2018-2019 Spring

CS 353-Database Systems

Company Interview and Employment Review Platform

Project Proposal

Group 4

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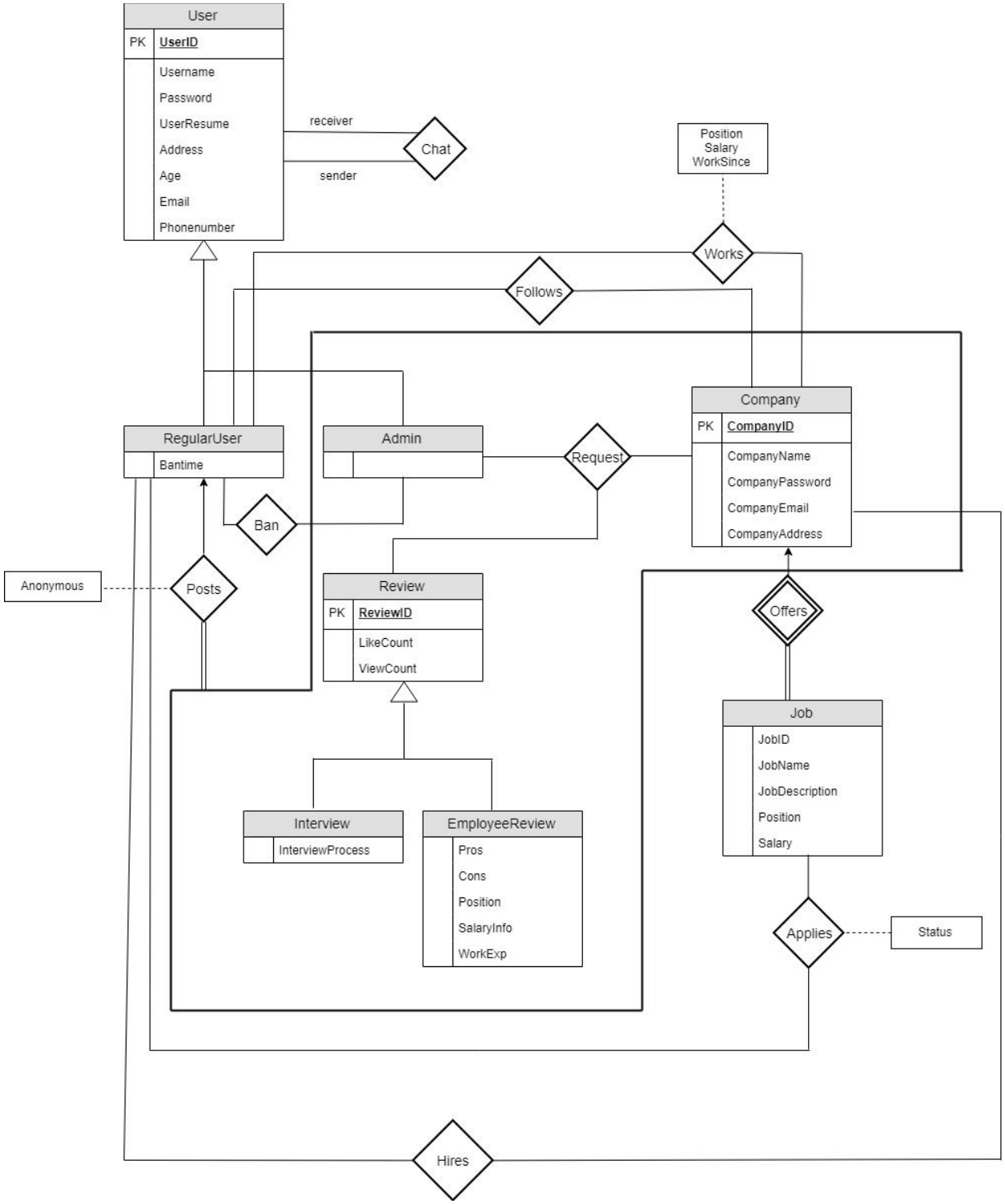
1.REVISED E/R DIAGRAM

Considering the feedback we have got from our teaching assistant, to have a more accurate database system structure, we made changes below:

- User entity is the parent of RegularUser entity and Admin entity. RegularUser entity has extra attribute banTime and now, there is a relation named ban between Admin and RegularUser.
- Review entity is now the parent of Interview and EmployeeReview entities. It also has the attributes LikeCount and ViewCount. Interview entity has only one attribute which is InterviewProcess and EmployeeReview entity has the attributes Pros, Cons, Position, SalaryInfo and WorkExp.
- Admin, Review and Company entities are now related with a ternary relation named Request.
- RegularUser has two relation with Company entity. The entity Works has the attributes Position, Salary and WorkSince.
- We aggregated Company, Admin, Review, Interview and EmployeeReview entities. RegularUser has a relation named Posts with this aggregation. Aggregation makes total participation to the relation Posts.
- We removed all foreign key representations from the diagram.
- Job entity is now a weak entity and makes total participation to the relation Offers.
- We added a new feature that allow users to chat with each other. Also a ranking system with the the attributes of entity Review, LikeCount and ViewCount.
- CompanyPassword and CompanyEmail for Company entity added to allow them sign up.
- Position attribute is added to the Job entity.


User
PK
UserID
Username
Password
UserResume
Address
Age
Email
Phonenumber
receiver
Chat
sender
Position
Salary
WorkSince
Works
Follows
Company
PK
CompanyID
CompanyName
CompanyPassword
CompanyEmail
CompanyAddress
RegularUser
Bantime
Admin
Request
Ban
Anonymous
Posts
Review
PK
ReviewID
LikeCount
ViewCount
Offers
Job
JobID
JobName
JobDescription
Position
Salary
Interview
InterviewProcess
EmployeeReview
Pros
Cons
Position
SalaryInfo
WorkExp
Applies
Status
Hires

2.RELATION SCHEMAS

2.1.User

Relational Model:

User(<u>UserID</u>, username, password, email, UserResume, address, age, phonenumber)

Functional Dependencies:

UserID -> username, password, email, UserResume, address, age, phonenumber

username -> UserID, password, email, UserResume, address, age, phonenumber

email -> UserID, username, password, UserResume, address, age, phonenumber

Candidate Keys:

{(UserID), (username), (email)}

Normal Form: BCNF

Table Definition:

```
Create table User(
        UserID int Primary Key Not NULL Auto Increment,
        Username varchar(32) Not NULL Unique,
        UserResume varchar(255),
        Password varchar(32) Not NULL,
        Address varchar(100),
        Email varchar(75) Not NULL Unique,
        Age int Check (Age>= 18),
        Phonenumber varchar(10)
);
```

2.2.Regular User

Relational Model:

RegularUser(<u>UserID</u>, Bantime)

Functional Dependencies:

UserID -> Bantime

Candidate Keys:

{(UserID)}

Normal Form: BCNF

Table Definition:

```
Create table RegularUser(
        UserID int,
        Bantime int,
        Foreign Key (UserID) References User(UserID)
)ENGINE = InnoDB;
```

2.3.Admin

Relational Model:

Admin(<u>UserID</u>)

Functional Dependencies:

None

Candidate Keys:

{(UserID)}

Normal Form: BCNF

Table Definition:

```
Create table Admin(
        UserID int,
        Foreign Key (UserID) References User(UserID)
)ENGINE = InnoDB;
```

2.4.Job

Relational Model:

Job(<u>JobID, JobName</u>, Salary, JobDescription, Position)

Functional Dependencies:

jobID, jobName -> salary, JobDescription, Position

Candidate Keys:

{(JobID, jobName)}

Normal Form: BCNF

Table Definition:

```
Create Table Job(
```

```
        JobID int,
        JobName varchar(32) Not NULL,
        Salary int Not NULL,
        JobDescription varchar(100) Not NULL,
        Position varchar(32) Not NULL,
        Foreign Key (JobID) References Company(CompanyID),
        Primary Key (JobID, JobName)
)ENGINE = InnoDB;
```

2.5.Applies

Relational Model:

Applies(<u>JobID, UserID, JobName, CompanyID</u>, State)

Functional Dependencies:

JobID, UserID, JobName, CompanyID -> State

Candidate Key:

{(JobID, UserID, JobName, CompanyID)}

Normal Form: BCNF

Table Definition:

```
Create Table Applies(
        State int,
        CompanyID int,
        JobID int,
        UserID int,
        JobName varchar(32) Not NULL,
```

```
        Foreign Key (JobID) References Job(JobID),
        Foreign Key (UserID) References User(RegularUser),
        Foreign Key (CompanyID) References Company(CompanyID),
        Primary Key (JobID,CompanyID, UserID, JobName)
)ENGINE = InnoDB;
```

2.6.Posts

Relational Model:

Posts(<u>UserID, ReviewID</u>, Anonymous)

Functional Dependencies:

UserID, ReviewID -> Anonymous

Candidate Key:

{(JobID, ReviewID)}

Normal Form: BCNF

Table Definition:

```
Create Table Posts(
        UserID int,
        ReviewID int,
        Anonymous Boolean Not NULL,
        Foreign Key (ReviewID) References (Review),
        Foreign Key (UserID) References (RegularUser),
        Primary Key (UserID, ReviewID)
)ENGINE = InnoDB;
```

2.7.Review

Relational Model:

Review(<u>ReviewID</u>, LikeCount, ViewCount)

Functional Dependencies:

ReviewID -> LikeCount, ViewCount

Candidate Key:

{(ReviewID)}

Normal Form: BCNF

Table Definition:

```
Create Table Review(
        ReviewID int Primary Key Auto Increment Not NULL,
        LikeCount int,
        ViewCount int
);
```

2.8.Interview

Relational Model:

Interview(<u>ReviewID</u>, InterviewProcess)

Functional Dependencies:

ReviewID -> InterviewProcess

Candidate Key:

{(ReviewID)}

Normal Form: BCNF

Table Definition:

```
Create Table Interview(
        ReviewID int,
        InterviewProcess varchar(255),
        Foreign Key (ReviewID) References Review
)ENGINE = InnoDB;
```

2.9.Employee Review

Relational Model:

EmployeeReview(<u>ReviewID</u>, CompanyName, Pros, Cons, Position, SalaryInfo, workExp)

Functional Dependencies:

ReviewID -> CompanyName, Pros, Cons, Position, SalaryInfo, workExp

Candidate Key:

{(ReviewID)}

Normal Form: BCNF

Table Definition:

```
Create Table EmployeeReview(
```

```
        ReviewID int,
        CompanyName varchar(50),
        Pros varchar(255),
        Cons varchar(255),
        Position varchar(32),
        SalaryInfo int,
        WorkExp varchar(255),
        Foreign Key (ReviewID) References Review(ReviewID)
)ENGINE = InnoDB;
```

2.10.Company

Relational Model:

Company(<u>CompanyID</u>, CompanyName, CompanyAddress, CompanyEmail)

Functional Dependencies:

CompanyID -> CompanyName, CompanyAddress, CompanyEmail

CompanyName -> CompanyID, CompanyAddress, CompanyEmail

Candidate Key:

{(CompanyID), (CompanyName)}

Normal Form: BCNF

Table Definition:

```
Create Table Company(
        CompanyID int Primary Key Auto Increment Not NULL,
        CompanyName varchar(70) Not NULL Unique,
        CompanyAddress varchar(255) Not NULL,
```

```
        CompanyEmail varchar(70) Not NULL
);
```

2.11.Follows

Relational Model:

Follows(<u>CompanyID, UserID</u>)

Functional Dependencies:

None

Candidate Key:

{(CompanyID), UserID)}

Normal Form: BCNF

Table Definition:

```
Create Table Follows(
        CompanyID int,
        UserID int,
        Foreign Key (CompanyID) References Company(CompanyID),
        Foreign Key (UserID) References User(UserID),
        Primary Key (CompanyID, UserID)
)ENGINE = InnoDB;
```

2.12.Offers

Relational Model:

Offers(<u>JobID, CompanyID</u>)

Functional Dependencies:

None

Candidate Key:

{(JobID, CompanyID)}

Normal Form: BCNF

Table Definition:

```
Create Table Offers(
        JobID int,
        CompanyID int,
        Foreign Key (JobID) References Job(JobID),
        Foreign Key (CompanyID) References Company(CompanyID),
        Primary Key (JobID, CompanyID)
)ENGINE = InnoDB;
```

2.13.Works

Relational Model:

Works(<u>UserID, CompanyID</u>, Position, Salary, WorkSince)

Functional Dependencies:

UserID, CompanyID -> Position, Salary, WorkSince

Candidate Key:

{(UserID, CompanyID)}

Normal Form: BCNF

Table Definition:

```
Create Table Works(
        UserID int,
        Position varchar(50),
        Salary int,
        WorkSince Date,
        CompanyID int,
        Foreign Key (CompanyID) References Company(CompanyID),
        Foreign Key (UserID) References User(UserID),
        Primary Key (UserID,CompanyID)
)ENGINE = InnoDB;
```

2.14.Request

Relational Model:

Request(<u>CompanyID, ReviewID</u>)

Functional Dependencies:

None

Candidate Key:

{(UserID, CompanyID)}

Normal Form: BCNF

Table Definition:

```
Create Table Request(
        CompanyID int,
        ReviewID int,
        Foreign Key (CompanyID) References Company(CompanyID),
        Foreign Key (ReviewID) References Review(ReviewID),
        Primary Key (CompanyID,ReviewID)
)ENGINE = InnoDB;
```

2.15.Chat

Relational Model:

Chat(<u>ReceiverID, SenderID</u>)

Functional Dependencies:

None

Candidate Key:

{(ReceiverID, SenderID)}

Normal Form: BCNF

Table Definition:

```
Create Table Chat(
        ReceiverID int Unique,
        SenderID int Unique,
        Foreign Key (ReceiverID) References User(UserID),
```

```
        Foreign Key (SenderID) References User(UserID)
)ENGINE = InnoDB;
```

2.16.Ban

Relational Model:

Ban(<u>ReceiverID, SenderID</u>)

Functional Dependencies:

None

Candidate Key:

