University of Pisa
MSc in Computer Engineering
Information Systems

Social Network - Task 1

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Contents

1 Introduction

Social Network is an application in which users can create new discussion topics and express their opinion on content shared by other users.

Each user, to access the platform, needs an account that uniquely identifies him within the system.

When the user launches the application, if it is already registered to the system, he must enter his username and password and access the platform.

If the user is not yet registered, he will fill a form containing the information required by the system like: username, password, name, surname, gender, date of birth, country, city, address and telephone number.

The user can view, in the home page of the application, all the posts created by all the users. The user can create a new post, edit or delete an old post. Only the user who created the post can edit the content or delete it.

The user can search for a post in two different ways: by indicating a keyword contained in the text of the post or by entering the username of the person who created the post.

The user can view also all the comments related to a post. As with posts, the user has at his disposal several functionalities: creating a new comment, editing or deleting a previously published comment. Only the user who created the comment can edit the content or delete it.

The user can view the profile of another user and all the related information.

The user must have the possibility to modify his personal information.

1.1 Functional Requirements

- The system shall allow users to communicate, through messages and comments, with other users registered in the system.
- If the user is already registered then he shall enter his username and password in the respective fields and press the **Login** button, otherwise he shall press the **Registration** button.
- If the user pressed the **Registration** button, the system shall show a form with the following mandatory information: username and password and other optional information: name, surname, gender, date of birth, country, city, address and telephone number.

- When the **Save** button is pressed, the system shall store user information.
- If the user is registered and logged in, the system shall show the posts published by all registered users on the social network. For each post, the user shall see: the username of the post creator, the content of the post, the number of comments and the creation date.
- The user shall create new posts. When **Add Post** button is pressed, the system shall store in the database all the information: postID, personID, message content, timestamp related to its creation.
- The user shall edit or delete the posts he has created. When **Enter** or **Delete** button is pressed, the system shall save all the changes in the database and update all the related information in the interface.
- The user shall search posts by indicating a keyword contained in the text of the post or by entering the username of the user who created the post. When one of the two buttons (**Search by Content** and **Search by User**) is pressed the system shall show the results of the search in the post table.
- If the user press **View all posts**, the system shall show again all the posts in the post table.
- If the user selects a post which contains at least one comment, then the system shall show the related comments in the comments table.
- The user shall create new comments. When the **Add Comment** button is pressed, the system shall store all the information in the database: commentID, postID, personID, content of the comment, timestamp relative to its creation.
- The user shall edit or delete the comments he has created. When **Enter** or **Delete** button is pressed, the system shall save all the changes in the database and update all the related information in the interface.
- The user shall search comments by indicating a keyword contained in the text of the comment or by entering the username of the user who created the comment. When one of the two buttons (**Search by Content** and **Search by User**) is pressed, the system shall show the results of the search in the comment table.
- The user shall be able to search for another user by entering the username in the Search User bar.

- When **Search User** button is pressed, the system shall show the information that the selected user has chosen to enter.
- The user shall be able to change his or her personal information. When button is pressed, the system shall display the personal information previously entered. If the user changes any information and **Save** button is pressed, then the system shall save the changes.
- The user shall be able to exit the application. When the **Logout** button is pressed, the system shall delete all local user data.

1.2 Non-functional Requirements

- **Portability**: the code shall be not platform dependent, since the programmer shall provide a auto-executable project which can work in different environments.
- **Readability**: the code shall be readable, since it shall consist of classes divided by role, each of them providing a specific set of functions.
- **Usability**: the application shall be user-friendly, since it shall consist of a graphical interface and the system shall guide the user to the correct choices through custom error messages and hints.
- **Security**: the system shall store password in a secure way, so they will be encrypted and not shown in clear.

1.3 Actor of the system

After the analysis of the requirements, the main actor identified is:

- **User** : a person who has joined the social network and is able to interact with other users and create new contents.

2 Design

2.1 Use cases

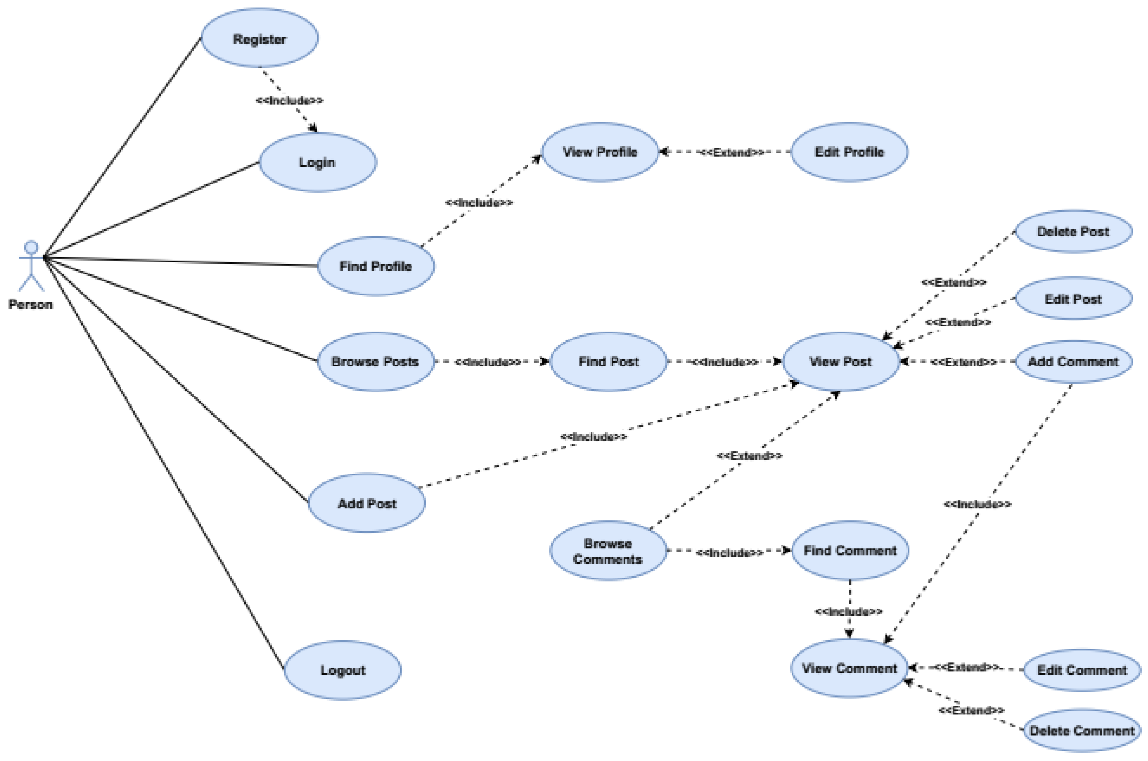


Figure 1: Use cases

This image represents the interaction between the main actor and the application. In particular, only the owner is allowed to modify his own profile and can also view other user profiles.
It is mandatory to login into the system to perform any kind of actions except for the registration.

2.2 Class Diagram

The main data structures identified within the system are the following:

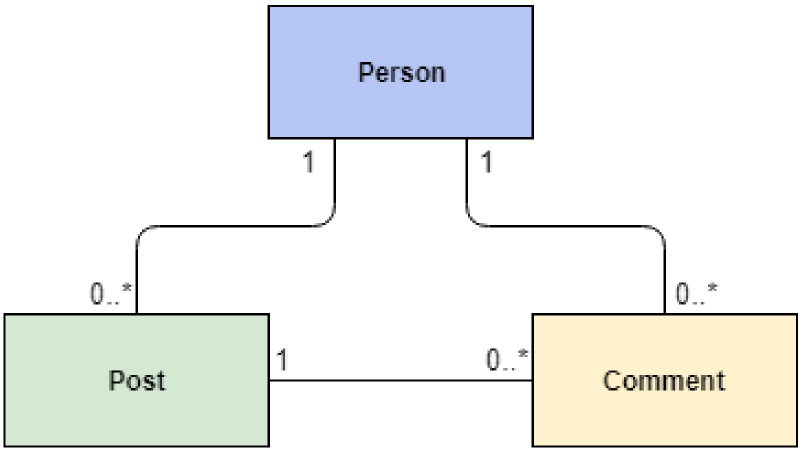


Figure 2: Class Diagram

- A **Person** can write zero or more Posts and zero or more Comments related to a Post.
- A **Post** is written by only one Person and can have zero or more Comments related to it.
- A **Comment** is written by only one Person and is related to only one Post.

2.3 Design Pattern

The design pattern chosen is the **Model-View-Controller** pattern.

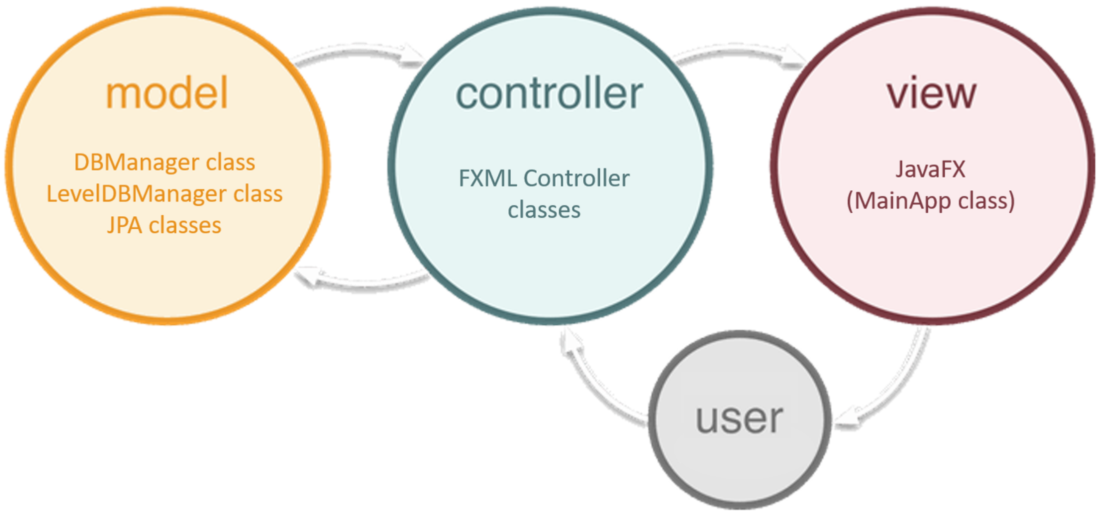


Figure 3: Model View Controller

This pattern divides the application in three part and each one has a well defined purpose.

