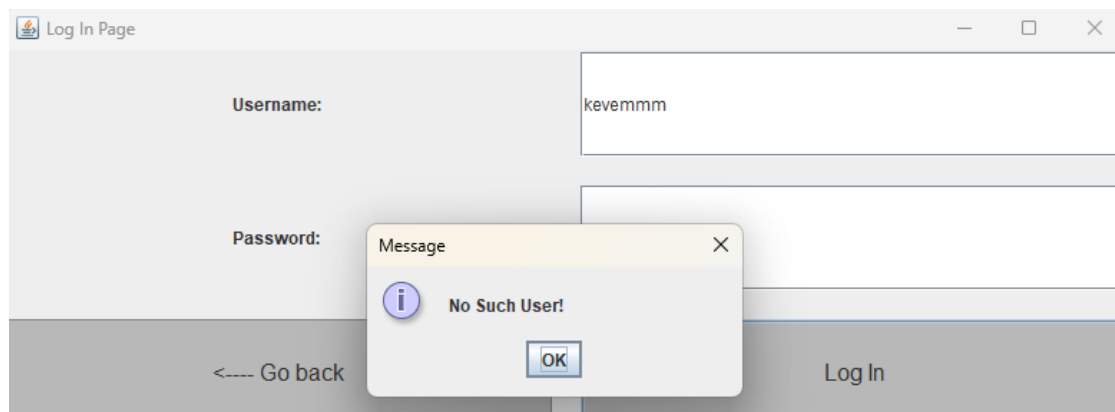


Ex 2: Screenshot of “StartPage”

Here, if the user clicks the login button, user is transferred to “LogInPage”. On the “LogInPage”, if user clicks on the “Go Back” button, is returned to “StartPage”. If user clicks on “Log In” button, the details given in the text fields are checked. This is done by checking every user that’s signed up and was logged inside “src\Logs\users.txt”. According to this check, user either logs in to the app and is transferred to “MainPage”, or is faced with a warning sign that says “No such user!”.

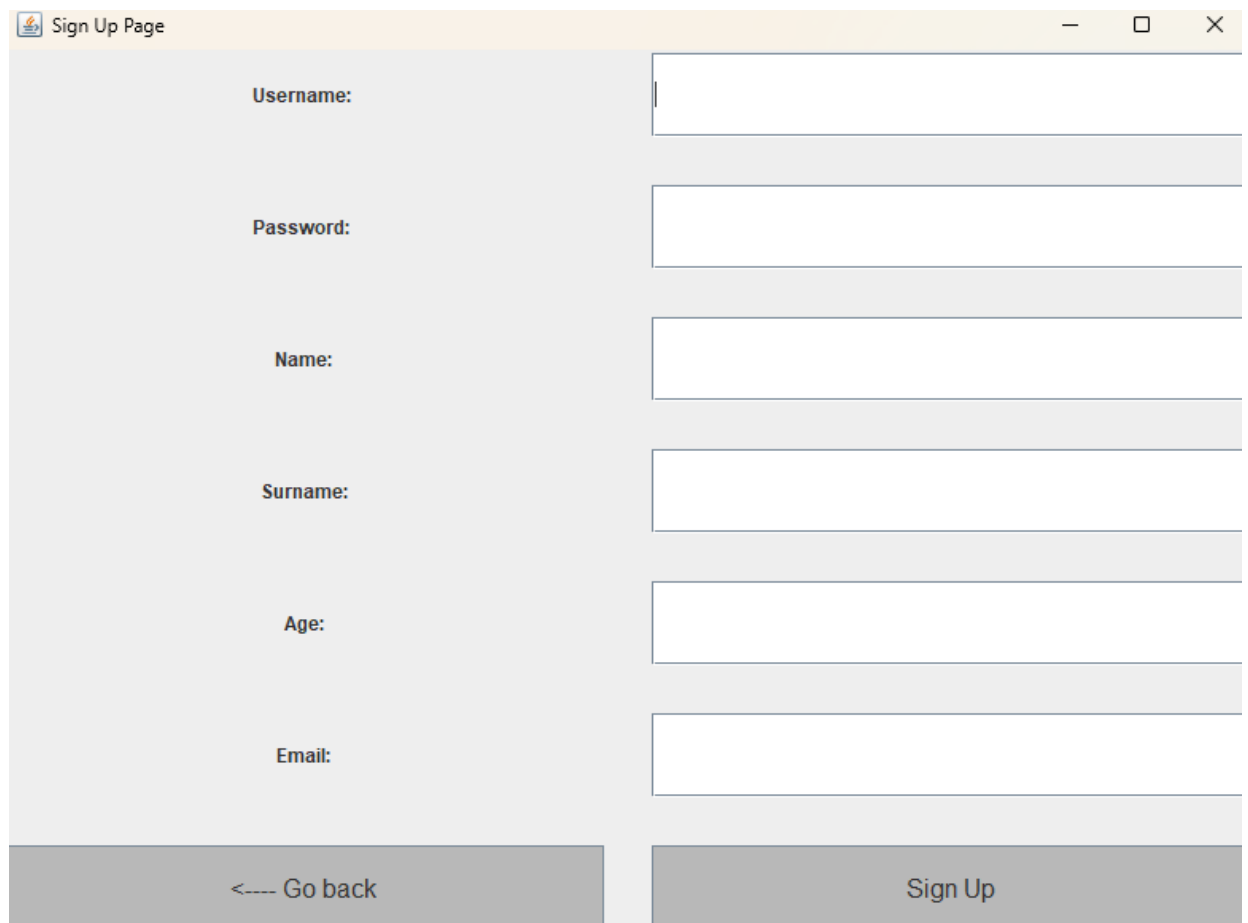


Ex 3: LogInPage



Ex 4: “No Such User!” pop-up

If user clicks on “Sign Up” button in “StartPage”, user is transferred to “SignUpPage”.