{(ReceiverID, SenderID)}

Normal Form: BCNF

Table Definition:

```
Create Table Ban(
        ReceiverID int Unique,
        SenderID int Unique,
        Foreign Key (ReceiverID) References User(UserID),
        Foreign Key (SenderID) References User(UserID)
)ENGINE = InnoDB;
```

2.17.Hires

Relational Model:

Hires(<u>CompanyID, userID</u>)

Functional Dependencies:

None

Candidate Key:

{(CompanyID, userID)}

Normal Form: BCNF

Table Definition:

```
Create Table Hires(
        CompanyID int,
        UserID int,
        Foreign Key (CompanyID) References Company(CompanyID),
        Foreign Key (UserID) References User(UserID),
        Primary Key (CompanyID, UserID)
)ENGINE = InnoDB;
```

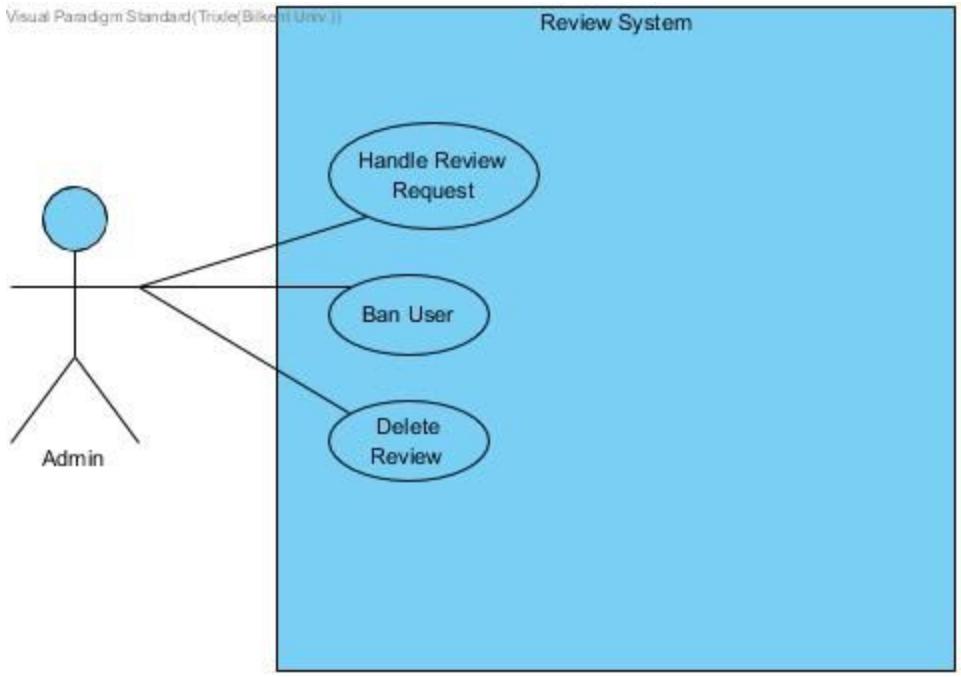
3.FUNCTIONAL DEPENDENCIES AND NORMALIZATION OF TABLES

The relational schemas part has the functional dependencies and normalization is not necessary since BCNF is used.

4.FUNCTIONAL COMPONENTS

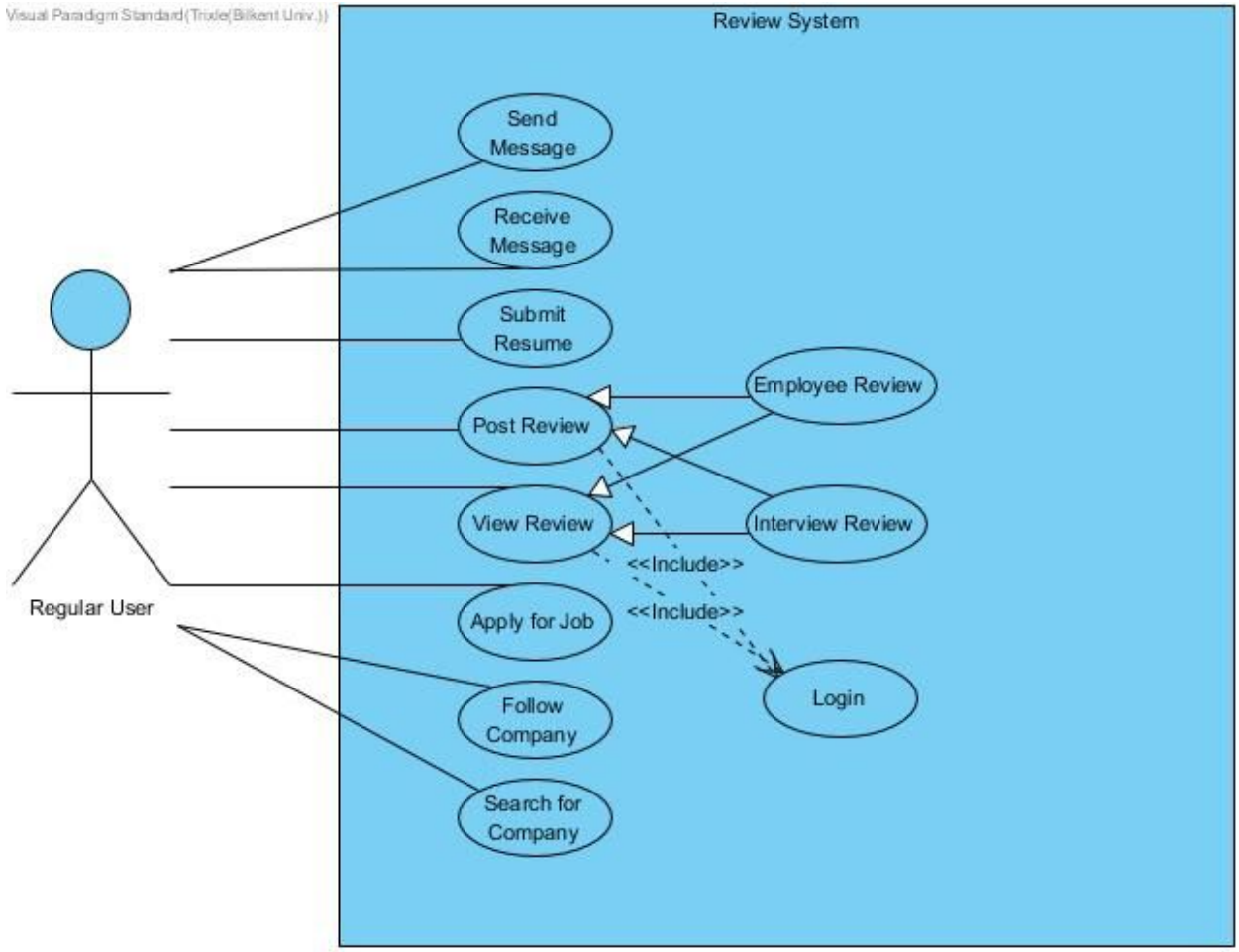
4.1.Use Cases and Scenarios

4.1.1.Admin:



- **Handle Review Request:** Admin can delete the reviews that are required from the companies.
- **Delete Review:** When admin accepts the user's deletion request or when the admin declines the review to be posted, he/she can delete the review.
- **Ban User:** When the users write inappropriate reviews or give false information about the company and its interview processes, admin will ban those users.

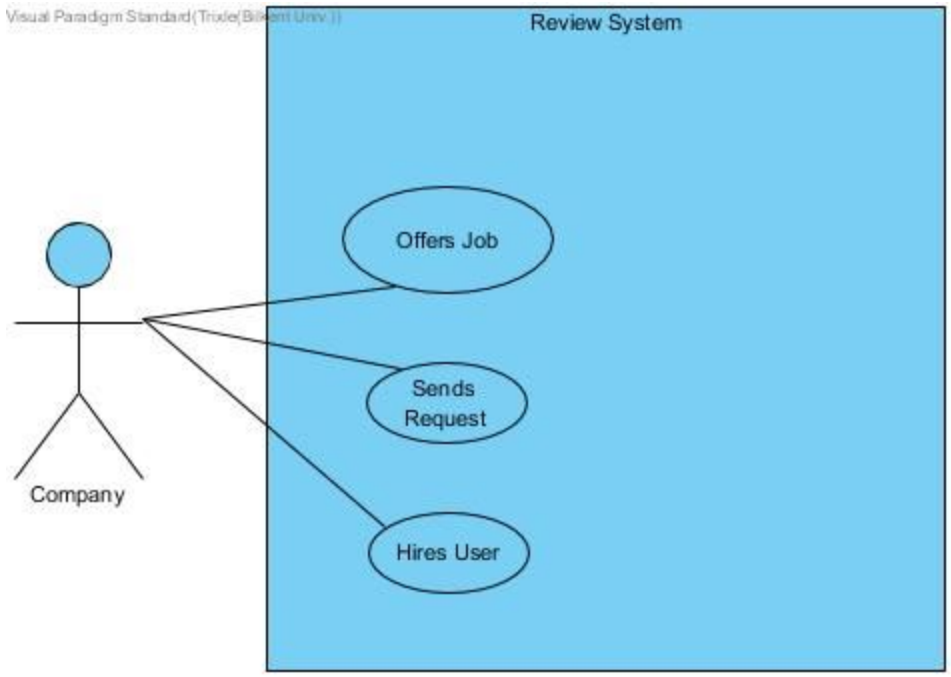
4.1.2.Regular User:



- **Send Message:** User can send message to the other users.
- **Receive Message:** User can receive message from the other users.
- **Submit Resume:** Users can upload their resume in their profile from their “edit profile” page.
- **Apply for the Job:** User can apply to a job which is posted by a particular company.
- **Follow Company:** Users can follow companies to get notified,

- **Search for the Company:** Users can search for the companies through a search box to learn the reviews of the company and its overall score.
- **Post Review:** Users can post two types of review on company's review page; employee review and interview review. To post employee review, user must have a work experience with that company.
- **View Review:** User can see the reviews from a company's review page.

4.1.3.Company:



- **Offers job:** Companies can create an application form for candidate users to apply.
- **Sends Request:** Companies can send requests to admins for deletion inappropriate reviews.
- **Hires User:** Companies can accept an application of a user to a jod offer that they create.

4.2.Algorithms

4.2.1.Deletion of a Review Algorithm

When a company wants to send a deletion request for a review which has an inappropriate content, it does that by submitting a request for deletion for a particular review. These requests are sent to a page that can be seen for only by admins. If an admin also finds the review inappropriate or irrelevant, review will be deleted by the admin.

4.2.2.Job Application Algorithm

A job application can be done in two ways. In the first way, the user searches for a company in search box. After clicking the search button, the user is directed to the page that contains reviews of that company and the offered jobs of that company. The application can be done by the buttons next to the offered jobs text. In the second way, the user can reach that page from the profile page. In the profile page, the button that directs the user to the followed companies has the links for reviews of that companies. This page is the same page that was mentioned in the first way.

4.2.3.Ranking Algorithm

The reviews have the attributes named “LikeCount” and “ViewCount” are used for that algorithm. “LikeCount” is incremented for a review when other users click the like button. “ViewCount” is incremented when a user search for a company’s reviews and read it. Rank is obtained by dividing “ViewCount” to “LikeCount”. It basically means that if a review will be more popular when it was seen and liked at the same time.

4.2.4 Ban System

Bans will be based on the requests. If a request contains inappropriate language, admin will be able to ban that user based on the “ReviewID”.

4.3.Data Structures

Numeric, String and Date types are used for schemas.

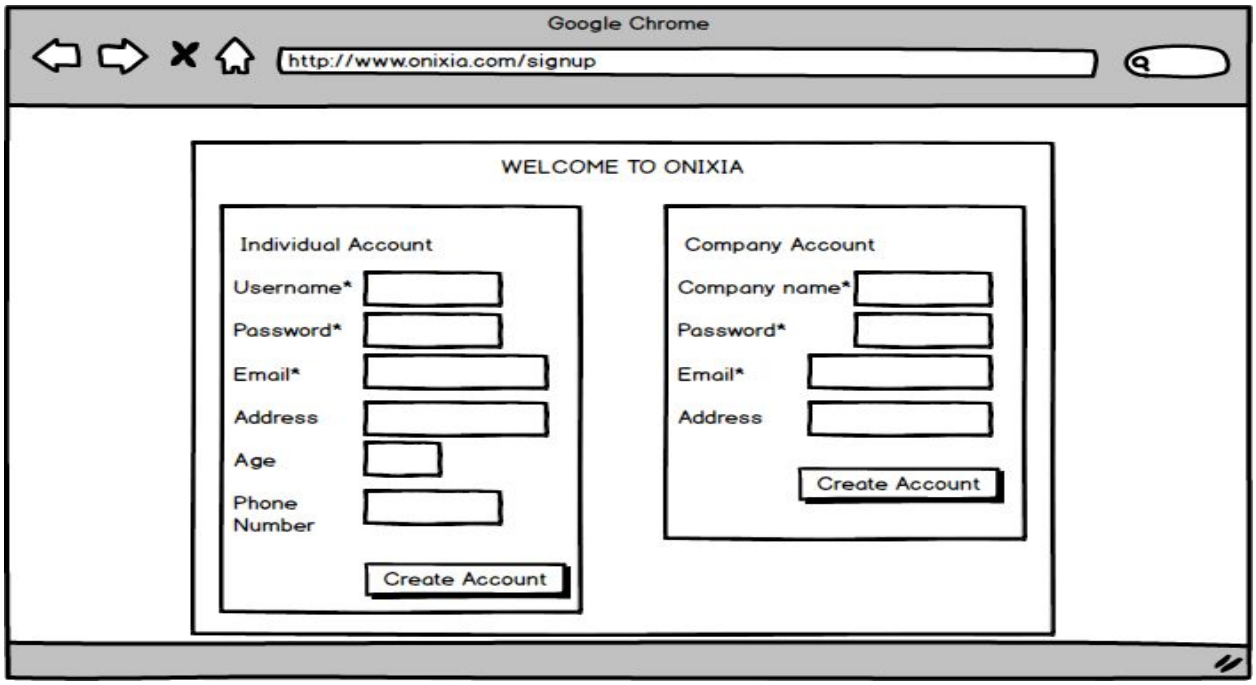
Numeric Types are used for id's of entities, numerical values and some counting attributes.