- **Model**: is the one that has to manage the data.
- **View**: is the one that has to communicate with the user.
- **Controller**: is the one that has to coordinate interactions between view and model.

This pattern is perfectly suitable for the application proposed.

3 Implementation

3.1 Java code structure

3.1.1 UML diagram

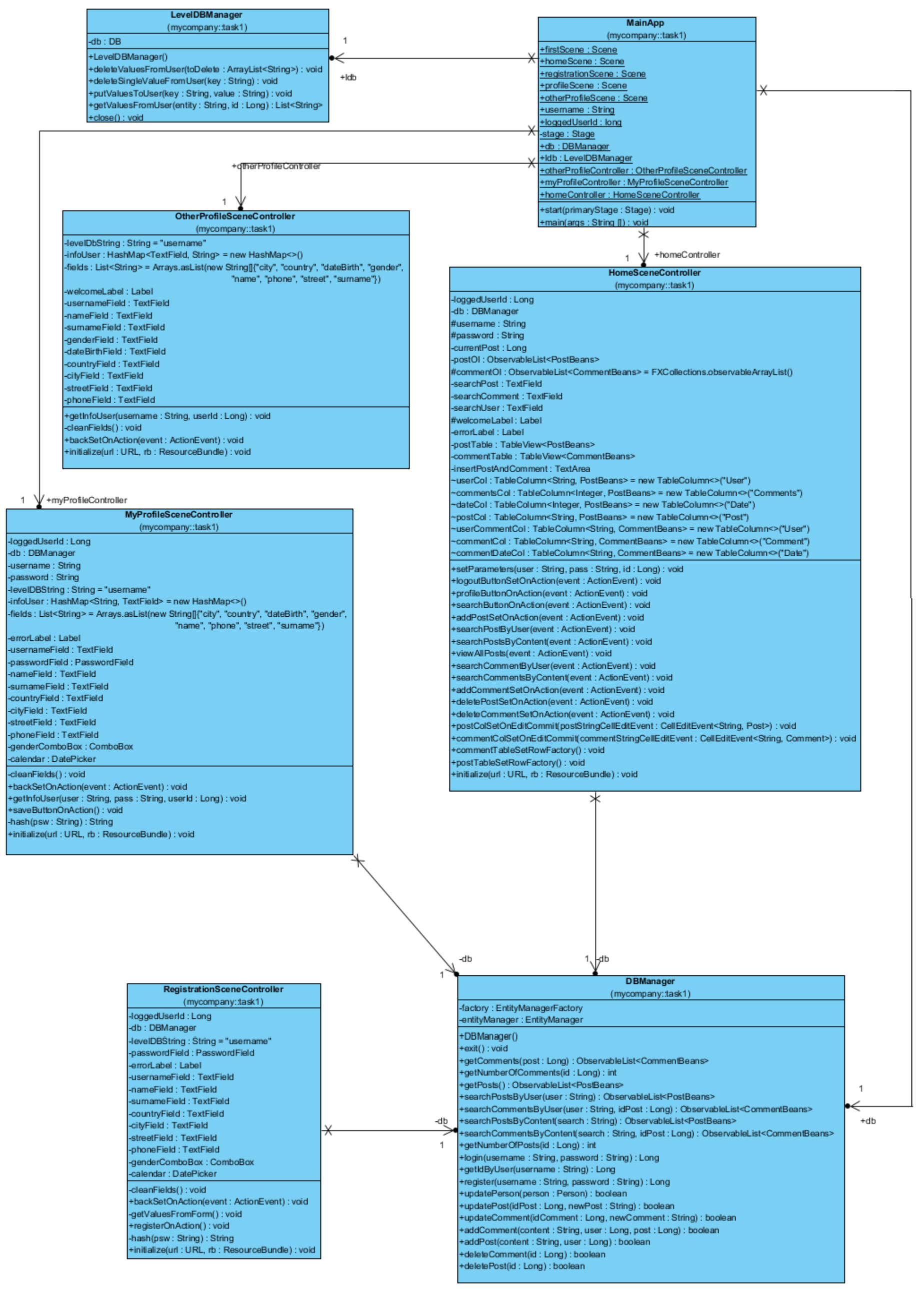

LevelDBManager
(mycompany::task1)
-db : DB
+LevelDBManager()
+deleteValuesFromUser(toDelete : ArrayList<String>) : void
+deleteSingleValueFromUser(key : String) : void
+putValuesToUser(key : String, value : String) : void
+getValuesFromUser(entity : String, id : Long) : List<String>
+close() : void
1
+ldb
MainApp
(mycompany::task1)
+firstScene : Scene
+homeScene : Scene
+registrationScene : Scene
+profileScene : Scene
+otherProfileScene : Scene
+username : String
+loggedUserId : long
-stage : Stage
+db : DBManager
+ldb : LevelDBManager
+otherProfileController : OtherProfileSceneController
+myProfileController : MyProfileSceneController
+homeController : HomeSceneController
+start(primaryStage : Stage) : void
+main(args : String []) : void
+otherProfileController
1
OtherProfileSceneController
(mycompany::task1)
-levelDbString : String = "username"
-infoUser : HashMap<TextField, String> = new HashMap<>()
-fields : List<String> = Arrays.asList(new String[]{"city", "country", "dateBirth", "gender", "name", "phone", "street", "surname"})
-welcomeLabel : Label
-usernameField : TextField
-nameField : TextField
-surnameField : TextField
-genderField : TextField
-dateBirthField : TextField
-countryField : TextField
-cityField : TextField
-streetField : TextField
-phoneField : TextField
+getInfoUser(username : String, userId : Long) : void
-cleanFields() : void
+backSetOnAction(event : ActionEvent) : void
+initialize(url : URL, rb : ResourceBundle) : void
1
+homeController
HomeSceneController
(mycompany::task1)
-loggedUserId : Long
-db : DBManager
#username : String
#password : String
-currentPost : Long
-postOl : ObservableList<PostBeans>
#commentOl : ObservableList<CommentBeans> = FXCollections.observableArrayList()
-searchPost : TextField
-searchComment : TextField
-searchUser : TextField
#welcomeLabel : Label
-errorLabel : Label
-postTable : TableView<PostBeans>
-commentTable : TableView<CommentBeans>
-insertPostAndComment : TextArea
~userCol : TableColumn<String, PostBeans> = new TableColumn<>("User")
~commentsCol : TableColumn<Integer, PostBeans> = new TableColumn<>("Comments")
~dateCol : TableColumn<Integer, PostBeans> = new TableColumn<>("Date")
~postCol : TableColumn<String, PostBeans> = new TableColumn<>("Post")
~userCommentCol : TableColumn<String, CommentBeans> = new TableColumn<>("User")
~commentCol : TableColumn<String, CommentBeans> = new TableColumn<>("Comment")
~commentDateCol : TableColumn<String, CommentBeans> = new TableColumn<>("Date")
+setParameters(user : String, pass : String, id : Long) : void
+logoutButtonSetOnAction(event : ActionEvent) : void
+profileButtonOnAction(event : ActionEvent) : void
+searchButtonOnAction(event : ActionEvent) : void
+addPostSetOnAction(event : ActionEvent) : void
+searchPostByUser(event : ActionEvent) : void
+searchPostsByContent(event : ActionEvent) : void
+viewAllPosts(event : ActionEvent) : void
+searchCommentByUser(event : ActionEvent) : void
+searchCommentsByContent(event : ActionEvent) : void
+addCommentSetOnAction(event : ActionEvent) : void
+deletePostSetOnAction(event : ActionEvent) : void
+deleteCommentSetOnAction(event : ActionEvent) : void
+postColSetOnEditCommit(postStringCellEditEvent : CellEditEvent<String, Post>) : void
+commentColSetOnEditCommit(commentStringCellEditEvent : CellEditEvent<String, Comment>) : void
+commentTableSetRowFactory() : void
+postTableSetRowFactory() : void
+initialize(url : URL, rb : ResourceBundle) : void
1
+myProfileController
MyProfileSceneController
(mycompany::task1)
-loggedUserId : Long
-db : DBManager
-username : String
-password : String
-levelDBString : String = "username"
-infoUser : HashMap<String, TextField> = new HashMap<>()
-fields : List<String> = Arrays.asList(new String[]{"city", "country", "dateBirth", "gender", "name", "phone", "street", "surname"})
-errorLabel : Label
-usernameField : TextField
-passwordField : PasswordField
-nameField : TextField
-surnameField : TextField
-countryField : TextField
-cityField : TextField
-streetField : TextField
-phoneField : TextField
-genderComboBox : ComboBox
-calendar : DatePicker
-cleanFields() : void
+backSetOnAction(event : ActionEvent) : void
+getInfoUser(user : String, pass : String, userId : Long) : void
+saveButtonOnAction() : void
-hash(psw : String) : String
+initialize(url : URL, rb : ResourceBundle) : void
-db
1
1
-db
RegistrationSceneController
(mycompany::task1)
-loggedUserId : Long
-db : DBManager
-levelDBString : String = "username"
-passwordField : PasswordField
-errorLabel : Label
-usernameField : TextField
-nameField : TextField
-surnameField : TextField
-countryField : TextField
-cityField : TextField
-streetField : TextField
-phoneField : TextField
-genderComboBox : ComboBox
-calendar : DatePicker
-cleanFields() : void
+backSetOnAction(event : ActionEvent) : void
-getValuesFromForm() : void
+registerOnAction() : void
-hash(psw : String) : String
+initialize(url : URL, rb : ResourceBundle) : void
-db
1
DBManager
(mycompany::task1)
-factory : EntityManagerFactory
-entityManager : EntityManager
+DBManager()
+exit() : void
+getComments(post : Long) : ObservableList<CommentBeans>
+getNumberOfComments(id : Long) : int
+getPosts() : ObservableList<PostBeans>
+searchPostsByUser(user : String) : ObservableList<PostBeans>
+searchCommentsByUser(user : String, idPost : Long) : ObservableList<CommentBeans>
+searchPostsByContent(search : String) : ObservableList<PostBeans>
+searchCommentsByContent(search : String, idPost : Long) : ObservableList<CommentBeans>
+getNumberOfPosts(id : Long) : int
+login(username : String, password : String) : Long
+getIdByUser(username : String) : Long
+register(username : String, password : String) : Long
+updatePerson(person : Person) : boolean
+updatePost(idPost : Long, newPost : String) : boolean
+updateComment(idComment : Long, newComment : String) : boolean
+addComment(content : String, user : Long, post : Long) : boolean
+addPost(content : String, user : Long) : boolean
+deleteComment(id : Long) : boolean
+deletePost(id : Long) : boolean
1
+db