A screenshot of a web browser window titled "Sign Up Page". The page has a light gray background. On the left side, there are labels for "Username:", "Password:", "Name:", "Surname:", "Age:", and "Email:". To the right of each label is a white text input field. Below the input fields, there are two buttons: a "Go back" button with a left-pointing arrow and a "Sign Up" button. The "Go back" button is on the left and the "Sign Up" button is on the right, both with a gray background and white text.

Ex 5: “SignUpPage”

In this page, if user clicks on “Go Back” button, user is returned to “StartPage”.

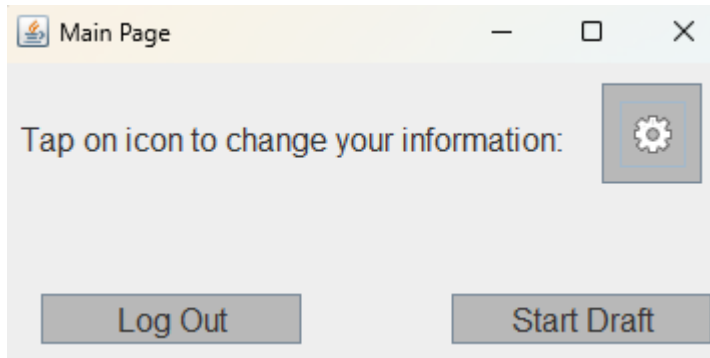
If user clicks on “Sign Up”, the information given in the textfields are checked since user cannot sign up with any random information. The conditions are:

- Password should be at least eight characters, including letters, numbers, and special characters.
- Name and surname, each should have at least three characters (only letters).
- Username can only include letter and number characters.
- Age must be at least 12
- The email address should be in the correct format. (e.g., [name@domain.com](mailto:name@domain.com))

Invalidating any of these conditions result in a pop-up message. If these constraints are valid, a new user is saved and user is transferred to “MainPage”.

- **User's Guide**

If user is successfully logged into or signed up, he is transferred to “MainPage” which can be seen as below.



Ex 6: “MainPage”

This page has 3 different buttons.

1. Button with “Settings” icon.
2. “Log Out”
3. “Start Draft”

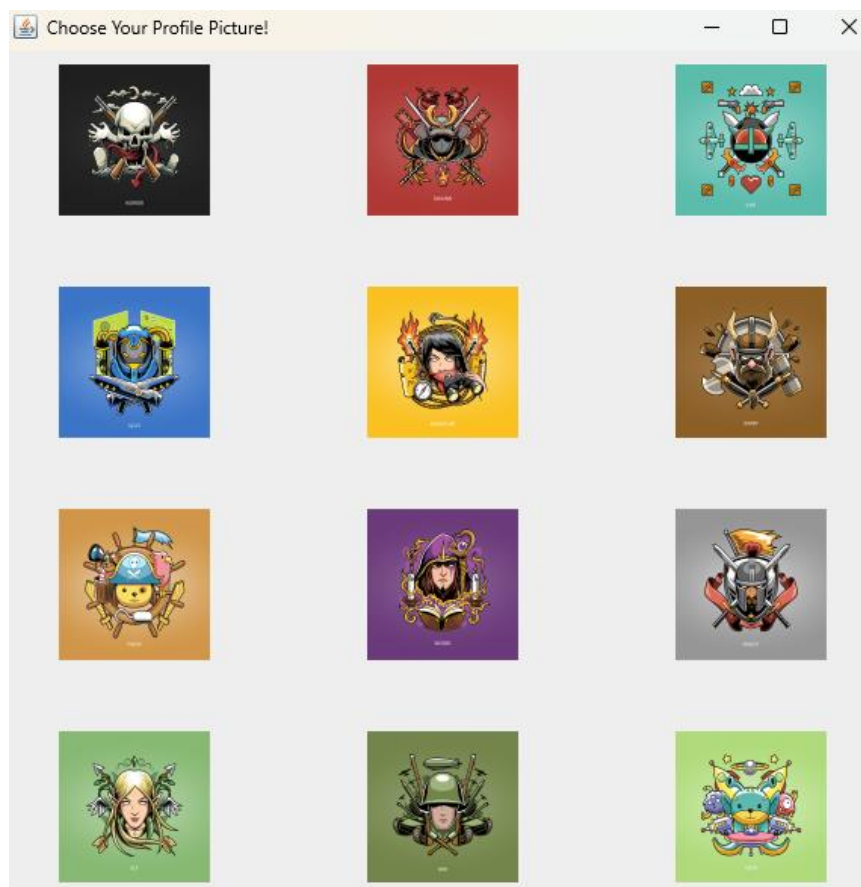
Pressing to “Settings” button transfers user to “ChangeInformationPage” where user can:

- Change his/her name.
- Change his/her password.
- Change his/her email address.
- Change his/her profile picture.