String Types are used for name attributes of the entities.

Date Type is only used for bantimes of the users.

5.User Interface Design and Corresponding SQL Statements

5.1.Sign up Page:



Inputs: @userID, @password, @email, @address, @age, @phone_number

Process: The sign up pop-up page link is located on top right of the log-in or home screen. This pop-up link will only be visible when the user have not logged in yet. User

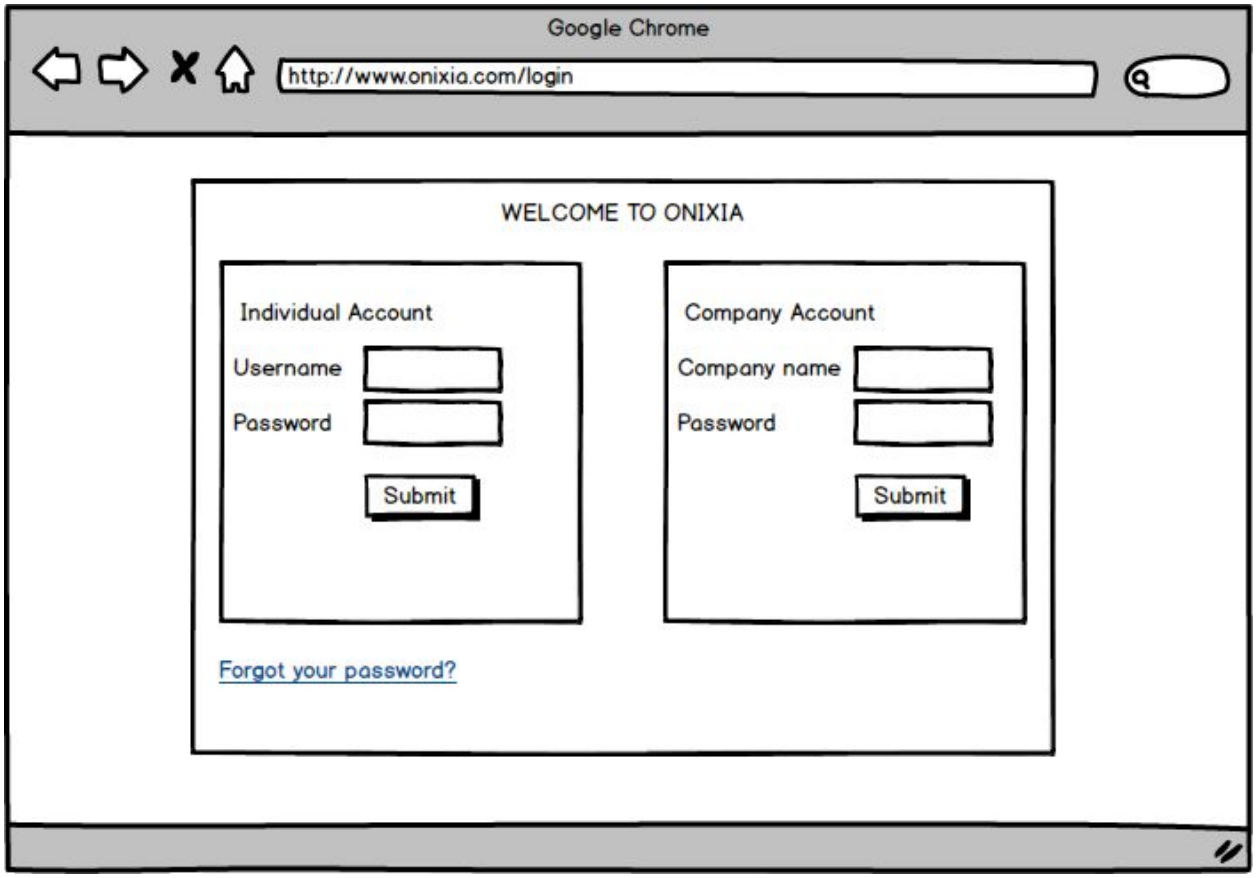
must enter a unique username, password and email. Address, age and phone number information will be optional for user to fill in. There are also word count limitations for username(32), password(32), email(75) and address(100).

SQL Statements:

INSERT INTO user

VALUES(@userID, @password, @email, @address, @age, @phone_number)

5.2.Login Page:



Inputs: @userID, @password

Process: This pop-up page can be reached by clicking a link which is located in the top right side of the page near the sign up pop-up link. User should enter his/her username

and password correctly in order to log-in or sign-in to the website. If the user forgot its password, they can click “forgot your password” link to open the reset password page.

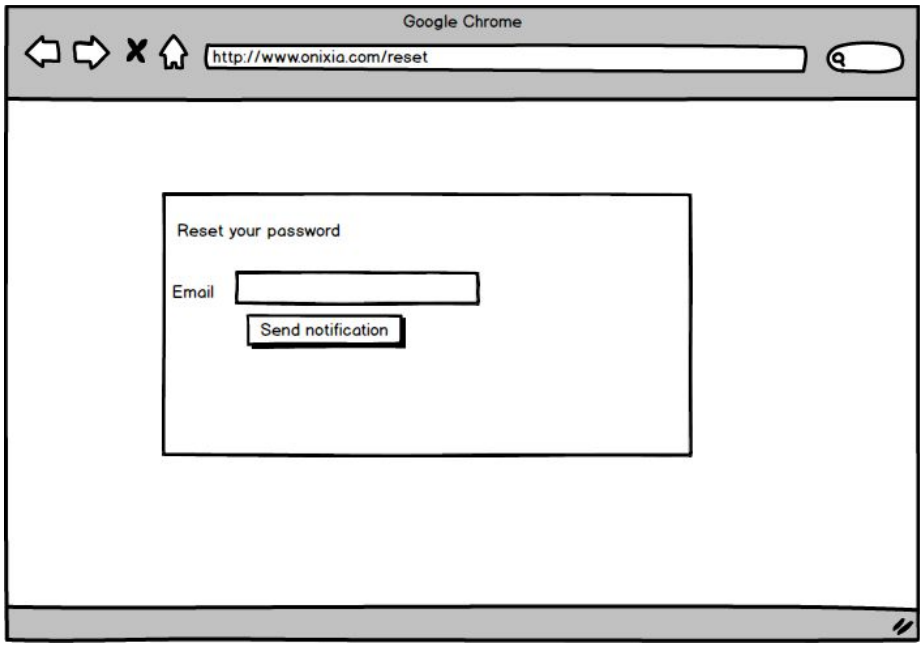
SQL Statements:

SELECT *

FROM user

WHERE userID = @userID AND password = @password

5.3.Reset Page:



Inputs: @email

Process: When the user forgot his/her password during sign in session, they can open this window by clicking “forgot your password” from sign in page. User enters their

Email and click send notification. Few minutes later, new password will assigned to their account and also new password will be sent to the user via email by us.

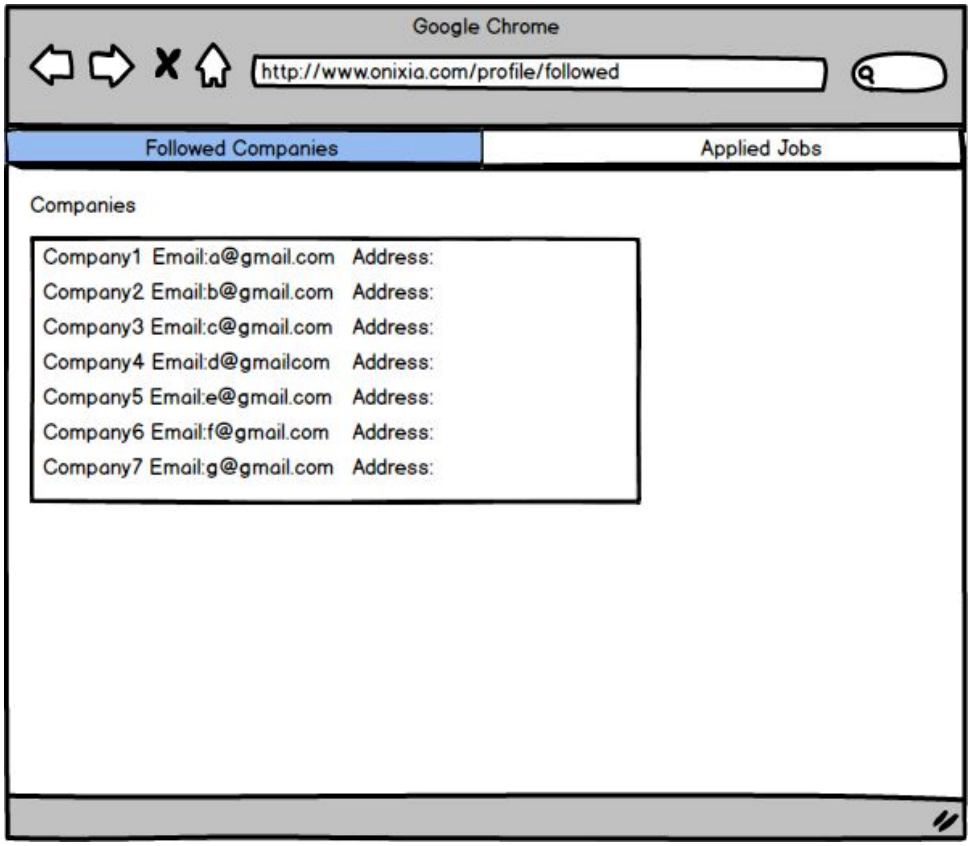
SQL Statements:

SELECT *

FROM user

WHERE email = @email

5.4.Followed Companies Page



Process: When the user wants to list his followed companies, s/he can press the “Followed Companies” button and the companies will be listed with their information.

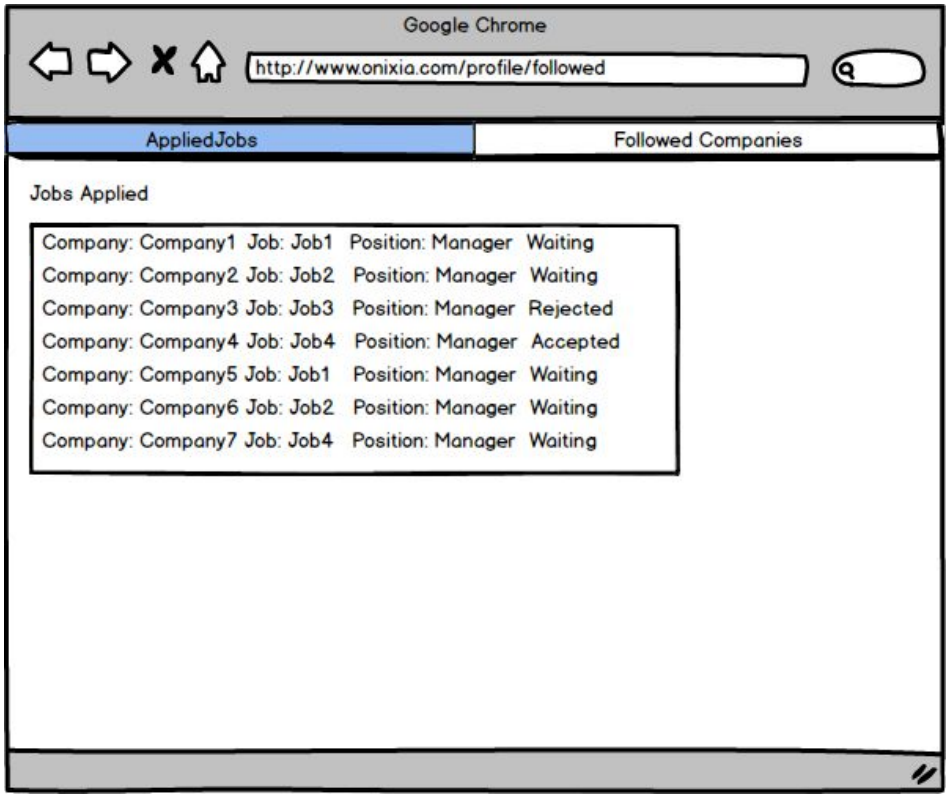
SQL Statement:

SELECT CompanyName, CompanyEmail, CompanyAddress

FROM Company Natural Join Follows Natural Join RegularUser

WHERE userID = @userID

5.5.Applied Jobs Page



Process: When the user wants to list his applied job list, s/he can press the “Followed Companies” button and the applied job will be listed with their information.