Figure 4: UML part 1

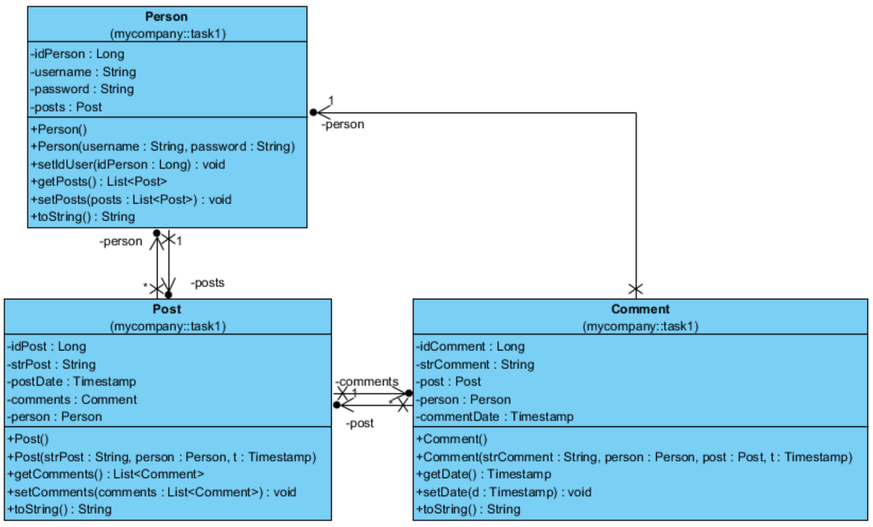


Figure 5: UML part 2

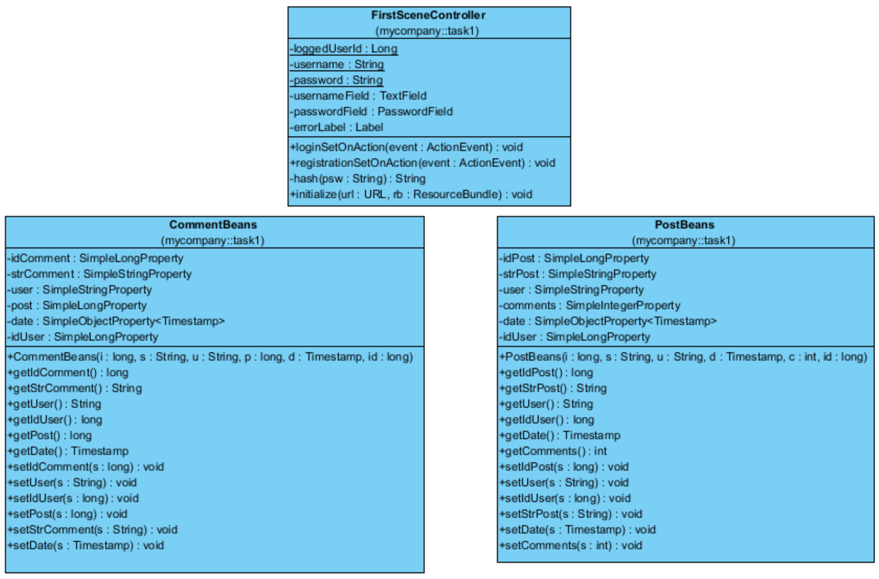

FirstSceneController
(mycompany::task1)
-loggedUserId : Long
-username : String
-password : String
-usernameField : TextField
-passwordField : PasswordField
-errorLabel : Label
+loginSetOnAction(event : ActionEvent) : void
+registrationSetOnAction(event : ActionEvent) : void
-hash(psw : String) : String
+initialize(url : URL, rb : ResourceBundle) : void
CommentBeans
(mycompany::task1)
-idComment : SimpleLongProperty
-strComment : SimpleStringProperty
-user : SimpleStringProperty
-post : SimpleLongProperty
-date : SimpleObjectProperty<Timestamp>
-idUser : SimpleLongProperty
+CommentBeans(i : long, s : String, u : String, p : long, d : Timestamp, id : long)
+getIdComment() : long
+getStrComment() : String
+getUser() : String
+getIdUser() : long
+getPost() : long
+getDate() : Timestamp
+setIdComment(s : long) : void
+setUser(s : String) : void
+setIdUser(s : long) : void
+setPost(s : long) : void
+setStrComment(s : String) : void
+setDate(s : Timestamp) : void
PostBeans
(mycompany::task1)
-idPost : SimpleLongProperty
-strPost : SimpleStringProperty
-user : SimpleStringProperty
-comments : SimpleIntegerProperty
-date : SimpleObjectProperty<Timestamp>
-idUser : SimpleLongProperty
+PostBeans(i : long, s : String, u : String, d : Timestamp, c : int, id : long)
+getIdPost() : long
+getStrPost() : String
+getUser() : String
+getIdUser() : long
+getDate() : Timestamp
+getComments() : int
+setIdPost(s : long) : void
+setUser(s : String) : void
+setIdUser(s : long) : void
+setStrPost(s : String) : void
+setDate(s : Timestamp) : void
+setComments(s : int) : void

Figure 6: UML part 3

- **LevelDBManager class:** The purpose of this class is to handle the connection with the Key-Value Database (LevelDB) used to store the optional profile fields of a user. It offers functions for insert and update,delete and find data.

- **DBManager class:** The purpose of this class is to handle the connection with the MySQL Database. It offers functions for insert and update,delete and find data, such as comments and posts. It is used for any operation that involves a database query.

- **FirstSceneController, HomeSceneController, MyProfileSceneController, OtherProfileSceneController classes:** Those classes handle any event related to FXML interface files.
- **CommentBeans and PostBeans classes:** are used only to visualize data coming from the relational database in the tables.
- **MainApp class:** contains the main method used to run the application.

3.1.2 Person JPA entity

```
@Entity
@Table(name = "Person")

public class Person {

    @Column(name="idPerson")
    @Id
    @GeneratedValue(strategy=GenerationType.IDENTITY)
    private Long idPerson;

    @Column(name="Username", length=50, nullable=false, unique=true)
    private String username;

    @Column(name="Password", length=64, nullable=false, unique=false)
    private String password;

    @OneToMany(mappedBy = "person", cascade = CascadeType.ALL)
    private List<Post> posts;


    //get and set methods for each field of the class

}
```

The entity has one field for each corresponding column of the database and it has also a list of Post objects that is used to model the one-to-many relation between Person and Post tables. The attribute *mappedBy* specifies the name of the person

field present in Post class, that is the owner of the relation.
There is also a one-to-many relation between Person and Comment, but it is not specified because we do not need all the comments written by a specific person.

3.1.3 Post JPA entity

```
@Entity
@Table(name="Post")

public class Post {

    @Column(name="IdPost")
    @Id
    @GeneratedValue(strategy = GenerationType.IDENTITY)
    private Long idPost;

    @Column(name="strPost", length=50, nullable=false, unique=false)
    private String strPost;

    @Column(name="postDate")
    private Timestamp postDate;

    @OneToMany(mappedBy = "post", cascade = CascadeType.ALL)
    private List<Comment> comments;

    @ManyToOne
    @JoinColumn(name="person", nullable=false, unique=false)
    private Person person;


    //get and set methods for each field of the class

}
```

The entity has one field for each corresponding column of the database and it has also a list of Comment objects that is used to model the one-to-many relation between Post and Comment tables. The attribute *mappedBy* specifies the name of the post field present in Comment class, that is the owner of the relation.
The entity has also an additional Person field used to model the many-to-one relation between Post and Person tables. This field has the *@JoinColumn* annotation

that specifies the database column used as foreign key.