Constraints regarding name, email address and password are still valid in this page and still must be satisfied. Any valid changes made in this page result in overwriting of file “users.txt”. For changing profile picture, each picture is a button itself and upon clicking, “users.txt” is overwritten again, thus changing the default profile picture.

A screenshot of a web application window titled "Change Your Information". The window has a light gray background and standard window controls (minimize, maximize, close) in the top right corner. On the left side, there are three labels: "Password:", "Age:", and "Email:". To the right of each label is a corresponding text input field. Below the input fields, there is a link that says "Click here to change your profile picture". At the bottom of the window, there are two buttons: "<---- Go back" on the left and "Update" on the right.

Ex 7: "ChangeInformationPage"



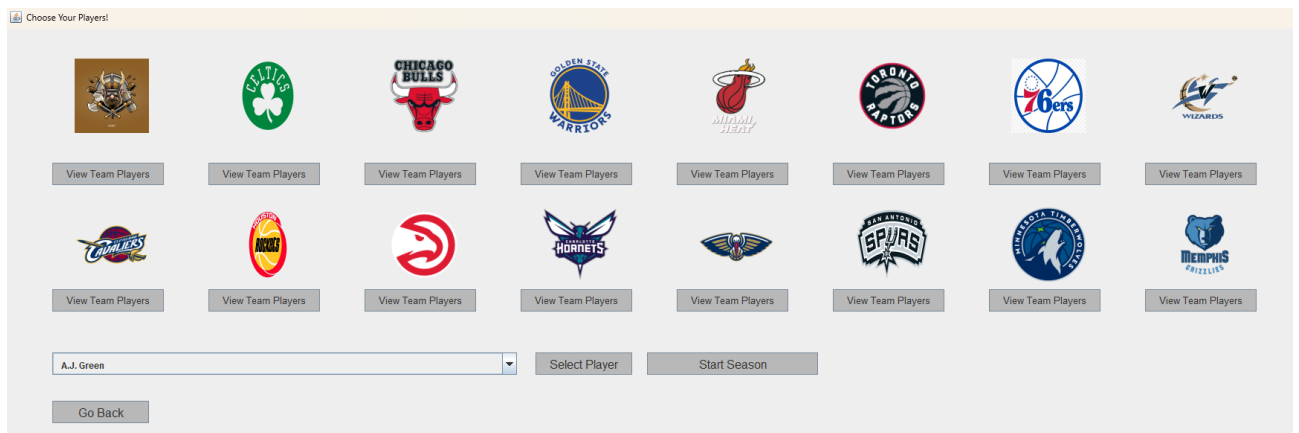
Ex 8: Frame dedicated to change profile pictures.

Pressing “Log Out” button in “MainPage” returns user to “StartPage”, thus requiring user to log in or sign up to reach to “MainPage” again.

Pressing “Start Draft” button transfers user to “DraftingPage”, where user chooses 5 players from a list of professional NBA players.

- **Drafting**

In “DraftingPage”, you can see your team with 15 other computer-controlled teams with logos and special names.



Ex 9: “DraftingPage” where each of 16 teams with their logos can be seen.

Team dedicated to you has your profile picture instead of a logo.



Teams List
{user.getName()}'s Team
Boston KUltics
ChicaKU Bulls
Golden KU Warriors
MiaKU Heats
Toronto RaptorkUs
KUadelphia 76ers
WasKington Wizards
KUleveland Cavaliers
Houston RockKUs
Atlanta HawKU
KUharlotte Hornets
New Orleans PeliKUns
KU Antonio Spurs
Minnesota TimberKUs
Memphis KUrizzlies

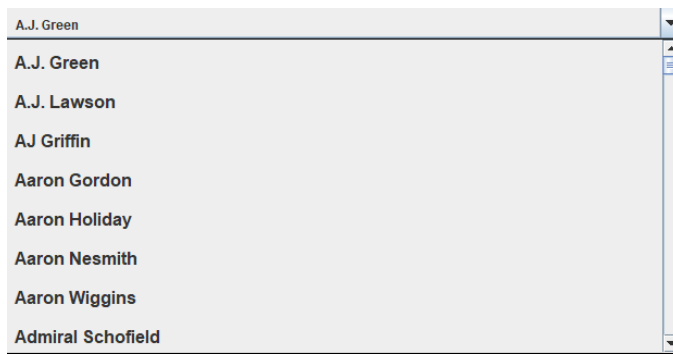
#### Ex 10: Teams List in simulation

This page has buttons with 4 distinct purposes:

- 1) Go Back
- 2) Select Player
- 3) View Team Players
- 4) Start Season

- 1) If user clicks on “Go Back” button, user is returned to “MainPage”.

Upon clicking on the list seen down below the frame, a list of available players’ names are shown.



Ex 11: List of available players

These players are ordered by first letter of their names, and duplicates are handled by using TreeSet collection type.

- 2) After selecting a player from list and pressing “Select Player”, that selected player is drafted to your team. After user drafts one player, computer randomly drafts 15 other players from that selected position for other 15 teams. Drafting must continue until each team has precisely one player from each position.

Since each team must have all 5 positions, upon selecting a player, that position is filtered, and only other position players are shown in list.