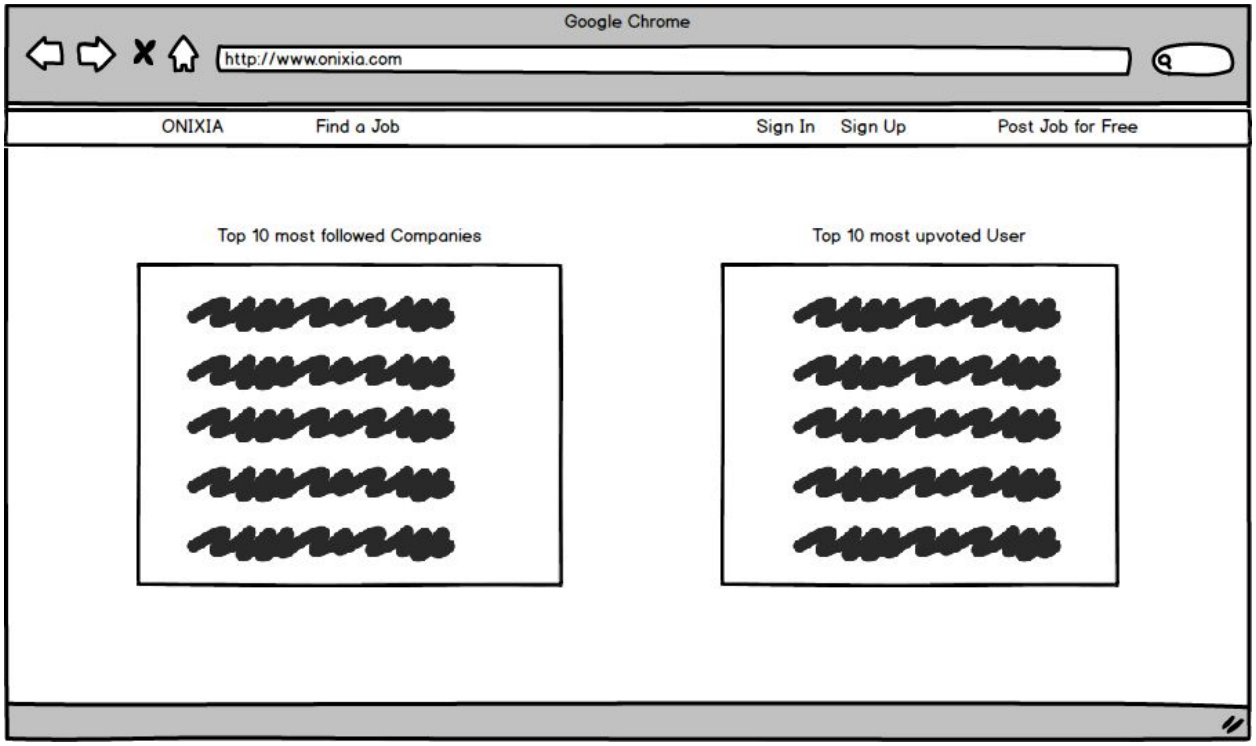
SQL Statement:

SELECT CompanyName, JobName, Position, Status

FROM Company NATURAL JOIN Job NATURAL JOIN Applies

WHERE userID = @userID

5.6.Home Screen Page



Process: Non-logged in users can see a menu bar and two tables in the home screen of the Onixia. Menu bar includes find a job, post job for free page and also sign in and sign up page. Furthermore, it includes two tables that show top 10 mos followed companies and top 10 most upvoted user.

SQL Statement:

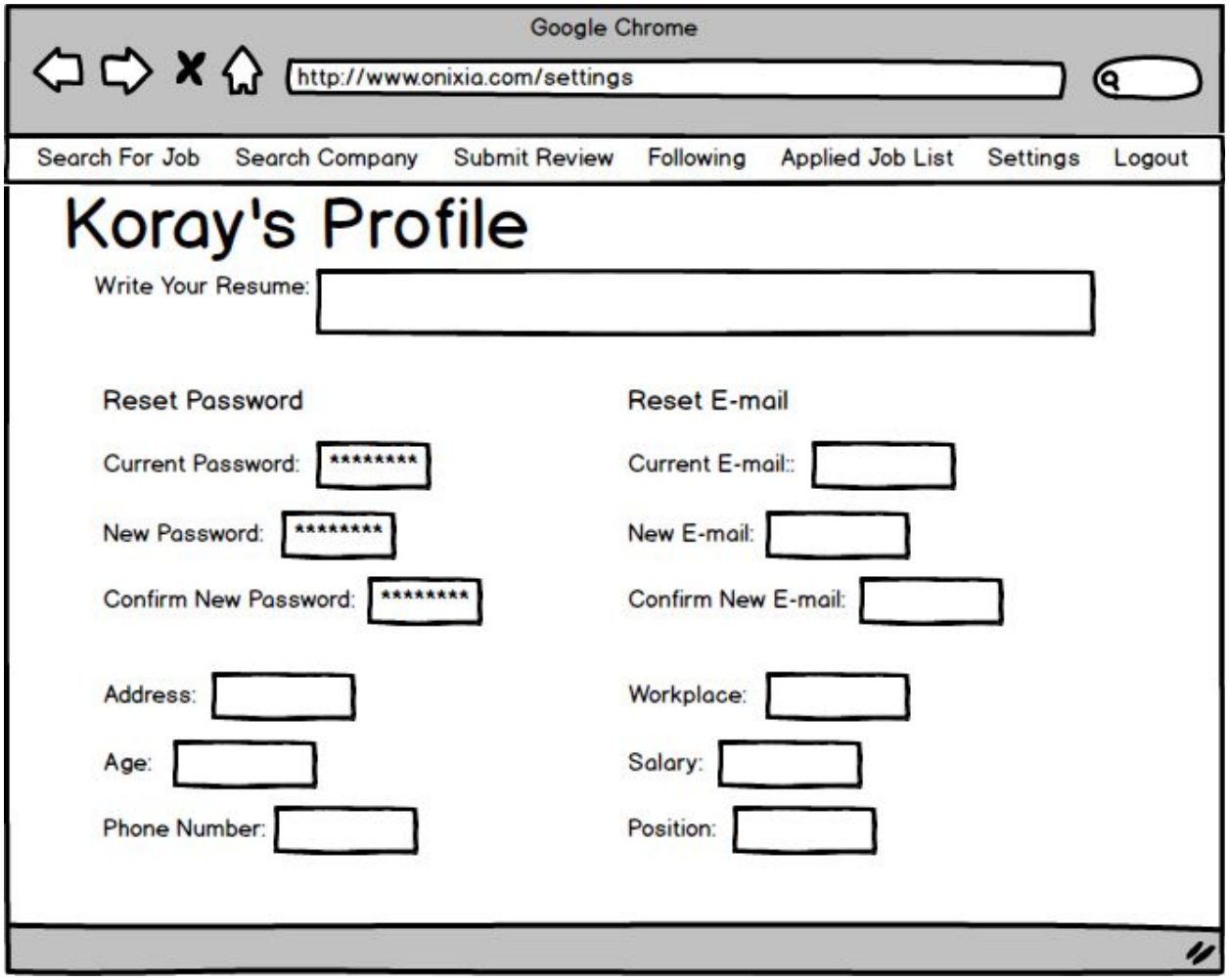
Top10 upvoted users

```
CREATE VIEW users_top10(name,rank)
SELECT username, MAX(likeCount/viewCount) AS m
FROM Post NATURAL JOIN Review NATURAL JOIN User
GROUP BY username
ORDER BY m DESC
LIMIT 10
```

Top 10 followed companies.

```
CREATE VIEW (CompanyName, follower)
SELECT CompanyName, count(CompanyID) AS c
FROM Company NATURAL JOIN Follows
GROUP BY CompanyName
ORDER BY c DESC
LIMIT 10
```

5.7.User's Profile Setting Page



Inputs: @resume, @password, @newpassword, @address, @age, @phonenumber, @email, @newemail, @workplace, @salary, @position

Process: Users can change their passwords and email along with their personal information through this page.

SQL STATEMENTS:

Change Password

UPDATE user

SET password = @newpassword

WHERE userID = @userID

Change Email

UPDATE User

SET email = @email

WHERE userID = @userID

Add Resume

INSERT INTO user.resume

VALUES(@resume)

WHERE userID = @userID

Add Address

INSERT INTO user.address

VALUES(@address)

WHERE userID = @userID

Add Age

INSERT INTO user.age

VALUES(@age)

WHERE userID = @userID

Add Phone Number

INSERT INTO user.phonenumber

VALUES(@phonenumber)

WHERE userID = @userID

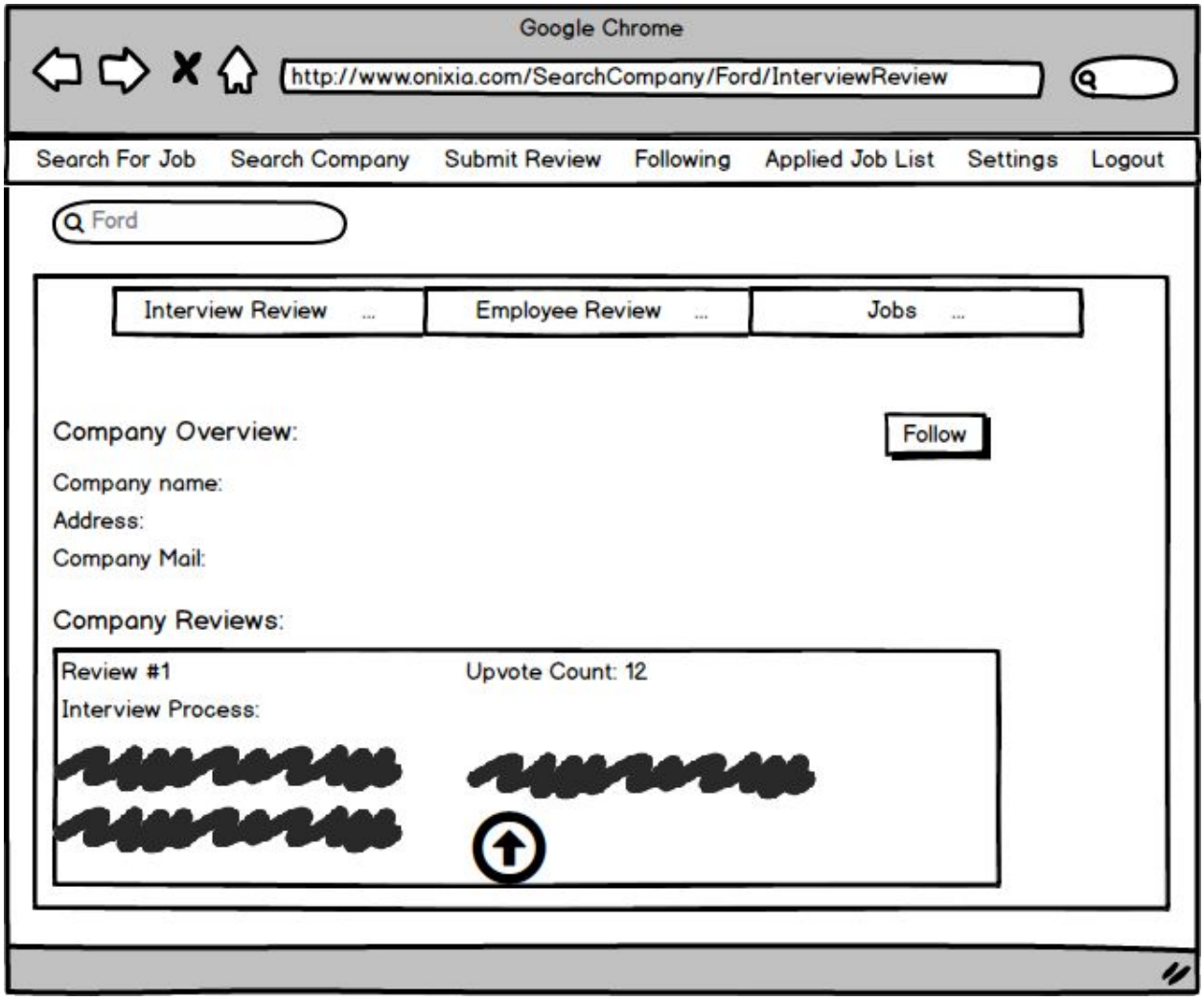
Add Phone Number

```
INSERT INTO job,workplace, job.salary, job.position
VALUES(@workplace, @salary, @position)
WHERE userID = @userID
```

View Profile Details

```
SELECT userID, email, address, age, phonenumber, workplace, salary, position, resume
FROM user, job
Where userID = @userID
```

5.8.View Company's Interview Review Page



Inputs: @searchquery

Process: User can search the company that he/she desires by typing the name of the company to the search box. In this page, user can choose between interview and employee reviews and jobs. User can also upvote another user's post by clicking upvote button.

SQL STATEMENT:

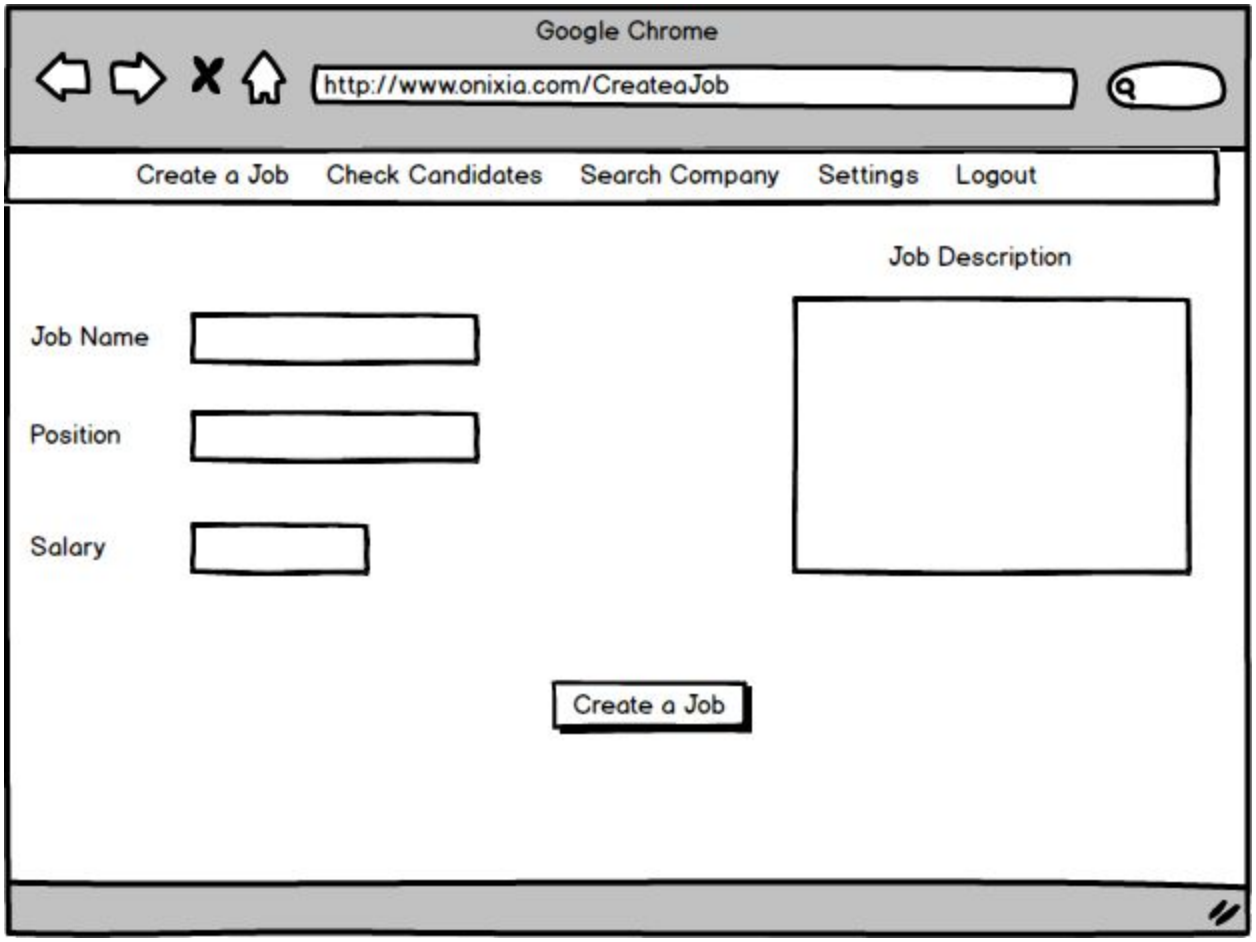
Company Search

```
SELECT CompanyName
        CASE WHEN @searchquery = CompanyName
        END
FROM Company
```

Sorting reviews for a particular company

```
CREATE VIEW users_top10c(name,rank)
SELECT username, MAX(likeCount/viewCount) AS m
FROM Post NATURAL JOIN Review NATURAL JOIN User
WHERE CompanyName = @CompanyName
GROUP BY username
ORDER BY m DESC
```

5.9.Create a Job Page



Inputs: @JobName, @position, @salary, @jobDescription

Process: Companies can create a job through this page by filling following attributes; salary, position, job name and job description. Then they have to click the Create a Job button in order to create a job.