3.1.4 Comment JPA entity

```
@Entity
@Table(name = "Comment")

public class Comment {

    @Column(name="idComment")
    @Id
    @GeneratedValue(strategy=GenerationType.IDENTITY)
    private Long idComment;

    @Column(name="strComment", length=50, nullable=false,
     ↪  unique=false)
    private String strComment;

    @ManyToOne
    @JoinColumn(name="post", nullable=false, unique=false)
    private Post post;

    @ManyToOne
    @JoinColumn(name="person", nullable=false, unique=false)
    private Person person;

    @Column(name="commentDate", unique=false)
    private Timestamp commentDate;


    //get and set methods for each field of the class

}
```

The entity has one field for each corresponding column of the database and it has also a Post object that is used to model the many-to-one relation between Comment and Post tables and a Person object used to model the many-to-one relation between Comment and Person tables.
Those two last fields have *@JoinColumn* annotation that specifies the database column used as foreign key.

3.2 Database structure

The database is composed by the following tables:

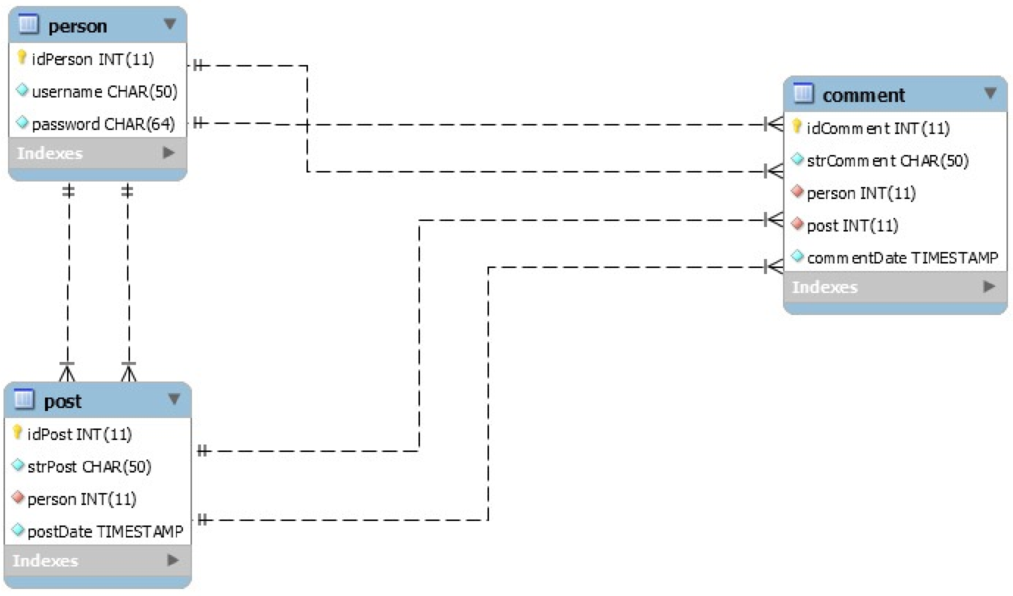


Figure 7: Database structure

3.2.1 Person Table

The Person Table has three fields:

- **IdPerson**: It will represent the primary key of the table and will contain the unique Id associated to a single person.
- **Username**: It will contain the user nickname.
- **Password**: It will contain the user password.

All these fields must be not null.

3.2.2 Post Table

The Post Table has four fields:

- **IdPost**: It will represent the primary key of the table and will contain the unique Id associated to a single post.
- **strPost**: It will contain the post content represented as a string. The maximum post length is 50 characters.

- **Person**: It will contain the person Id of the person who published the post.
- **Date**: It will contain the time in timestamp format when the user published the post.

All these fields must be not null.

3.2.3 Comment Table

The Comment Table has five fields:

- **IdComment**: It will represent the primary key of the table and will contain the unique Id associated to a single comment.
- **strComment**: It will contain the comment content represented as a string. The maximum comment length is 50 characters.
- **Person**: It will contain the person Id of the person who published the comment.
- **Post**: It will contain the post Id the comment is associated with.
- **Date**: It will contain the time in timestamp format when the user published the comment.

All these fields must be not null.

4 Manual of usage

4.1 Login

If the user is already registered to the system, he must enter:

- Username
- Password

and press the **Login** button. If username and password are correct, the user will be logged into the system.

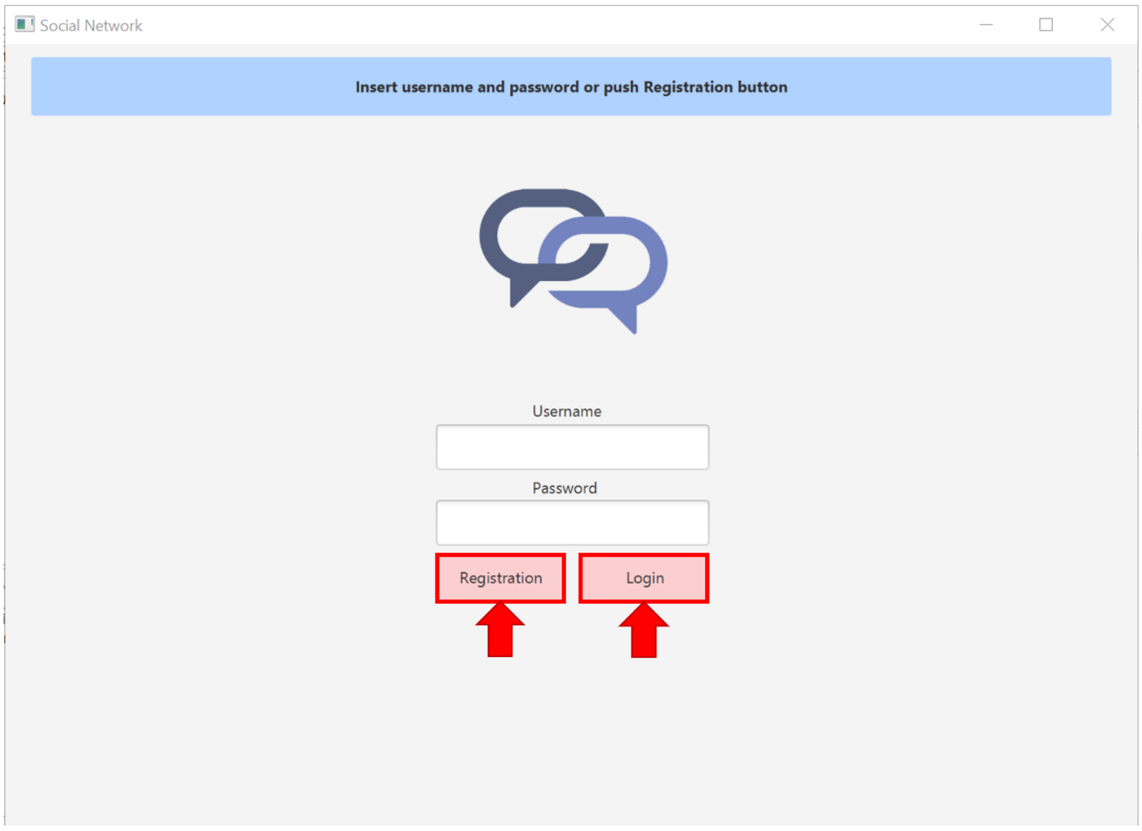


Figure 8: Login phase

If the user is not yet registered, he has to press the **Registration** button.

4.2 Registration

The user must enter the two fields relating to the username and password. In addition, he can enter other optional information such as: name, surname, gender, date of birth, country, city, address and telephone number. At the end, he must press the **Register** button through which he will access the home page.