- 3) If users press “View Team Players” button for any team, team’s drafted players until that moment are shown. All players from list are clickable, and clicking will result in another popup that shows player’s statistics.



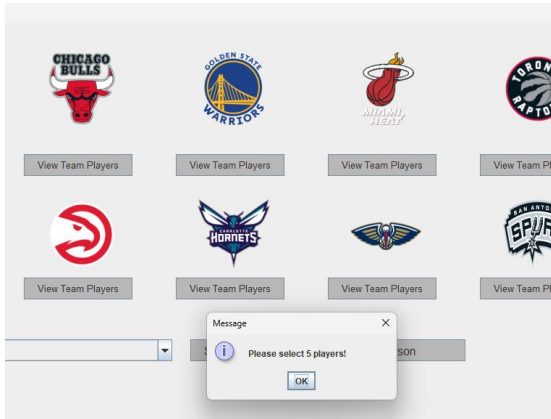
Ex 12: “View Team Players”



Ex 13: Viewing Players

Duplicate players' statistics are handled by taking average of all entries' statistics.

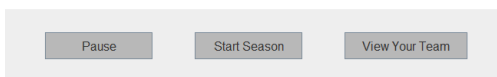
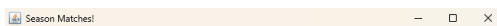
- 4) Upon pressing “Start Season” button, if user drafted 5 players with different positions, user is transferred to “SeasonMatchesPage”, if not a pop-up warning is shown.



Ex 13: “Please select 5 players!” popup warning.

- **Match Making**

After a successful draft, user is transferred to “SeasonMatchPage”.



Ex 14: “SeasonMatchPage”

Here, user can click on three distinct buttons:

- 1) View Your Team
- 2) Start Season
- 3) Pause

- 1) By pressing “View Your Team” button, user can view his/her own team, just like in the drafting stage. Each player is again clickable.
- 2) By clicking on “Start Season” button, user can start season matches. Each team plays 2 matches with one another -one home match and one away match- making a total of 30 matches for each team.
- 3) By pressing “Pause” button, user can pause the simulation and the matches as long as he/she wants. Upon pressing “Pause”, button name changes into “Continue” and vice versa.

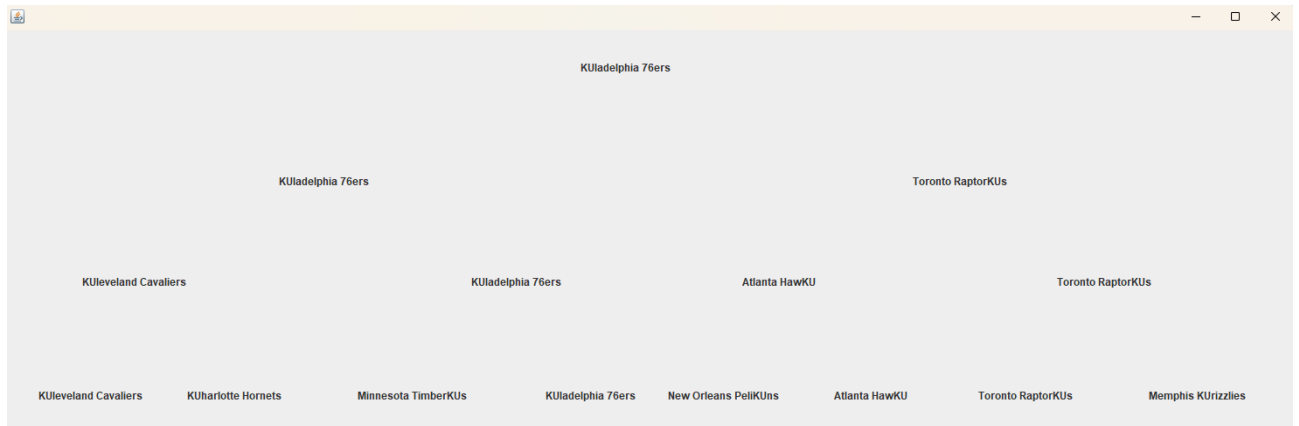


Ex 15: Screenshot from “SeasonMatchPage”



Ex 16: Screenshot from paused season

After season matches are completed, play-off season starts with 8 teams with highest win. Teams randomly play quarterfinals, semi-finals and final with each other. Result of this play-off is shown with a pop-up just after season finishes.



Ex 16: Play-off results pop-up.

- **Scoring**

Winner of the matches are determined by that teams' scores. Team's score is calculated by sum of their players statistics multiplied by that area's weight for each position. The catch is their statistics are randomly selected between [statistic – n, statistics + n] where n is pre-determined. For example, the centre player "AI Horford" has 9.8 points, 6.2 rebounds, 3 assists, 1 block and 0.5 steals. So, his contribution to team score is:

$$[8.8, 10.8] * 0.2 + [5.2, 7.2] * 0.3 + [2, 4] * 0 + [0, 2] * 0.4 + [0, 1.5] * 0.1$$

It is handled by program that randomly selected statistic is bigger than zero.

Home team has an advantage; thus, its score is multiplied by 1.05.

WEIGHTS	Points	Rebounds	Assists	Blocks	Steals	Total
Centre	0.2	0.3	0	0.4	0.1	1
Point Guard	0.3	0.1	0.4	0.1	0.1	1
Shooting Guard	0.4	0.1	0.3	0.1	0.1	1
Small Forward	0.2	0.2	0.15	0.2	0.25	1
Power Forward	0.3	0.3	0.1	0.2	0.1	1

Ex 17: Weights for each position in each category. This was determined by expectations from each position.