SQL STATEMENTS:
Add Job Name

INSERT INTO job.JobName

VALUES(@JobName)

Add position

INSERT INTO job.position

VALUES(@position)

Add salary

INSERT INTO job.salary

VALUES(@salary)

Add Job Description

INSERT INTO job.jobDescription

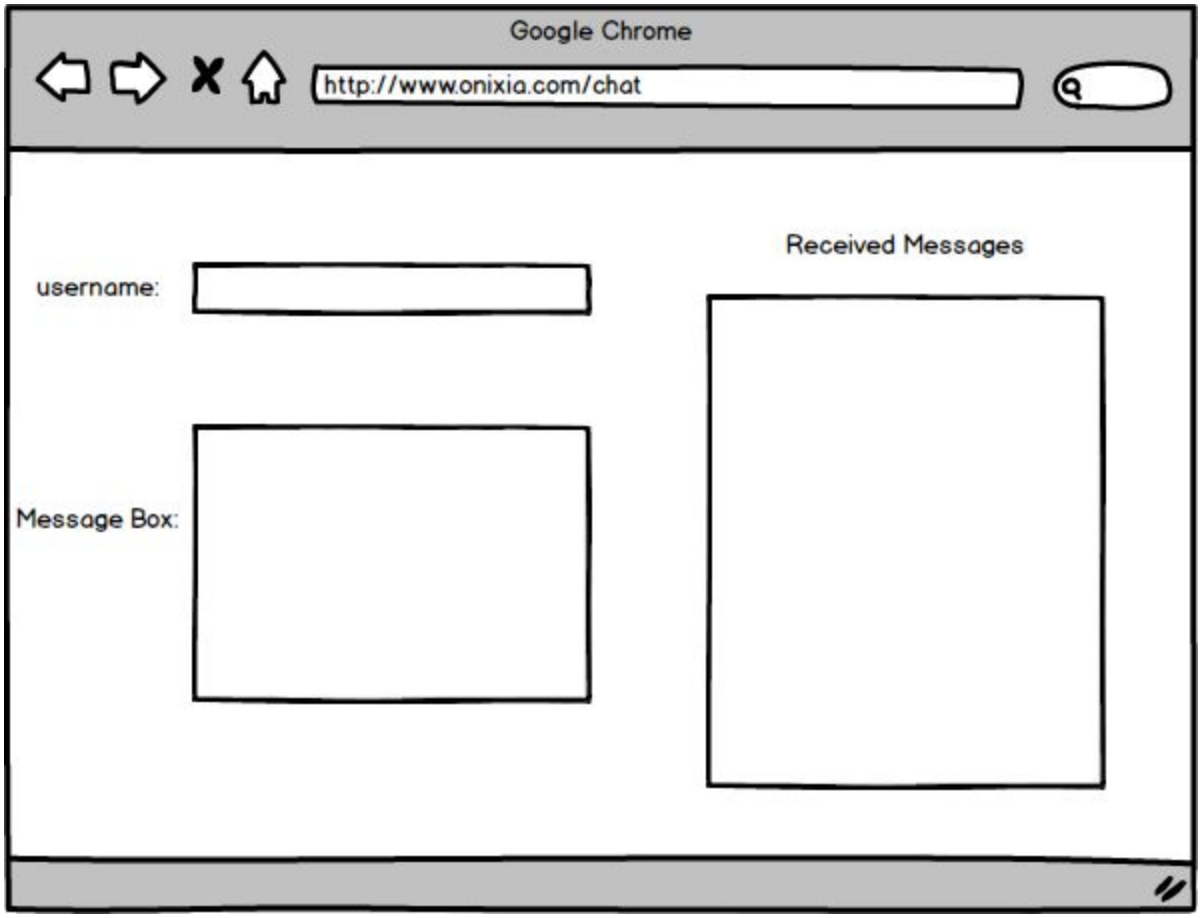
VALUES(@jobDescription)

Check Candidates

Process: Companies can check the candidates for their created jobs. Company can accept or decline the candidates for the particular job through this menu.

SQL STATEMENTS:
There is no particular SQL statement for this page.

5.10.Chat



Input: @userID, @message

Process: Users can chat through this menu.

SQL STATEMENTS:
There is no particular SQL statement for this page.

Submit Review

Input: @pros, @cons, @position, @salary, @workexp, @interviewProcess

Process: User selects the type of the review and after fill the relevant chapters, user will upload the post to the particular company.

SQL STATEMENTS:

If employee review

INSERT INTO EmployeeReview.pros, EmployeeReview.cons, EmployeeReview.position, EmployeeReview.salary, EmployeeReview.workexp
VALUES(@pros, @cons, @posiiton, @salary, @workexp)

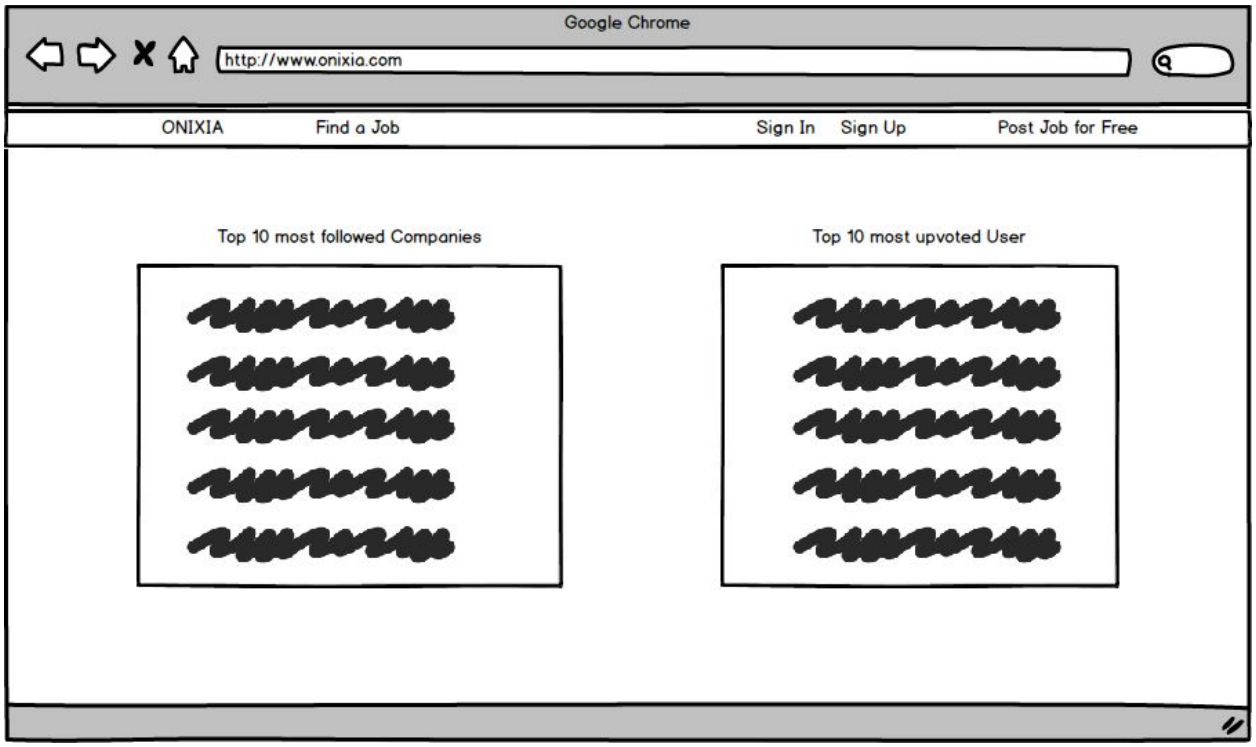
If interview review

INSERT INTO InterviewReview.interviewProcess
VALUES(@interviewProcess)

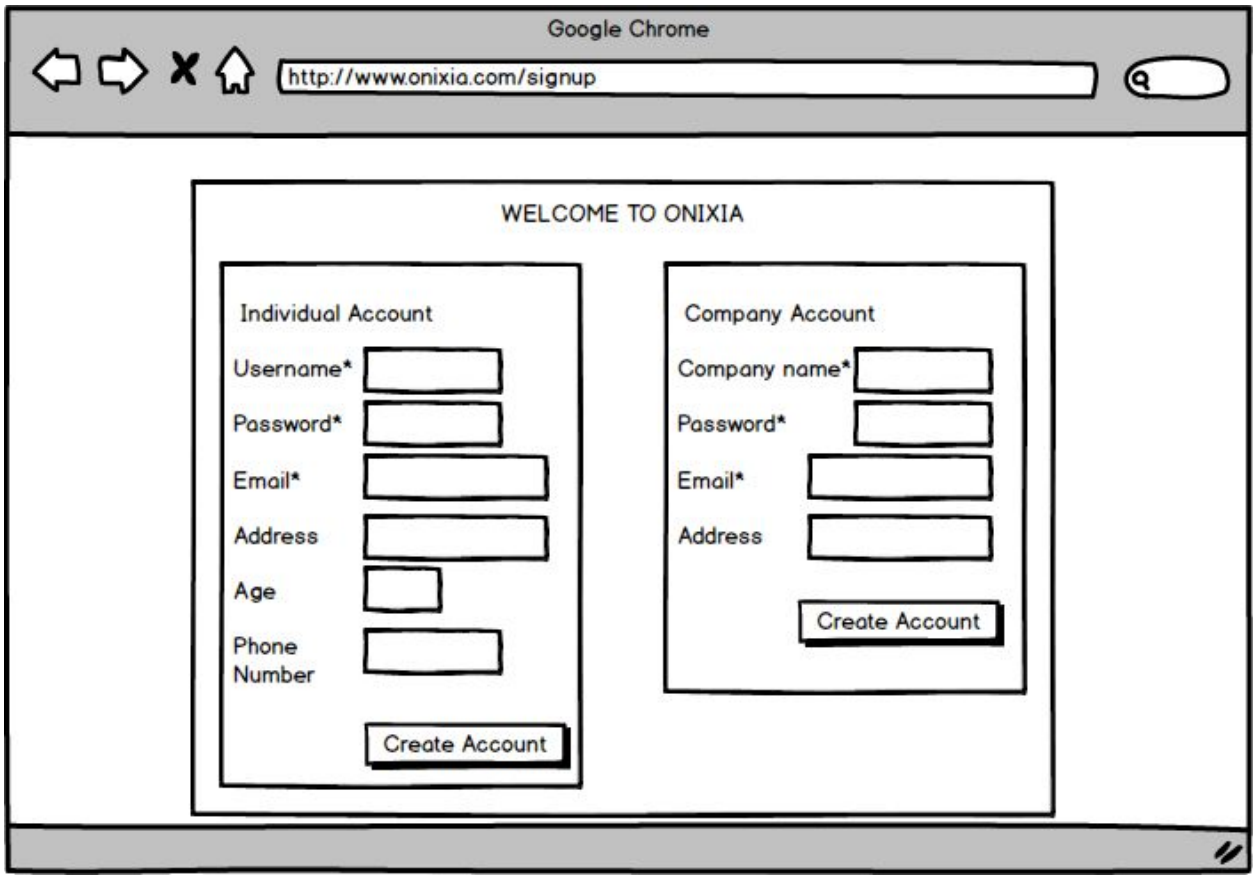
5.11 Shared UI Designs

This UI Designs shared for all types of users.