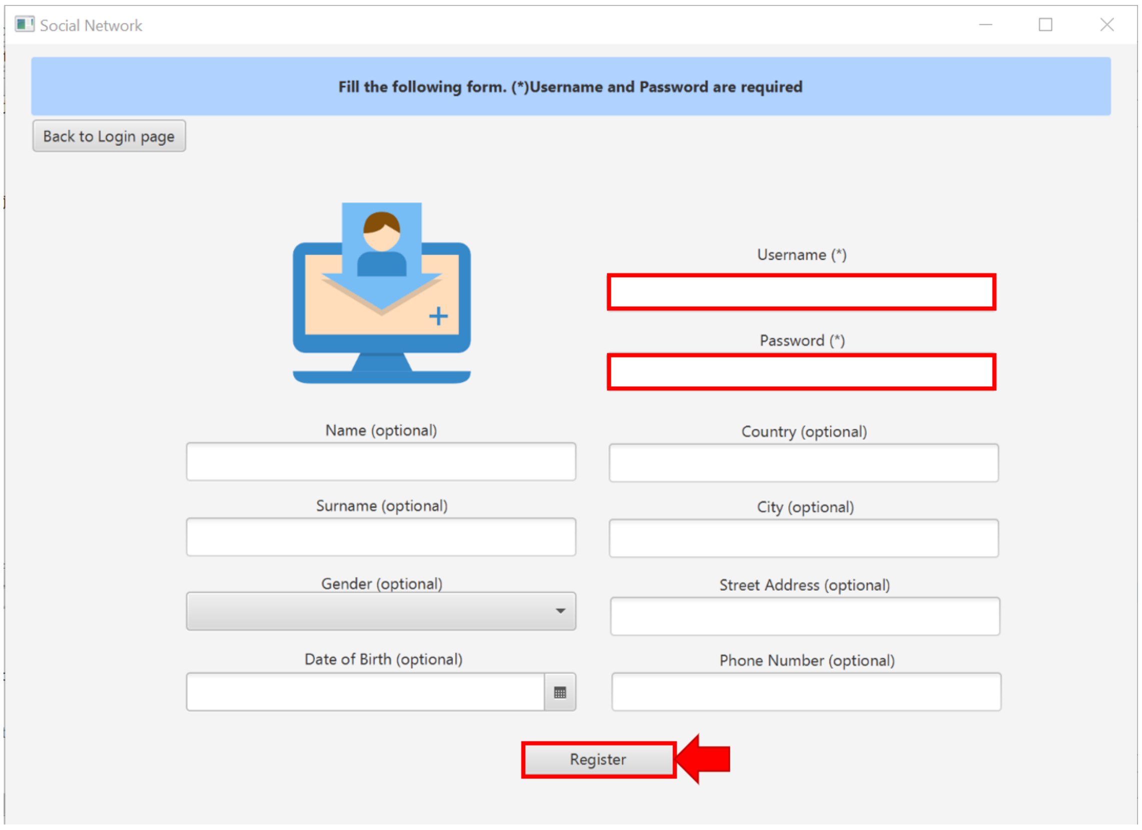
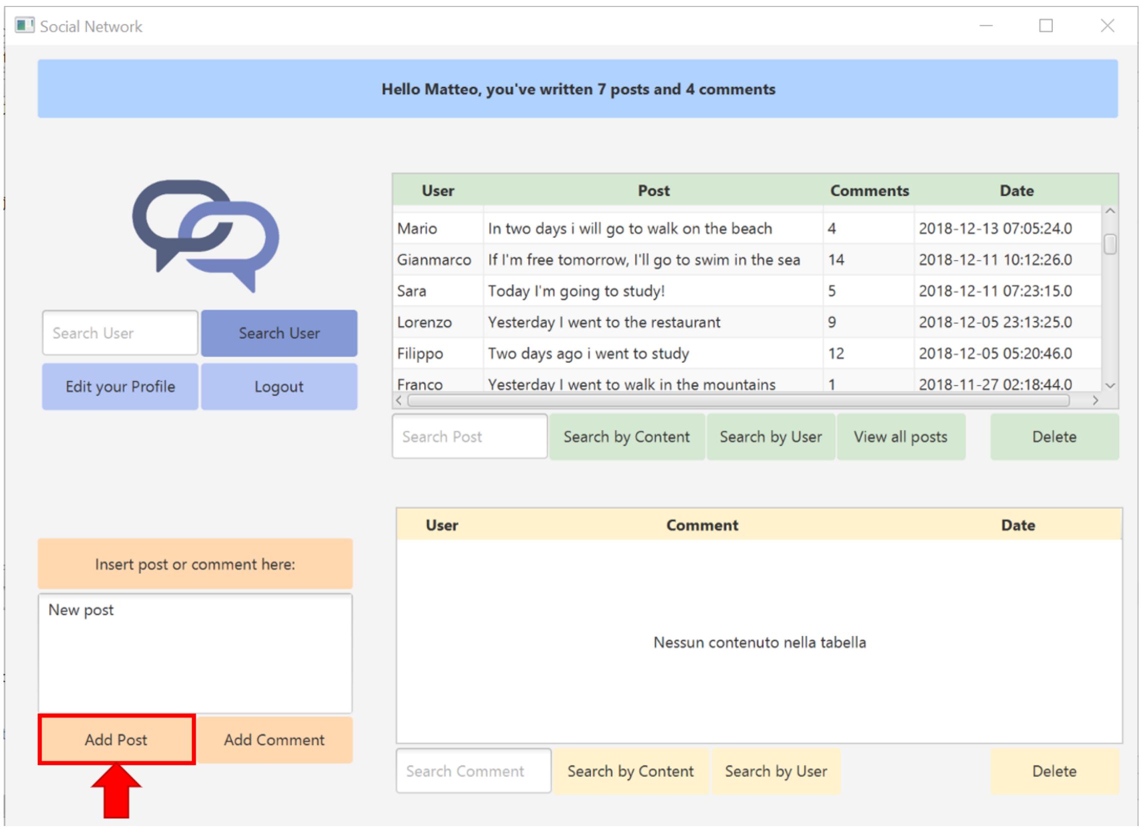


Figure 9: Registration phase

4.3 Add post

The user can write a new post by inserting the text into the box highlighted in the figure. Each post has a limit of 50 characters. After writing the content, the user can press the **Add Post** button.



Hello Matteo, you've written 7 posts and 4 comments

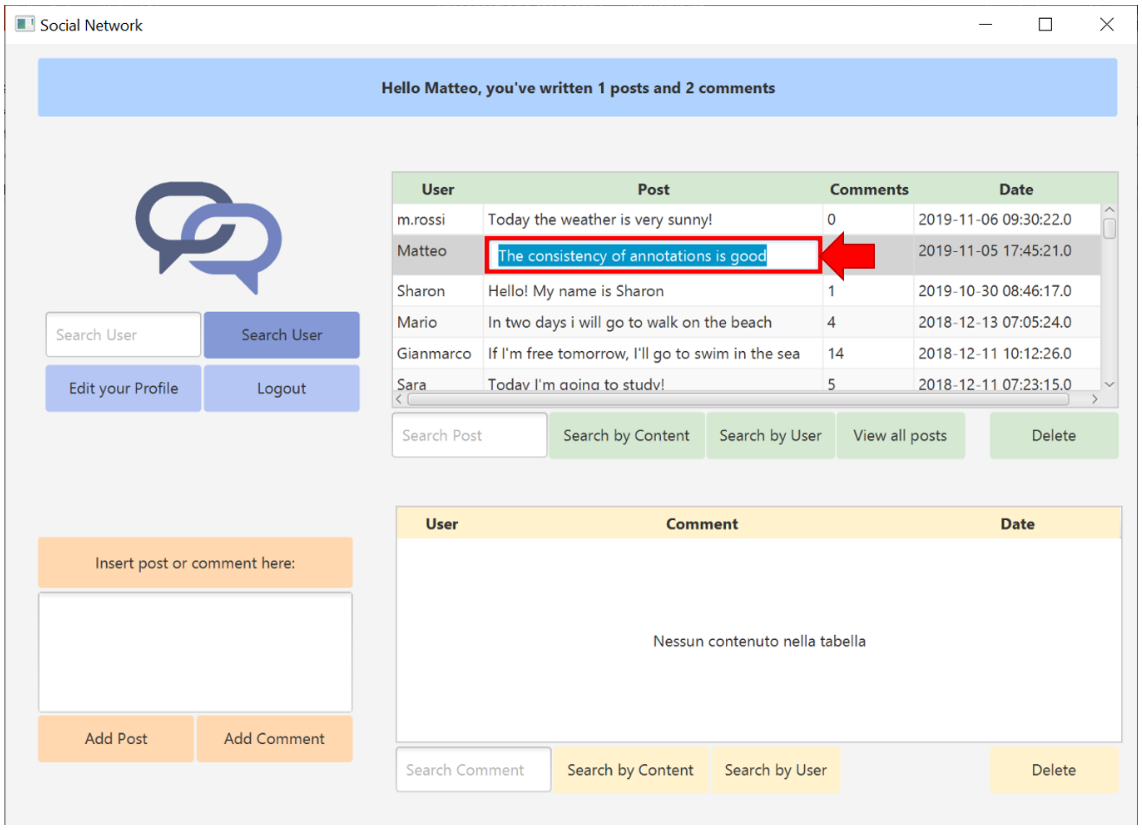
User	Post	Comments	Date
Mario	In two days i will go to walk on the beach	4	2018-12-13 07:05:24.0
Gianmarco	If I'm free tomorrow, I'll go to swim in the sea	14	2018-12-11 10:12:26.0
Sara	Today I'm going to study!	5	2018-12-11 07:23:15.0
Lorenzo	Yesterday I went to the restaurant	9	2018-12-05 23:13:25.0
Filippo	Two days ago i went to study	12	2018-12-05 05:20:46.0
Franco	Yesterday I went to walk in the mountains	1	2018-11-27 02:18:44.0

User	Comment	Date
	Nessun contenuto nella tabella	

Figure 10: Add post

4.4 Modify post

The user can only modify the content of the posts created by him. This is possible by selecting the post to be edited and clicking on it to make the content editable. The edit is saved by pressing Enter.