Match ending with tie is extremely unlikely since statistics are randomized as doubles, however if it is a tie, home wins since it has advantage.

- **Logging**

Simulator has a total of 4 logs:

- users.txt
- DraftResults.txt
- PlayOffMatches.txt
- SeasonMatches.txt

```

Kerem Burak's Team;A.J. Green;SG;4.4;0.4;1.3;0.1;0.0;0.3;0.0;0.1;0.2;0.1;AJ Griffin;SF;8.9;0.2;2.1;0.2;1.0;0.15;0.2;0.2;0.6;0.25;Aaron Gordon;PF;10.3;0.3;6.6;0.3;3.0;0.1;0.8;0.2;0
Boston KULTics;Nickel Alexander-Walker;SG;5.9;0.4;1.8;0.1;1.4;0.3;0.3;0.1;0.3;0.1;Jalen McDaniels;SF;6.7;0.2;3.2;0.2;0.8;0.15;0.2;0.2;0.7;0.25;JaMychal Green;PF;6.4;0.3;3.6;0.3;0.9;0.1;0.4
ChicaKU Bulls;Jeenathan Williams;SG;10.6;0.4;3.0;0.1;2.0;0.3;0.4;0.1;0.6;0.1;Xavier Sneed;SF;4.3;0.2;1.3;0.2;1.3;0.15;0.3;0.2;0.0;0.25;Aaron Gordon;PF;10.3;0.3;6.6;0.3;3.0;0.1;0.8;0.2;0.8
Golden KU Warriors;Dru Smith;SG;2.9;0.4;1.6;0.1;1.5;0.3;0.3;0.1;0.7;0.1;Joe Ingles;SF;6.9;0.2;2.8;0.2;3.3;0.15;0.1;0.2;0.7;0.25;Admiral Schofield;PF;4.2;0.3;1.7;0.3;0.8;0.1;0.1;0.2;0.2;0.1
MiaKU Heats;Collin Sexton;SG;14.3;0.4;2.2;0.1;2.9;0.3;0.1;0.1;0.6;0.1;Jalen McDaniels;SF;9.4;0.2;4.3;0.2;1.6;0.15;0.4;0.2;1.0;0.25;Larry Nance Jr.;PF;6.8;0.3;5.4;0.3;1.8;0.1;0.6;0.2;0.9;0.1
Toronto RaptorKUs;Josh Hart;SG;10.2;0.4;7.0;0.1;3.6;0.3;0.5;0.1;1.4;0.1;Julian Champagnie;SF;9.7;0.2;3.5;0.2;0.6;0.15;0.3;0.2;0.4;0.25;Rudy Gay;PF;5.2;0.3;2.9;0.3;1.0;0.1;0.3;0.2;0.3;0.1
KULadelpHia 76ers;Dru Smith;SG;3.3;0.4;1.5;0.1;1.7;0.3;0.1;0.1;0.6;0.1;Kevin Durant;SF;26.0;0.2;6.4;0.2;3.5;0.15;1.3;0.2;0.3;0.25;Darius Bazley;PF;4.0;0.3;2.3;0.3;0.9;0.1;0.7;0.2;0.4;0.1
WaskUngton Wizards;Dru Smith;SG;2.2;0.4;1.8;0.1;1.0;0.3;0.6;0.1;0.8;0.1;Max Strus;SF;11.5;0.2;3.2;0.2;2.1;0.15;0.2;0.2;0.5;0.25;Draymond Green;PF;8.5;0.3;7.2;0.3;6.8;0.1;0.8;0.2;1.0;0.1;Jam
KULeveland Cavaliers;CJ McCollum;SG;20.9;0.4;4.4;0.1;5.7;0.3;0.5;0.1;0.9;0.1;Ron Harper Jr.;SF;2.2;0.2;0.8;0.2;0.4;0.15;0.1;0.2;0.0;0.25;Chris Silva;PF;2.0;0.3;0.0;0.3;0.0;0.1;0.0;0.2;0.0
Houston RockKuts;Stanley Umuode;SG;2.0;0.4;0.0;0.1;0.0;0.3;1.0;0.1;1.0;0.1;MarJon Beauchamp;SF;5.1;0.2;2.2;0.2;0.7;0.15;0.1;0.2;0.4;0.25;Patrick Williams;PF;10.2;0.3;4.0;0.3;1.2;0.1;0.9;0.2
Atlanta HawKU;Matisse Thybulle;SG;4.1;0.4;2.0;0.1;0.7;0.3;0.5;0.1;1.2;0.1;Michael Porter Jr.;SF;17.4;0.2;5.5;0.2;1.0;0.15;0.5;0.2;0.6;0.25;Bol Bol;PF;9.1;0.3;5.8;0.3;1.0;0.1;1.2;0.2;0.4;0.1
KUhArLotte Hornets;Nickel Alexander-Walker;SG;6.3;0.4;1.6;0.1;2.1;0.3;0.4;0.1;0.7;0.1;Gordon Hayward;SF;14.7;0.2;4.3;0.2;4.1;0.15;0.2;0.2;0.8;0.25;Donian Finney-Smith;PF;8.3;0.3;4.8;0.3;1
New Orleans PelikUns;Seth Curry;SG;9.2;0.4;1.6;0.1;1.6;0.3;0.1;0.1;0.6;0.1;Justin Minaya;SF;4.3;0.2;3.8;0.2;1.0;0.15;1.3;0.2;0.5;0.25;RaiQuan Gray;PF;16.0;0.3;9.0;0.3;7.0;0.1;1.0;0.2;0.0;0.1
KU Antonio Spurs;Donte DiVincenzo;SG;9.4;0.4;4.5;0.1;3.5;0.3;0.1;0.1;1.3;0.1;Ish Wainwright;SF;4.2;0.2;2.3;0.2;0.9;0.15;0.4;0.2;0.6;0.25;Kevin Knox;PF;5.6;0.3;2.6;0.3;0.4;0.1;0.3;0.2;0.3;0.1
Minnesota TimberKUs;Matisse Thybulle;SG;7.4;0.4;3.5;0.1;1.4;0.3;0.8;0.1;1.7;0.1;Kawhi Leonard;SF;23.8;0.2;6.5;0.2;3.9;0.15;0.5;0.2;1.4;0.25;LeBron James;PF;28.9;0.3;8.3;0.3;6.8;0.1;0.6;0.2
Memphis KUrizzlies;Bryn Forbes;SG;3.6;0.4;0.6;0.1;0.7;0.3;0.1;0.1;0.3;0.1;Brandon Ingram;SF;24.7;0.2;5.5;0.2;5.8;0.15;0.4;0.2;0.7;0.25;Kenneth Lofton Jr.;PF;5.0;0.3;2.1;0.3;0.8;0.1;0.1;0.2

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Ex 18: “DraftResults.txt”

Each teams’ players and all their statistics and their weights are recorded in “DraftResults.txt”.