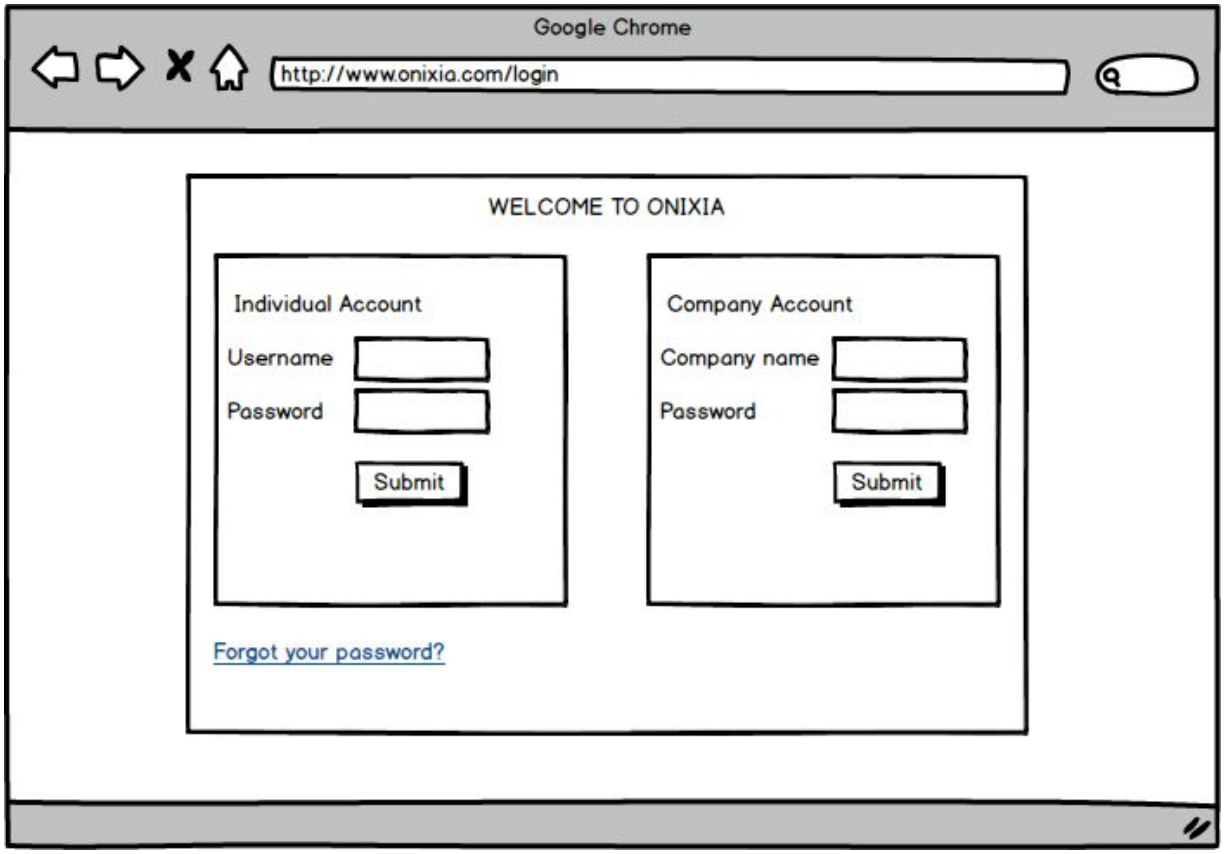
5.11.1 Home Screen



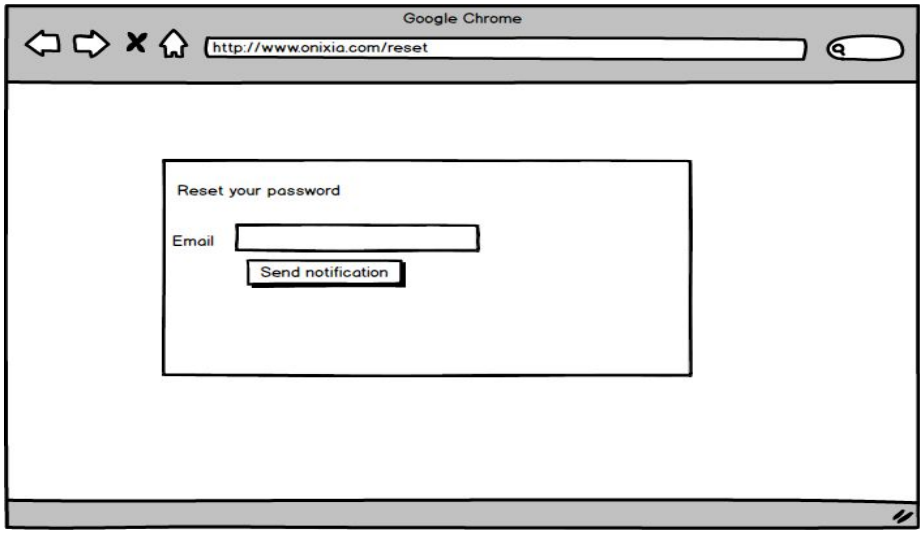
5.11.2 Sign Up Page



5.11.3 Login Page



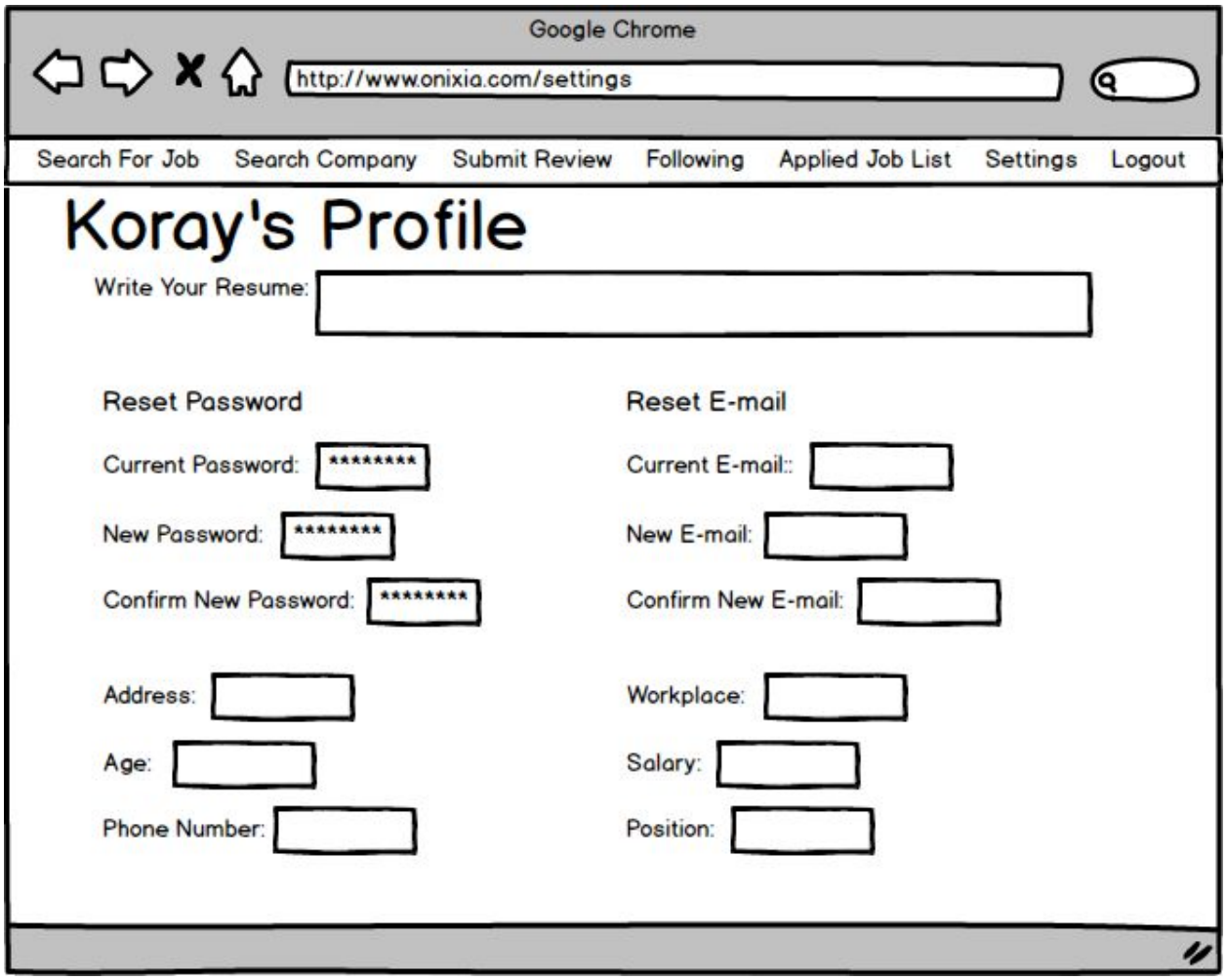
5.11.4 Reset Password Page



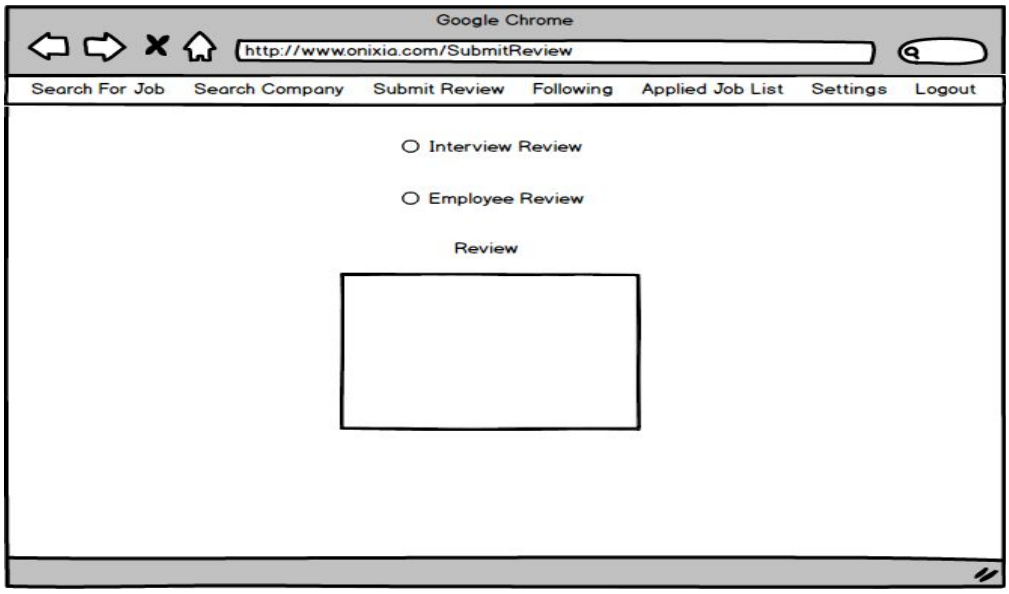
5.12 UI Design for Users

This UI design is explicit for regular users.

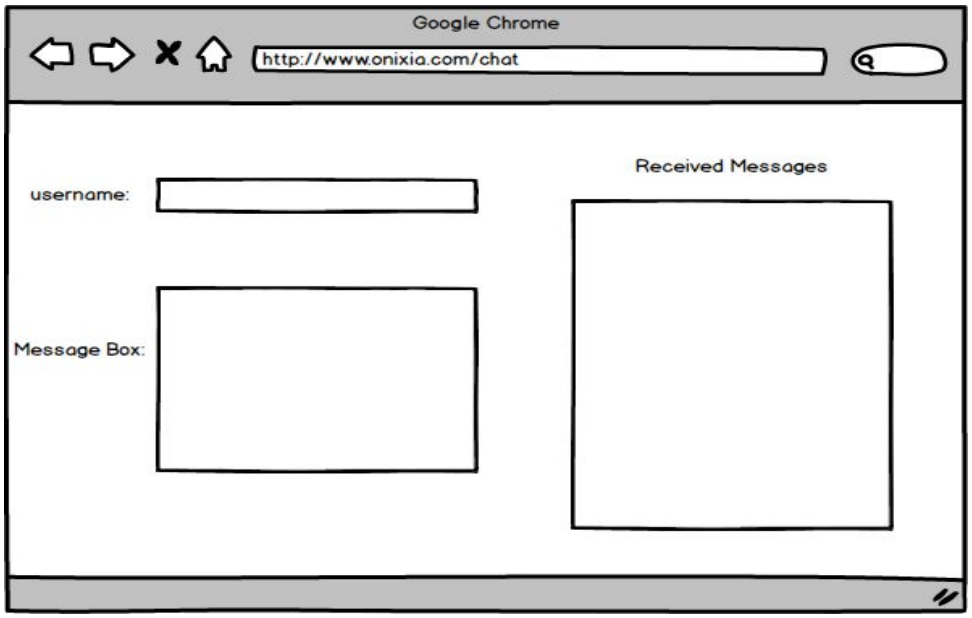
5.12.1 Edit Profile(Setting)