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Hello Matteo, you've written 1 posts and 2 comments

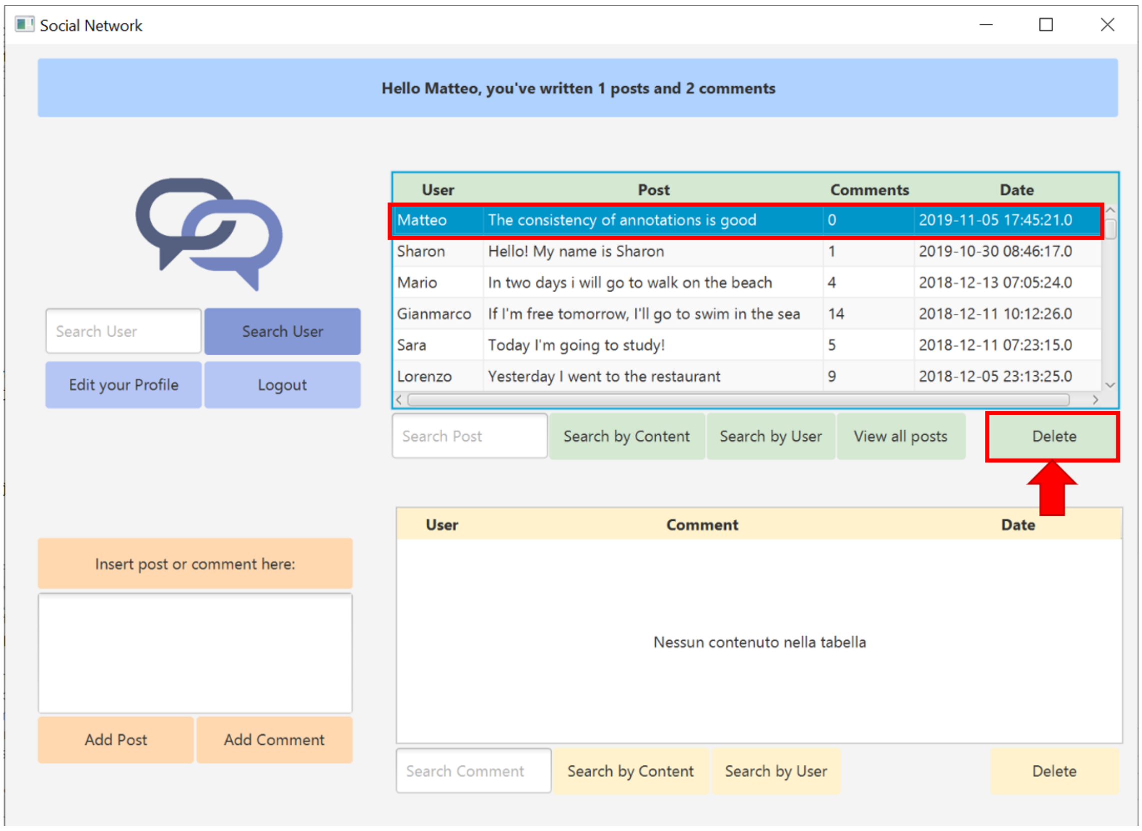
User	Post	Comments	Date
m.rossi	Today the weather is very sunny!	0	2019-11-06 09:30:22.0
Matteo	The consistency of annotations is good		2019-11-05 17:45:21.0
Sharon	Hello! My name is Sharon	1	2019-10-30 08:46:17.0
Mario	In two days i will go to walk on the beach	4	2018-12-13 07:05:24.0
Gianmarco	If I'm free tomorrow, I'll go to swim in the sea	14	2018-12-11 10:12:26.0
Sara	Today I'm going to study!	5	2018-12-11 07:23:15.0

User	Comment	Date
	Nessun contenuto nella tabella	

Figure 11: Modify post

4.5 Delete post

To delete a post, the user must select it and press the Delete button below the table. Also in this case the user cannot delete posts created by other users but only those created by him.



User	Post	Comments	Date
Matteo	The consistency of annotations is good	0	2019-11-05 17:45:21.0
Sharon	Hello! My name is Sharon	1	2019-10-30 08:46:17.0
Mario	In two days i will go to walk on the beach	4	2018-12-13 07:05:24.0
Gianmarco	If I'm free tomorrow, I'll go to swim in the sea	14	2018-12-11 10:12:26.0
Sara	Today I'm going to study!	5	2018-12-11 07:23:15.0
Lorenzo	Yesterday I went to the restaurant	9	2018-12-05 23:13:25.0

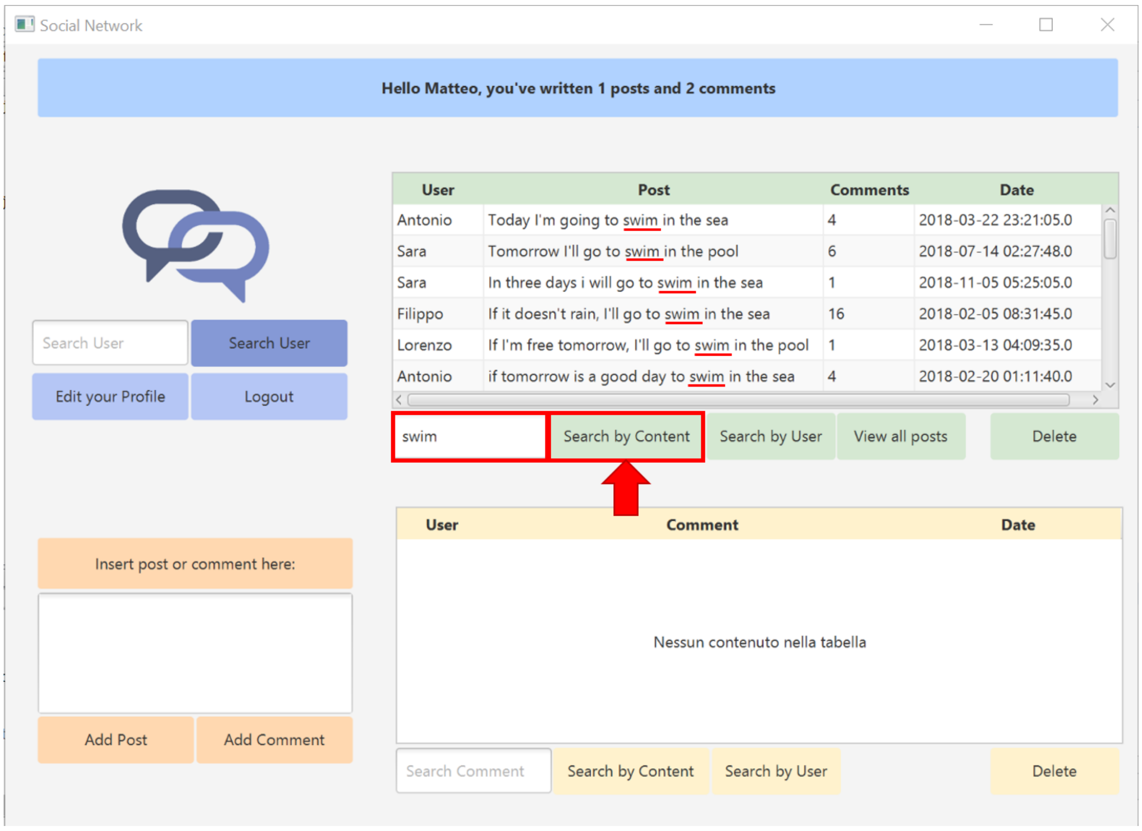
User	Comment	Date

Nessun contenuto nella tabella

Figure 12: Delete post

4.6 Search post content

The user can search for a post by indicating a word inside the content of the post. The user must enter the word to be searched into the Search post bar and then press the **Search by Content** button.



User	Post	Comments	Date
Antonio	Today I'm going to swim in the sea	4	2018-03-22 23:21:05.0
Sara	Tomorrow I'll go to swim in the pool	6	2018-07-14 02:27:48.0
Sara	In three days i will go to swim in the sea	1	2018-11-05 05:25:05.0
Filippo	If it doesn't rain, I'll go to swim in the sea	16	2018-02-05 08:31:45.0
Lorenzo	If I'm free tomorrow, I'll go to swim in the pool	1	2018-03-13 04:09:35.0
Antonio	if tomorrow is a good day to swim in the sea	4	2018-02-20 01:11:40.0

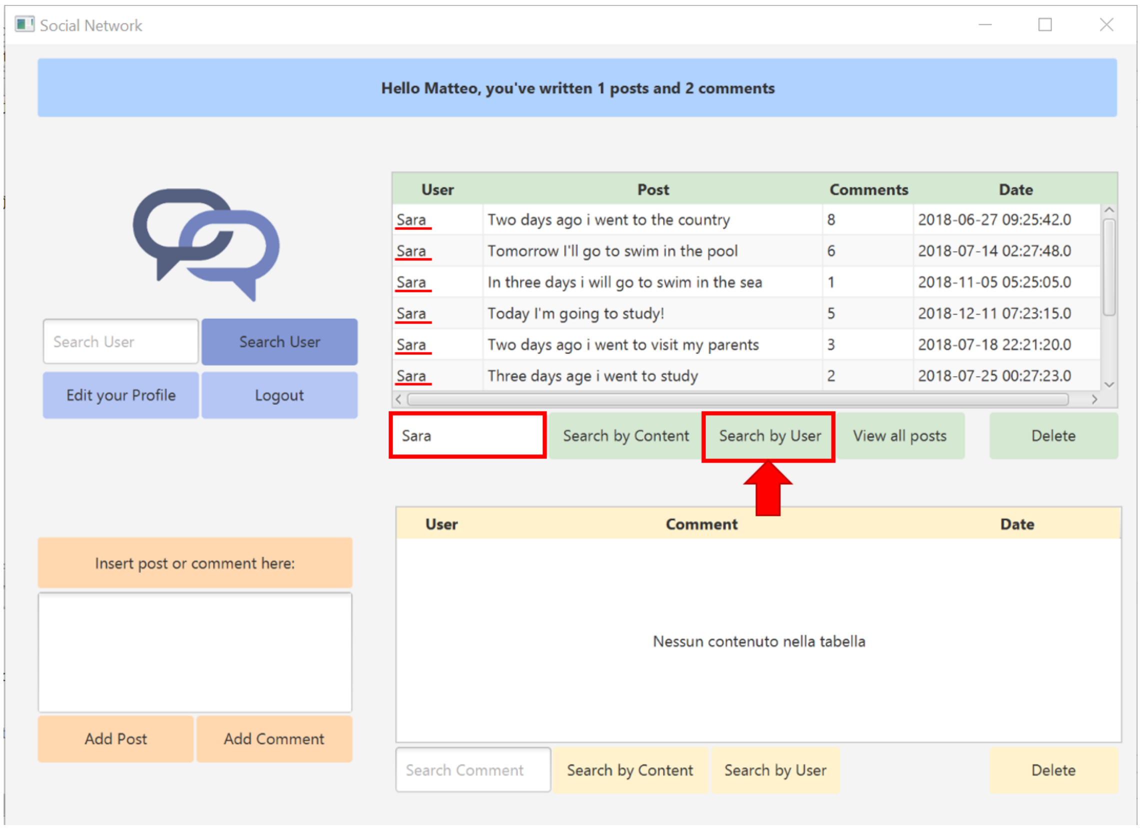
User	Comment	Date

Nessun contenuto nella tabella

Figure 13: Search post content

4.7 Search user posts

The user can search for all posts written by a given user by indicating the username of the creator of the post. The user must enter the username into the Search post bar and then press the **Search by User** button.