```

1 Match #1 - KULeveland Cavaliers vs. KUharllotte Hornets, Winner: KULeveland Cavaliers
2 Match #2 - Minnesota TimberKUs vs. KULadelpHia 76ers, Winner: KULadelpHia 76ers
3 Match #3 - New Orleans PelikUns vs. Atlanta HawKU, Winner: Atlanta HawKU
4 Match #4 - Toronto RaptorKUs vs. Memphis KUrizzlies, Winner: Toronto RaptorKUs
5 Match #5 - KULeveland Cavaliers vs. KULadelpHia 76ers, Winner: KULadelpHia 76ers
6 Match #6 - Atlanta HawKU vs. Toronto RaptorKUs, Winner: Toronto RaptorKUs
7 Match #7 - KULadelpHia 76ers vs. Toronto RaptorKUs, Winner: KULadelpHia 76ers
8

```

Ex 19: “PlayOffMatches.txt”

```

210 Match #210- Home: Memphis KUrizzlies Away: Houston RockKUs, Winner: Memphis KUrizzlies
211 Match #211- Home: Atlanta HawKU Away: KUharlotte Hornets, Winner: Atlanta HawKU
212 Match #212- Home: KUharlotte Hornets Away: Atlanta HawKU, Winner: KUharlotte Hornets
213 Match #213- Home: Atlanta HawKU Away: New Orleans PeliKUns, Winner: Atlanta HawKU
214 Match #214- Home: New Orleans PeliKUns Away: Atlanta HawKU, Winner: Atlanta HawKU
215 Match #215- Home: Atlanta HawKU Away: KU Antonio Spurs, Winner: Atlanta HawKU
216 Match #216- Home: KU Antonio Spurs Away: Atlanta HawKU, Winner: Atlanta HawKU
217 Match #217- Home: Atlanta HawKU Away: Minnesota TimberKUs, Winner: Minnesota TimberKUs
218 Match #218- Home: Minnesota TimberKUs Away: Atlanta HawKU, Winner: Minnesota TimberKUs
219 Match #219- Home: Atlanta HawKU Away: Memphis KUrizzlies, Winner: Atlanta HawKU
220 Match #220- Home: Memphis KUrizzlies Away: Atlanta HawKU, Winner: Atlanta HawKU
221 Match #221- Home: KUharlotte Hornets Away: New Orleans PeliKUns, Winner: KUharlotte Hornets
222 Match #222- Home: New Orleans PeliKUns Away: KUharlotte Hornets, Winner: KUharlotte Hornets
223 Match #223- Home: KUharlotte Hornets Away: KU Antonio Spurs, Winner: KUharlotte Hornets
224 Match #224- Home: KU Antonio Spurs Away: KUharlotte Hornets, Winner: KUharlotte Hornets
225 Match #225- Home: KUharlotte Hornets Away: Minnesota TimberKUs, Winner: Minnesota TimberKUs
226 Match #226- Home: Minnesota TimberKUs Away: KUharlotte Hornets, Winner: Minnesota TimberKUs
227 Match #227- Home: KUharlotte Hornets Away: Memphis KUrizzlies, Winner: KUharlotte Hornets
228 Match #228- Home: Memphis KUrizzlies Away: KUharlotte Hornets, Winner: KUharlotte Hornets
229 Match #229- Home: New Orleans PeliKUns Away: KU Antonio Spurs, Winner: New Orleans PeliKUns
230 Match #230- Home: KU Antonio Spurs Away: New Orleans PeliKUns, Winner: New Orleans PeliKUns
231 Match #231- Home: New Orleans PeliKUns Away: Minnesota TimberKUs, Winner: Minnesota TimberKUs
232 Match #232- Home: Minnesota TimberKUs Away: New Orleans PeliKUns, Winner: Minnesota TimberKUs
233 Match #233- Home: New Orleans PeliKUns Away: Memphis KUrizzlies, Winner: Memphis KUrizzlies
234 Match #234- Home: Memphis KUrizzlies Away: New Orleans PeliKUns, Winner: Memphis KUrizzlies
235 Match #235- Home: KU Antonio Spurs Away: Minnesota TimberKUs, Winner: Minnesota TimberKUs
236 Match #236- Home: Minnesota TimberKUs Away: KU Antonio Spurs, Winner: Minnesota TimberKUs
237 Match #237- Home: KU Antonio Spurs Away: Memphis KUrizzlies, Winner: Memphis KUrizzlies
238 Match #238- Home: Memphis KUrizzlies Away: KU Antonio Spurs, Winner: Memphis KUrizzlies
239 Match #239- Home: Minnesota TimberKUs Away: Memphis KUrizzlies, Winner: Minnesota TimberKUs
240 Match #240- Home: Memphis KUrizzlies Away: Minnesota TimberKUs, Winner: Minnesota TimberKUs
241 |