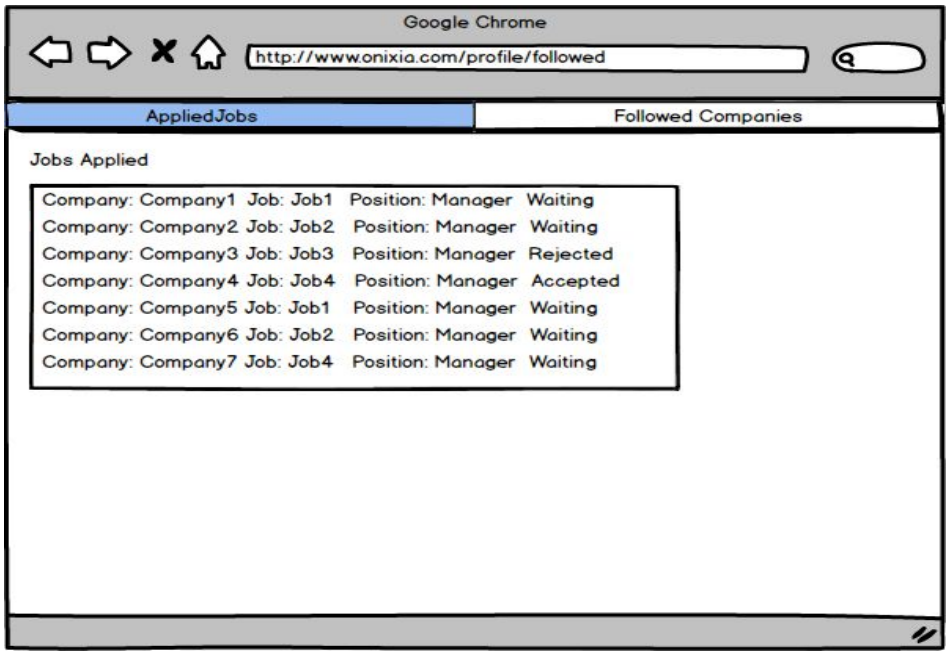
5.12.2 Post Review



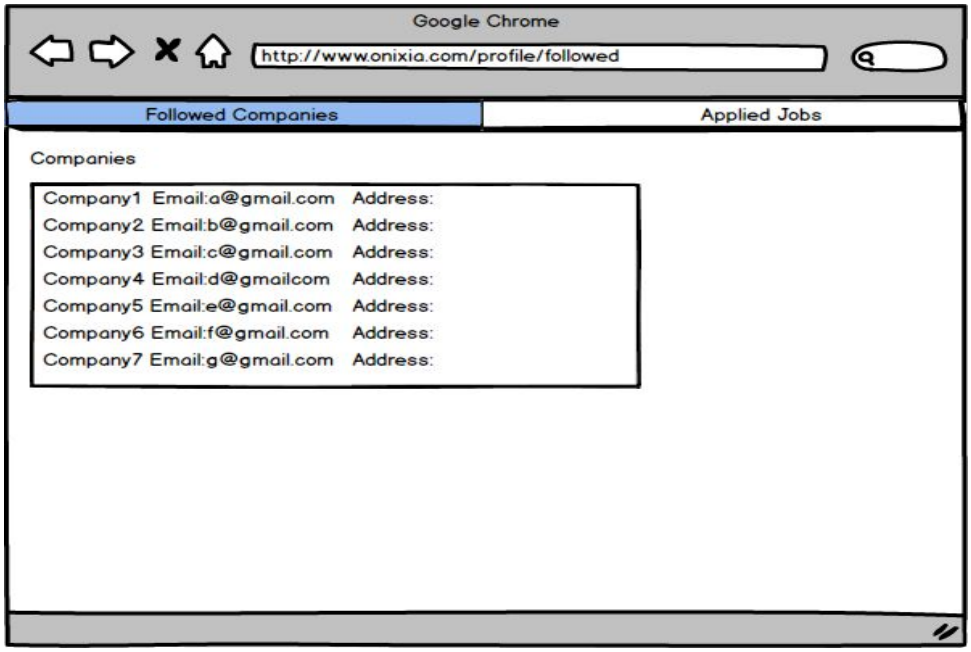
5.12.3 Chat



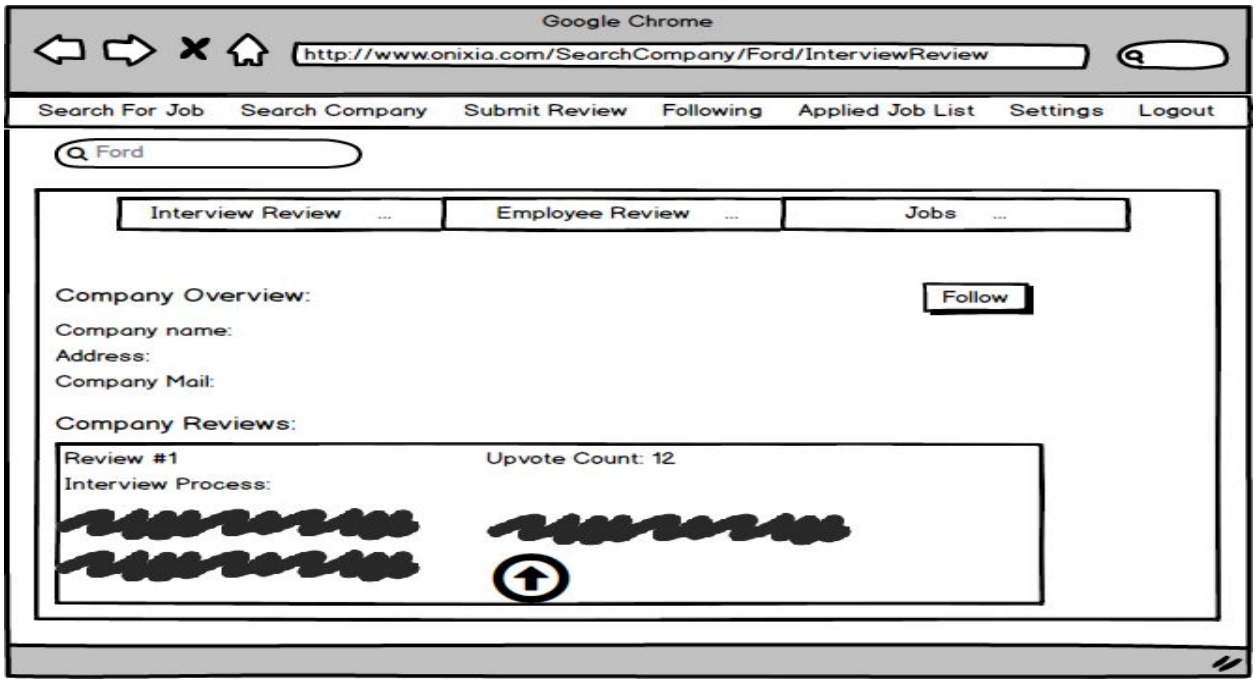
5.12.4 Applied Jobs



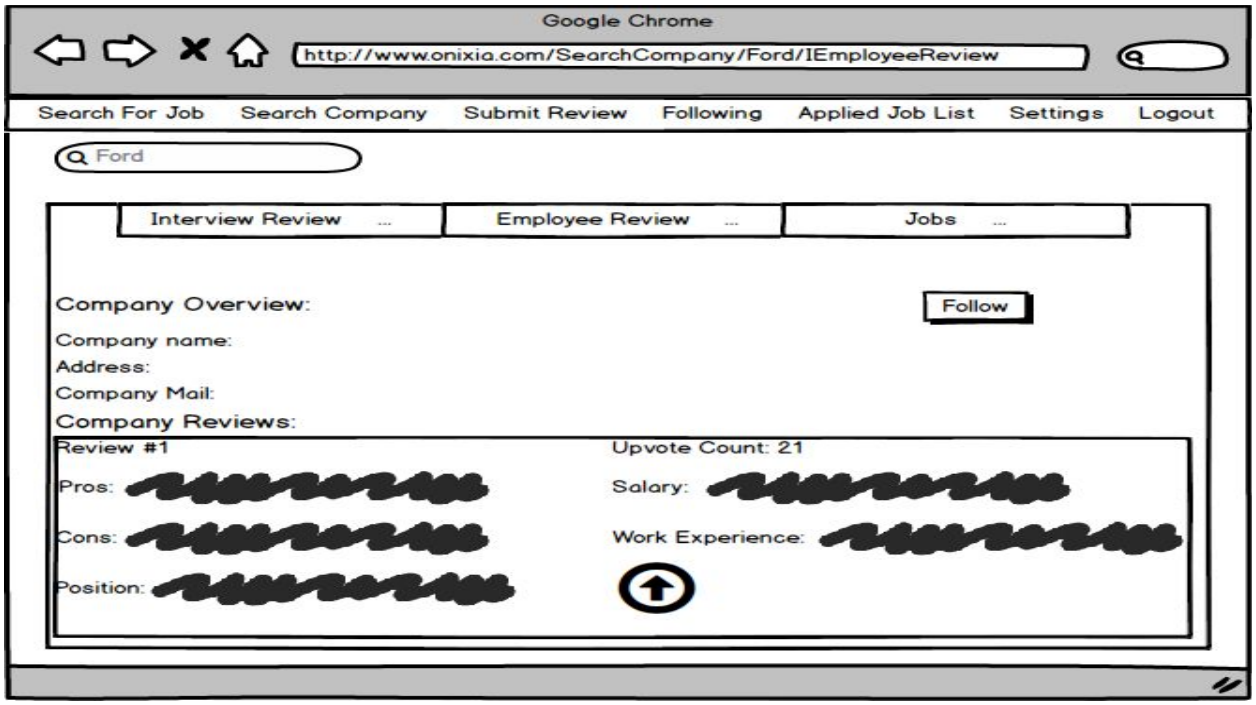
5.12.5 Followed Companies



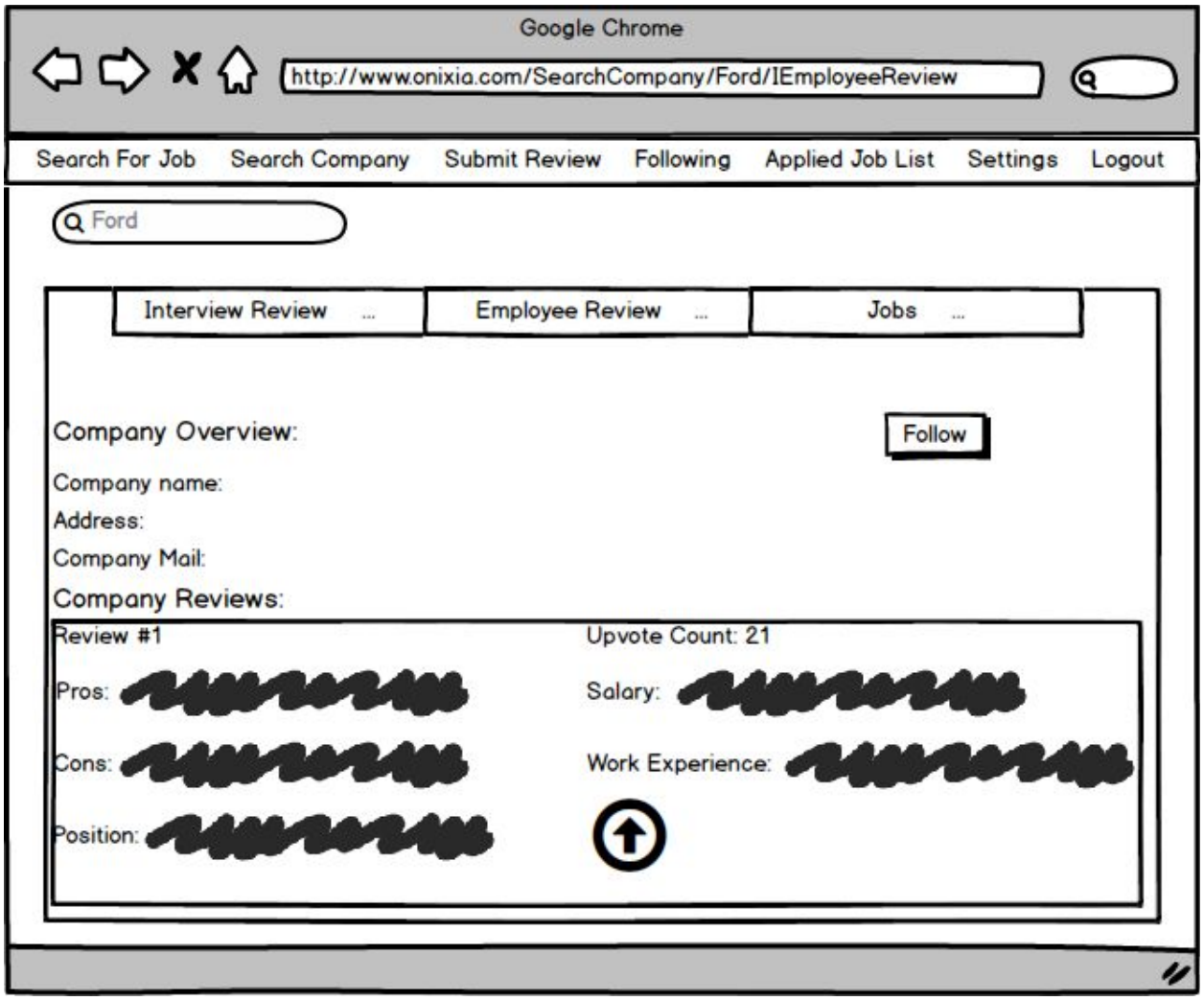
5.12.6 View Employee Review For a Company