User	Post	Comments	Date
Sara	Two days ago i went to the country	8	2018-06-27 09:25:42.0
Sara	Tomorrow I'll go to swim in the pool	6	2018-07-14 02:27:48.0
Sara	In three days i will go to swim in the sea	1	2018-11-05 05:25:05.0
Sara	Today I'm going to study!	5	2018-12-11 07:23:15.0
Sara	Two days ago i went to visit my parents	3	2018-07-18 22:21:20.0
Sara	Three days age i went to study	2	2018-07-25 00:27:23.0

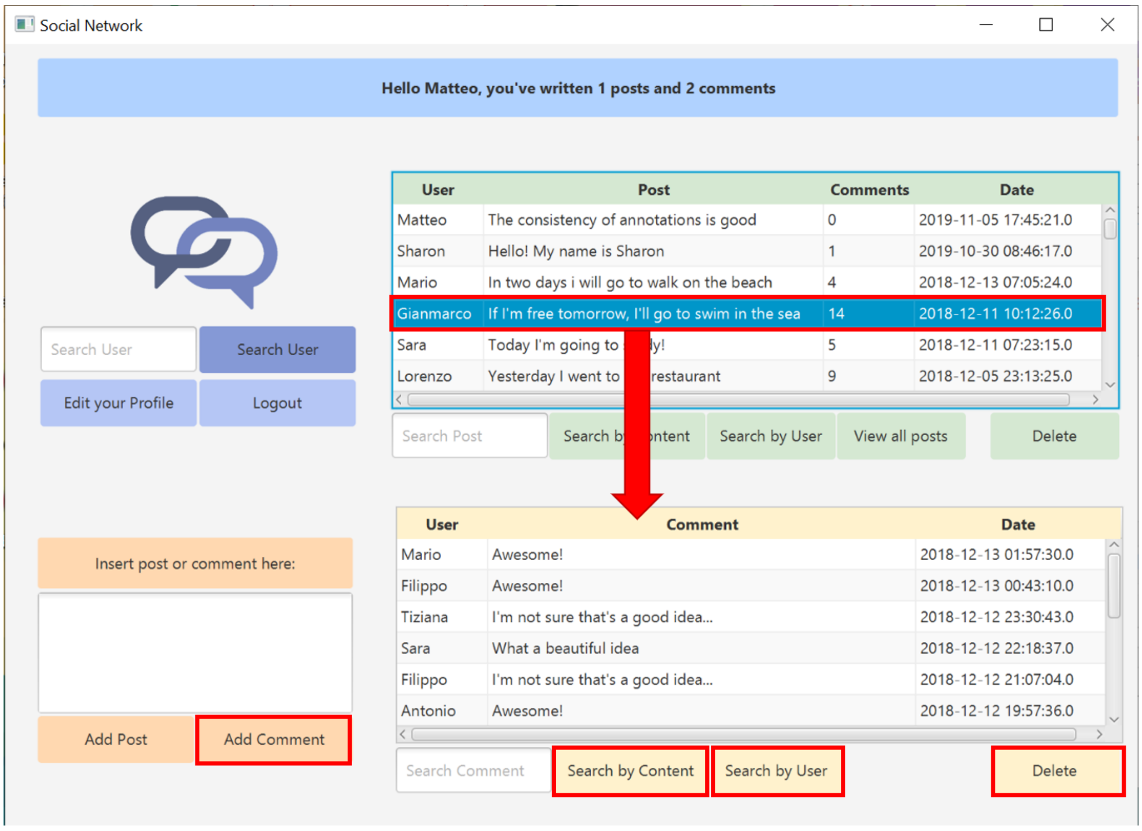
User	Comment	Date

Nessun contenuto nella tabella

Figure 14: Search user's posts

4.8 Comment functionalities

To view all comments related to a post, the user must click on the corresponding post. The comments will be displayed within the comment table.



Hello Matteo, you've written 1 posts and 2 comments

User	Post	Comments	Date
Matteo	The consistency of annotations is good	0	2019-11-05 17:45:21.0
Sharon	Hello! My name is Sharon	1	2019-10-30 08:46:17.0
Mario	In two days i will go to walk on the beach	4	2018-12-13 07:05:24.0
Gianmarco	If I'm free tomorrow, I'll go to swim in the sea	14	2018-12-11 10:12:26.0
Sara	Today I'm going to [illegible]y!	5	2018-12-11 07:23:15.0
Lorenzo	Yesterday I went to [illegible] restaurant	9	2018-12-05 23:13:25.0

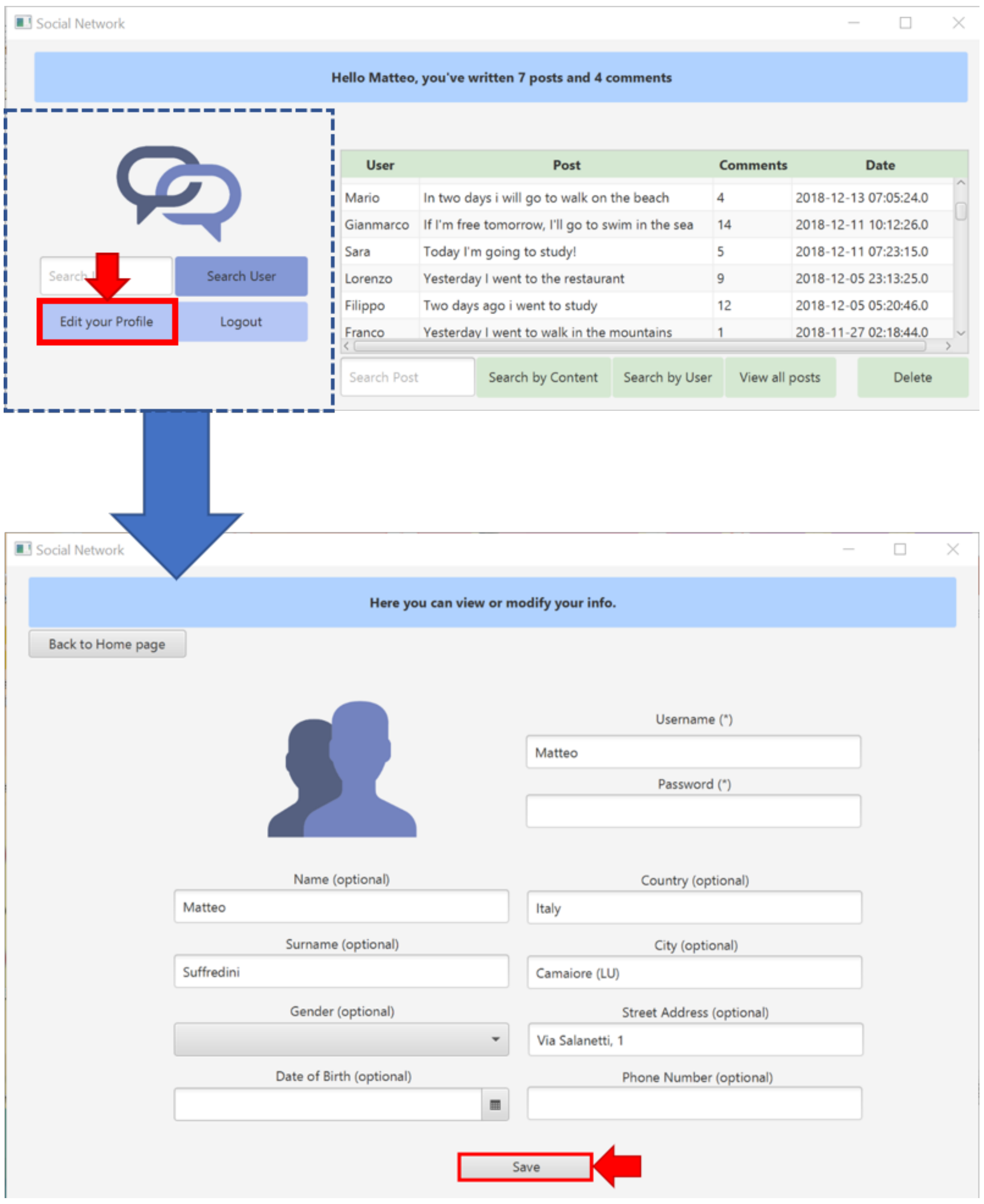
User	Comment	Date
Mario	Awesome!	2018-12-13 01:57:30.0
Filippo	Awesome!	2018-12-13 00:43:10.0
Tiziana	I'm not sure that's a good idea...	2018-12-12 23:30:43.0
Sara	What a beautiful idea	2018-12-12 22:18:37.0
Filippo	I'm not sure that's a good idea...	2018-12-12 21:07:04.0
Antonio	Awesome!	2018-12-12 19:57:36.0

Figure 15: Comment functionalities

All features offered for posts are also offered for comments. Thus, the user can perform the following operations: adding a new comment, editing or deleting an old comment, searching for a post by a word in the content of the comment or searching for comments written by a particular user.