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Ex 20: “SeasonMatches.txt”

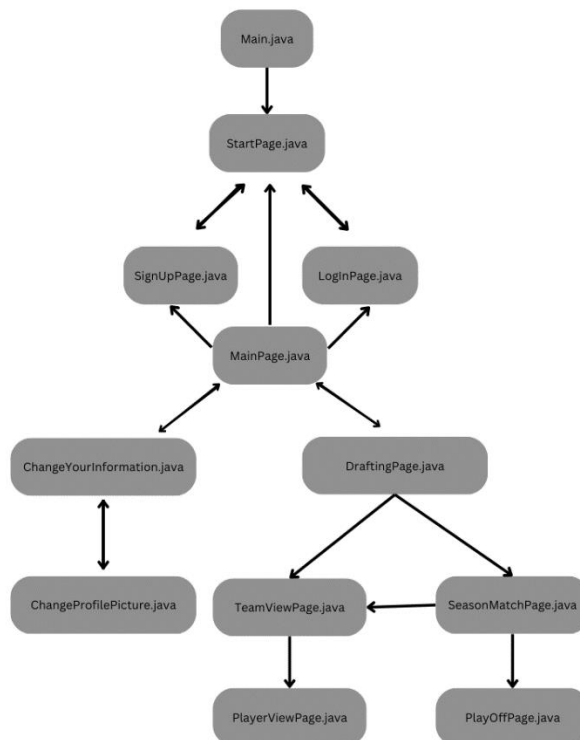
Each played match is recorded, including season and play-off matches.

File “users.txt” is appended when a new user signs up and is overwritten when a user changes his/her information. “DraftResults.txt”, “PlayOffMatches.txt”, “SeasonMatches.txt” are overwritten every time a new season is played.

## Part 2 Design

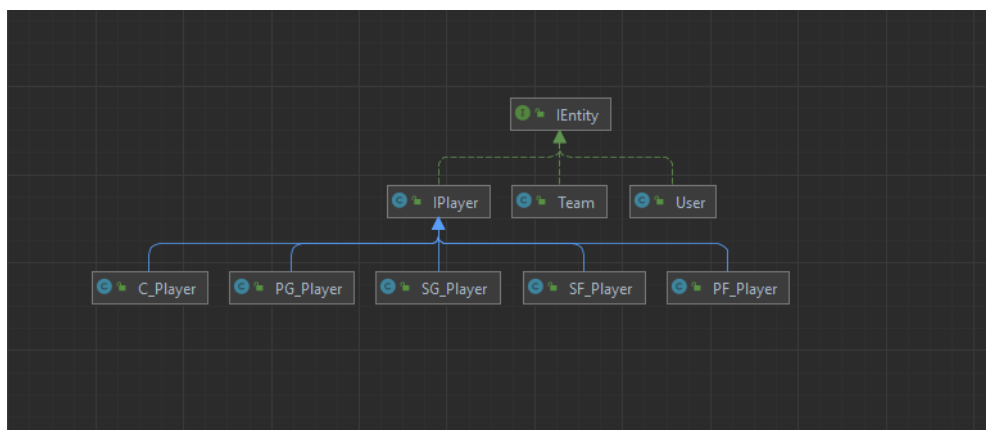
### Project Design Description:

- **Application Flow**



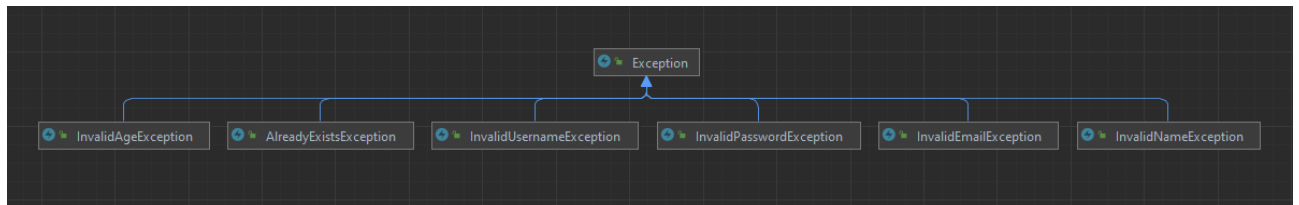
Ex 21: Application Flow between GUI classes