4.9 Edit profile

The user, by pressing the **Edit your Profile** button, can access the information he has previously entered. To save the changes, the user must press the **Save** button.



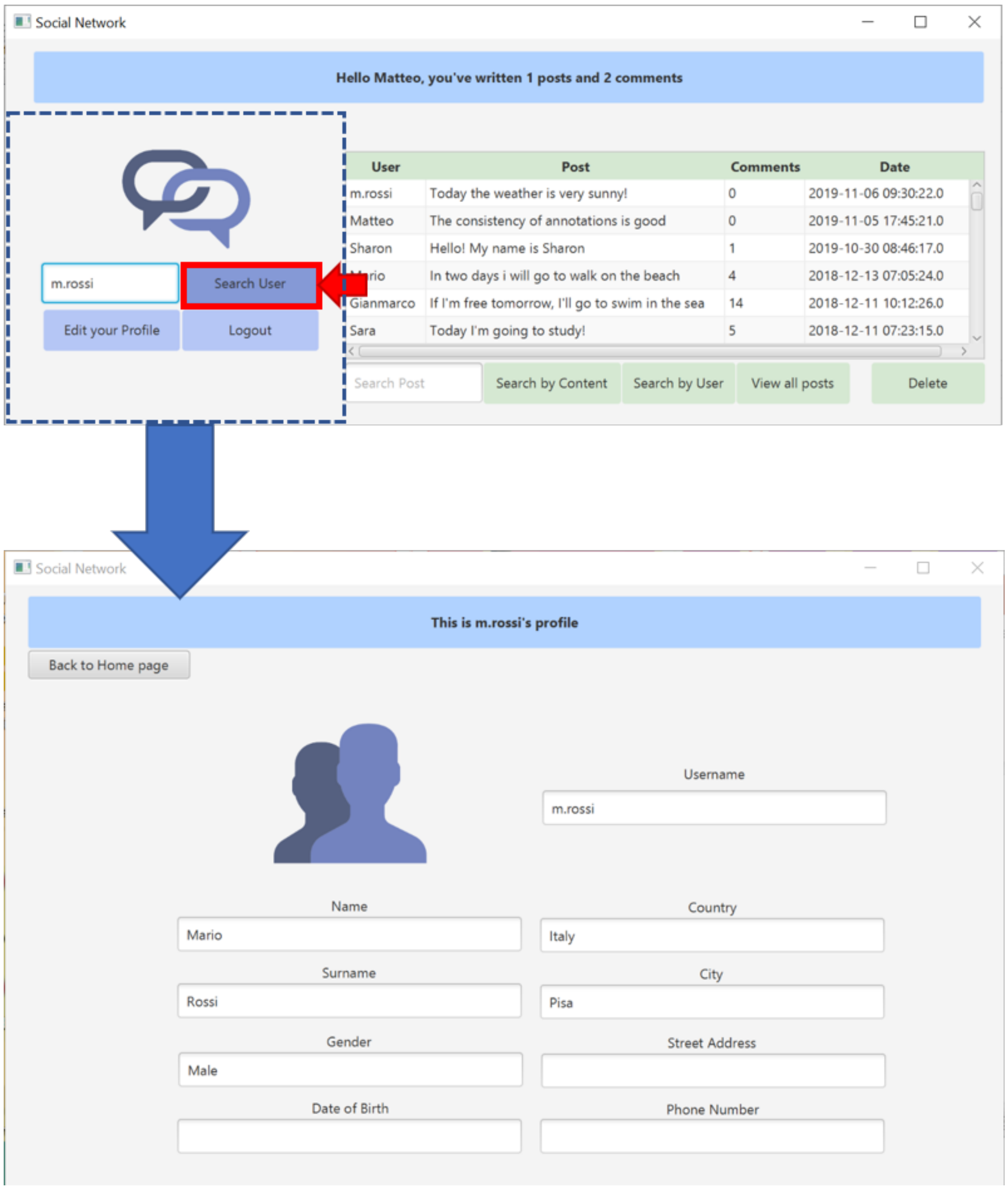
User	Post	Comments	Date
Mario	In two days i will go to walk on the beach	4	2018-12-13 07:05:24.0
Gianmarco	If I'm free tomorrow, I'll go to swim in the sea	14	2018-12-11 10:12:26.0
Sara	Today I'm going to study!	5	2018-12-11 07:23:15.0
Lorenzo	Yesterday I went to the restaurant	9	2018-12-05 23:13:25.0
Filippo	Two days ago i went to study	12	2018-12-05 05:20:46.0
Franco	Yesterday I went to walk in the mountains	1	2018-11-27 02:18:44.0

Username (*)	Matteo
Password (*)	
Name (optional)	Matteo
Country (optional)	Italy
Surname (optional)	Suffredini
City (optional)	Camaiore (LU)
Gender (optional)	
Street Address (optional)	Via Salanetti, 1
Date of Birth (optional)	
Phone Number (optional)	

Figure 16: Edit profile

4.10 Search user

The user can view the profile of another user by entering the username in the Search user bar and pressing the **Search User** button. In this way, a new window will be opened containing all the information relating to the selected user.



Hello Matteo, you've written 1 posts and 2 comments

User	Post	Comments	Date
m.rossi	Today the weather is very sunny!	0	2019-11-06 09:30:22.0
Matteo	The consistency of annotations is good	0	2019-11-05 17:45:21.0
Sharon	Hello! My name is Sharon	1	2019-10-30 08:46:17.0
rio	In two days i will go to walk on the beach	4	2018-12-13 07:05:24.0
Gianmarco	If I'm free tomorrow, I'll go to swim in the sea	14	2018-12-11 10:12:26.0
Sara	Today I'm going to study!	5	2018-12-11 07:23:15.0

This is m.rossi's profile

Username	m.rossi
Name	Mario
Country	Italy
Surname	Rossi
City	Pisa
Gender	Male
Street Address	
Date of Birth	
Phone Number	

Figure 17: Search user

5 Key-Value Databases

5.1 Introduction to Key-Value Databases

A Key-Value Database is a kind of database different from the traditional relational database. In fact here tables do not exist, but there is just a sequence of key-value couples. It means that every value can be retrieved just using a key that must be unique in the bucket. This approach is pretty useful when there is no need to use features typical of relational databases, such as joining tables to retrieve some related information about some attributes. Plus, they do not provide a predefined schema nor types on attributes, that makes Key-Value Databases more flexible.

5.2 Feasibility study

In this section the project will be analyzed to decide if it should be implemented using a standard Relational Database or a Key-Value Database.
Just to remember, the project is a social network where the registered people are allowed to read posts of the other users, to type a new post, to add comments to posts, to edit their own profiles and to view other profiles.
Let's now think about an operation that involves the comments of a post: if a person wants to read comments of a post, the application has to retrieve comments considering the post and the user whom has previously commented that post.
In this example is shown how the fields are related, because it exists a relation between a post, the list of comments to that post, and the user whom has written each of that comments.
Because of that, implementing this part as Key-Value Database will be really though and hard to handle, so it is preferred to use a standard Relational Database to represent those fields.
Using a MySQL Database, all of those information can be retrieved in an easy way using join operations between different tables(Post Table, Person Table, Comment Table).
The situation is really different for the operations that involve the view/edit of a profile. Since only username and password are required, a lot of profile fields may not be set. So, in a relational database, the table representing the optional fields of a user must have a number of columns equals to the number of optional fields, but in each row, representing a person, a lot of those columns may be set to null. Plus, since it is not requested any interaction between profile fields and other attributes but the id related to the user, there is no need to use a relational database to represent those information, so in this case a Key-Value database is recommended because of flexibility.

5.3 LevelDB

In this project the key-value database used is **LevelDB**. LevelDB is a fast key-value storage library written at Google in C++ language that provides an ordered mapping from string keys to string values.[1]
Since the application is written in Java language, a Java porting of LevelDB is used.[2]
The main functions offered by LevelDB are:

- **getValue(Key):** This function will return the value associated to the Key passed as argument, if there is a match.
- **putValue(Key,Value):** This function will store in the database the couple key-value passed as argument. If a value, associated to the same key, already exists then the value passed as argument will overwrite the old one stored.
- **deleteValue(Key):** This function will delete the couple key-value related to the key passed as argument, if stored in database.

Since the key must be unique, it will be represented with a fixed pattern. In this application, the LevelDB database has to store just the optional profile fields of a certain registered person.
Each registered person has a unique id that represents him in the social network, so part of the key must include it.
The key is constructed from three different fields:

- a string that represents the entity
- the unique id mentioned before
- the attribute

These three fields are linked using a special character " : ". In particular, in this case, the first two fields of the key will represent the unique person, while the last one will represent an optional profile field.
For instance, let's suppose that a person with id equals to 1 has filled some of the optional profile fields (name and surname for example), LevelDB will store two different couples of key-value: one with key **username:1:name** and the other with key **username:1:surname**.

References

[1] Google. *LevelDB*. `https://github.com/google/leveldb`. 2014.

[2] Dain. *Porting Java of LevelDB*. `https://github.com/dain/leveldb`. 2019.