- **Inheritances, type hierarchies, interfaces, abstract classes**

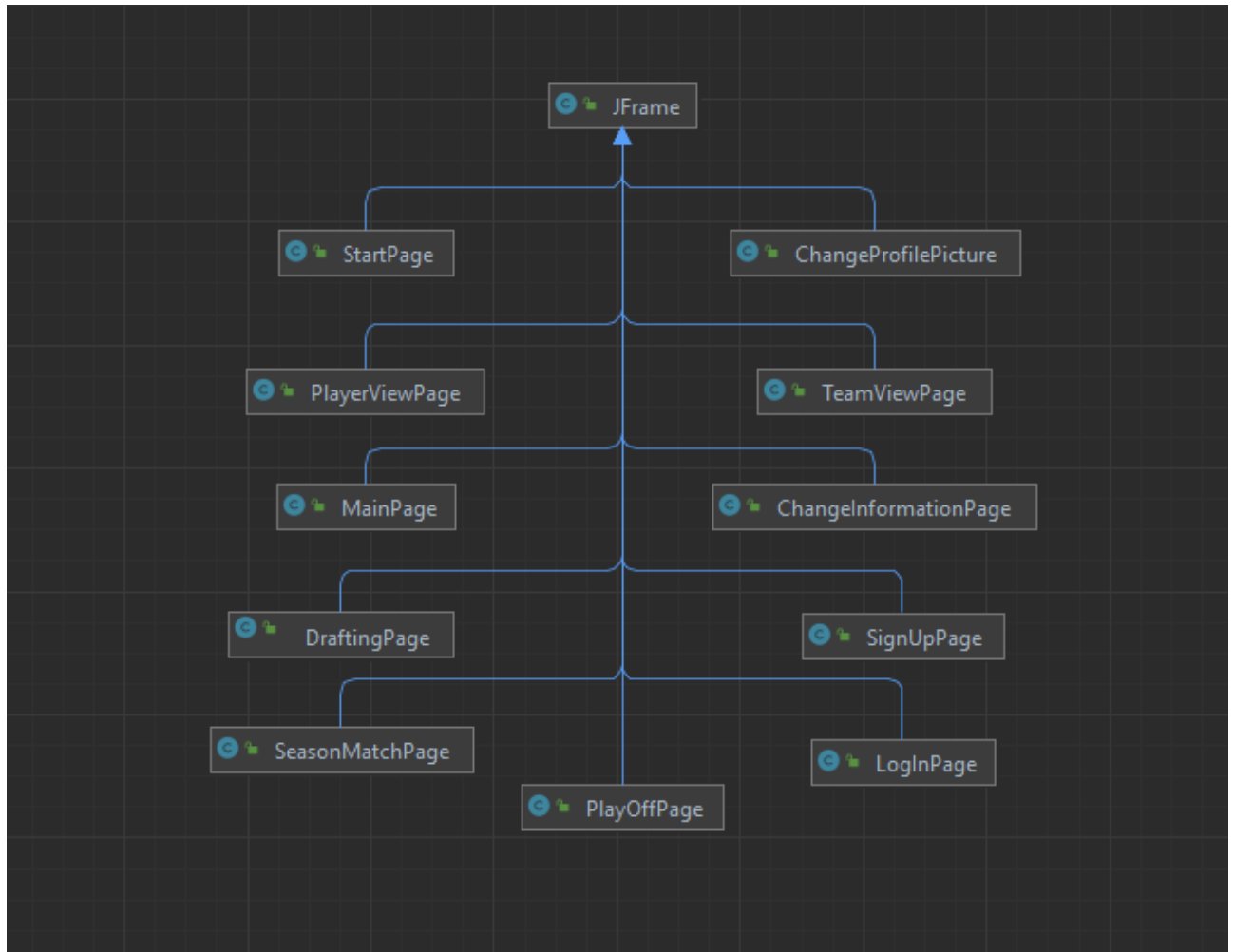


Ex 22: Relationship between entities of project





Ex 23: Exceptions of the project



Ex 24: Frames of the project

- **GUI components.**

- Text fields and password fields are used to take inputs from the user in classes such as LogInPage.java, SignUpPage.java and ChangeInformationPage.java.
- Buttons are used for taking inputs from the user and to direct the user in the application.
- Panels are used to show popup messages.
- Labels are used to show text or pictures.
- Combo boxes are used to show list of players during drafting page.

## References

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1. <https://www.baeldung.com/java-write-to-file>
2. [https://www.w3schools.com/java/java\\_files\\_create.asp](https://www.w3schools.com/java/java_files_create.asp)
3. <https://stackoverflow.com/questions/4585867/transparent-jbutton>
4. <https://cloudinary.com/guides/bulk-image-resize/3-ways-to-resize-images-in-java>
5. <https://www.baeldung.com/java-custom-font>
6. <https://docs.oracle.com/javase/tutorial/uiswing/components/index.html>
7. <https://stackoverflow.com/questions/6644922/jtable-cell-renderer>
8. <https://konfhub.medium.com/how-to-process-csv-files-in-java-with-streams-a69221ae46e6>