5.12.7 View Interview Review For a Company



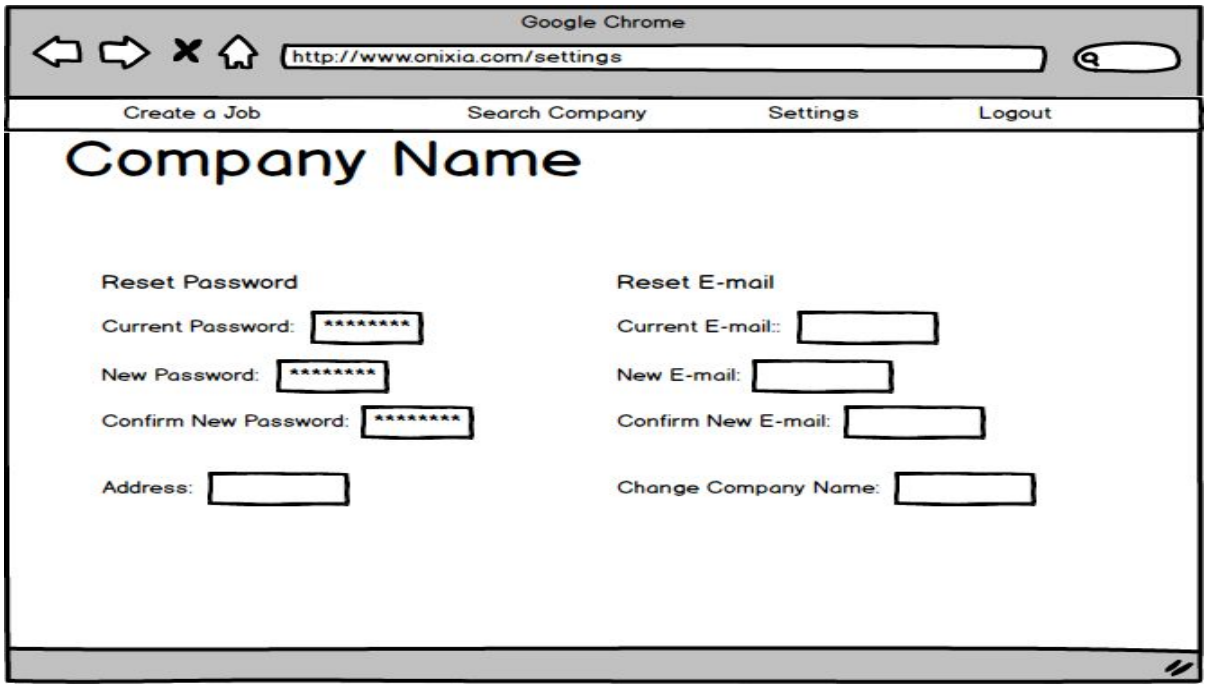
5.12.8 View Jobs For a Company



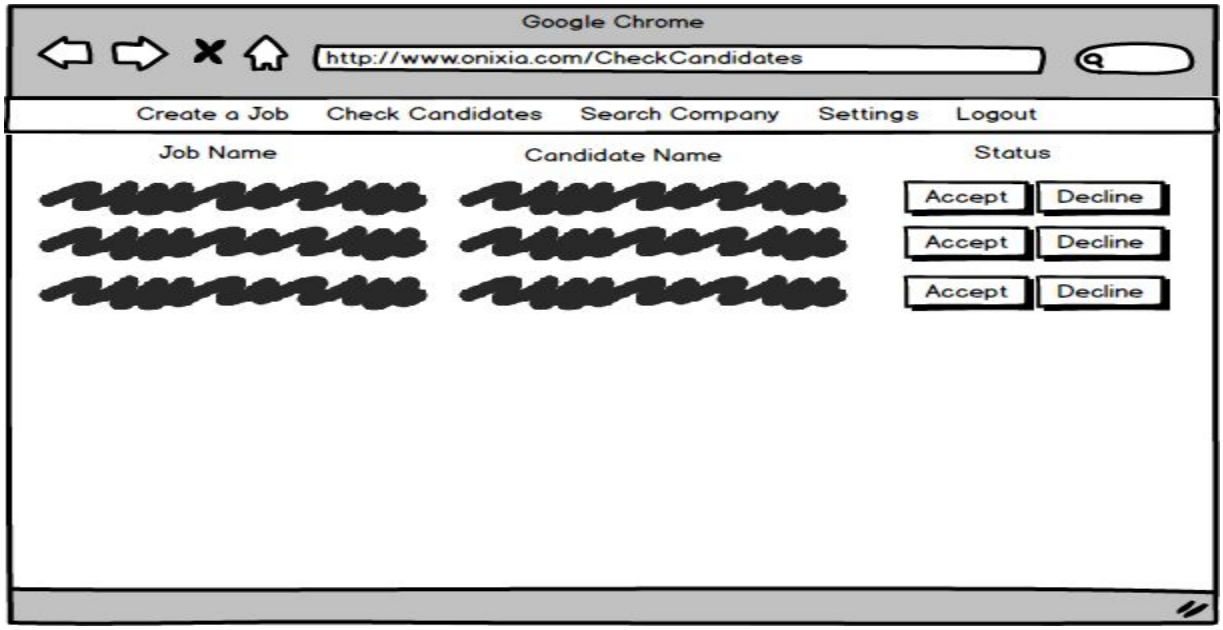
5.13 UI Design for Company

This UI design is for the company.

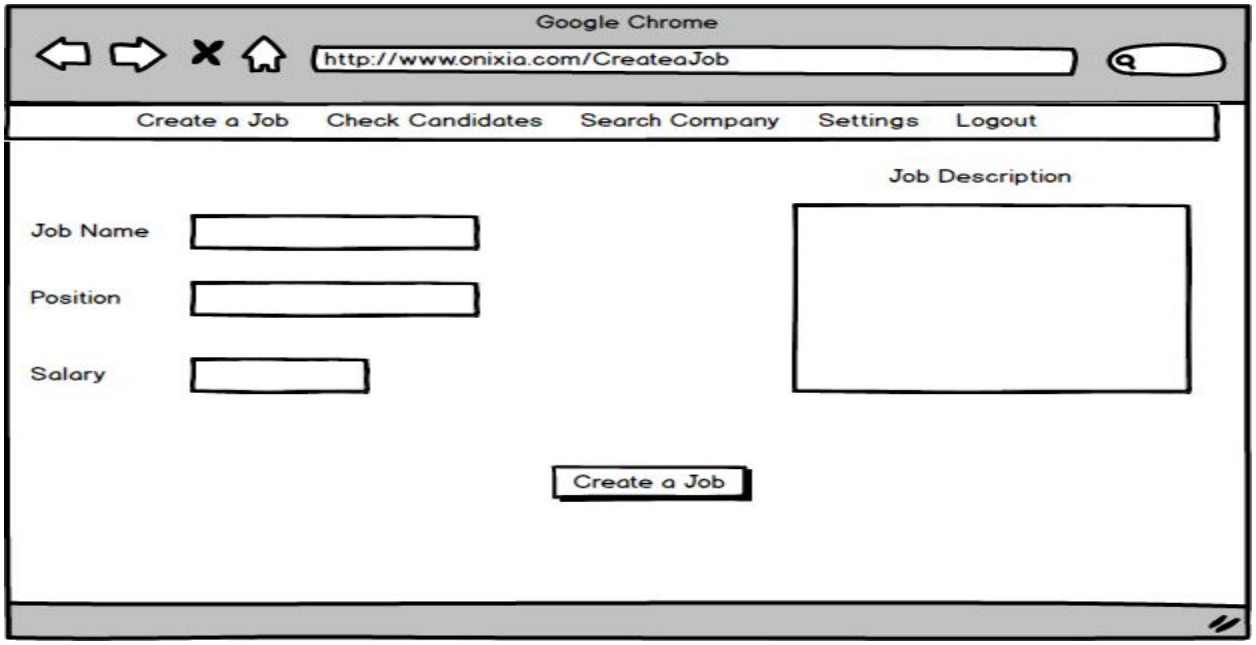
5.13.1 Company's Edit Profile Page(Settings)



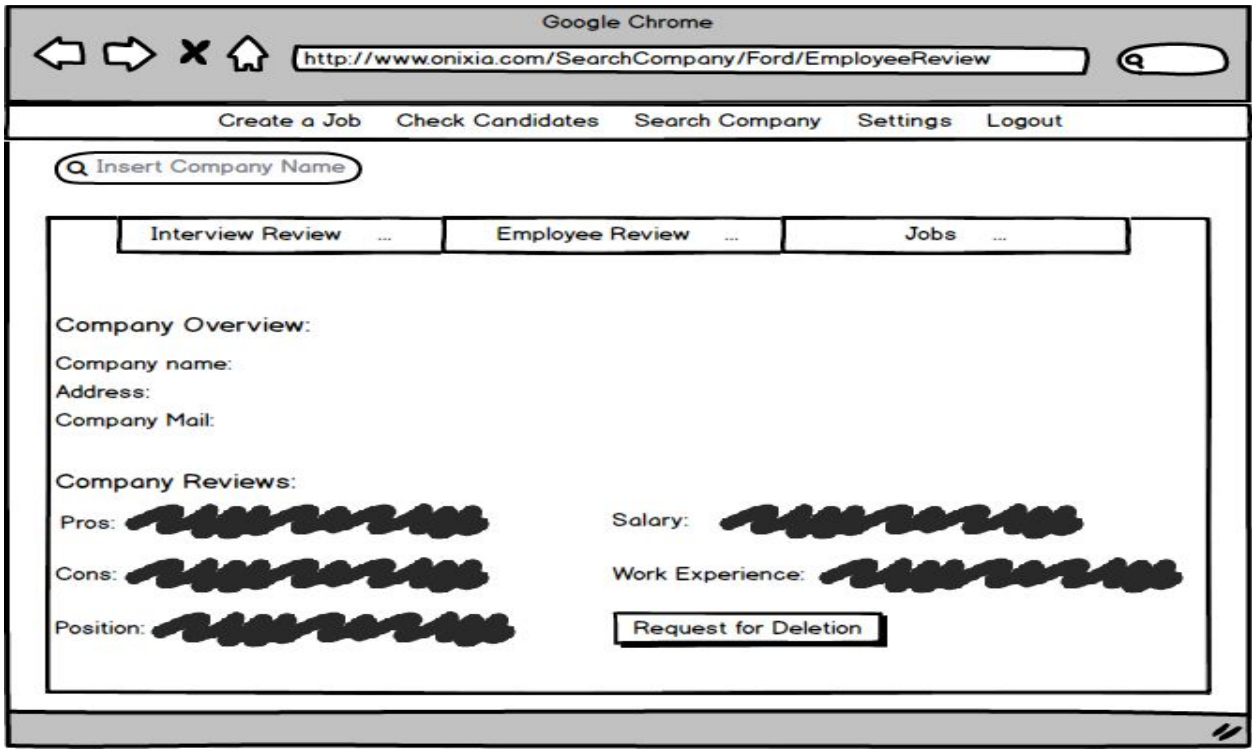
5.13.2 Check Candidate Page



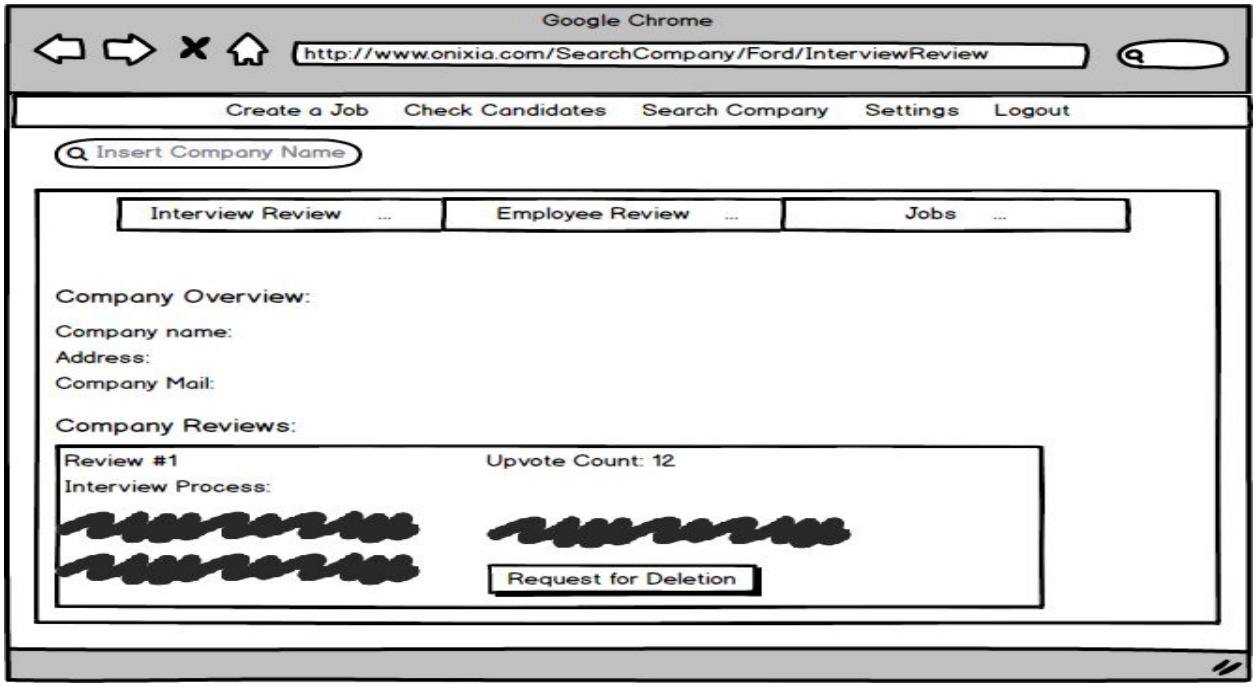
5.13.3 Create Job Page



5.13.4 View Employee Review For a Company



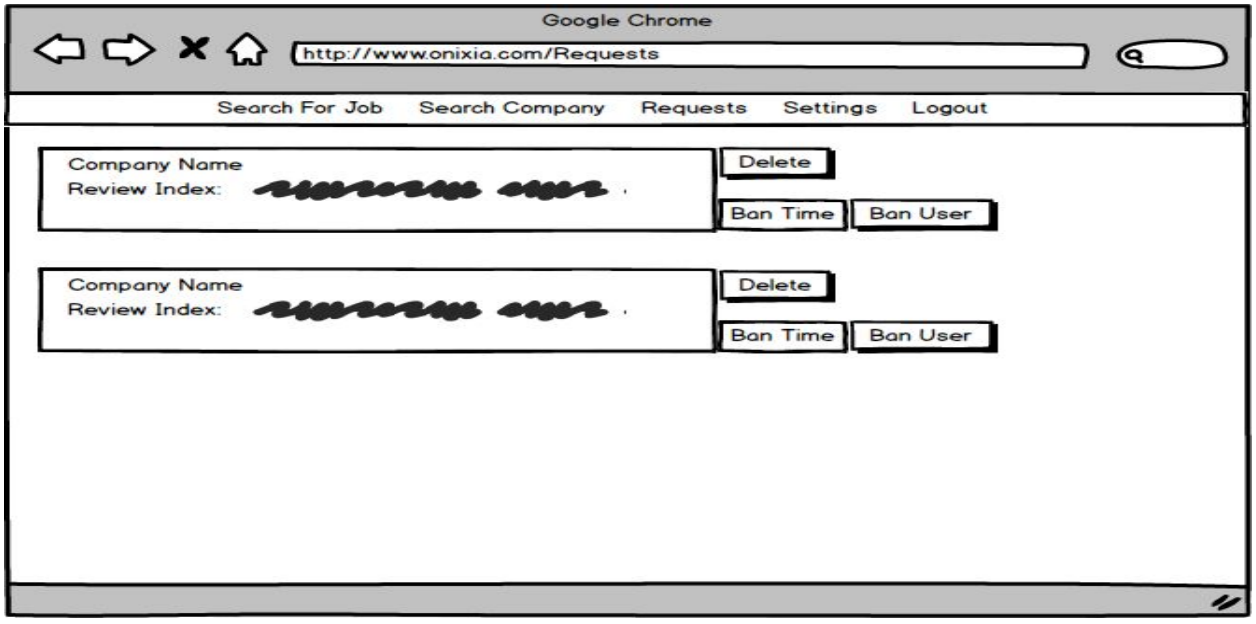
5.13.5 View Interview Review For a Company



5.14 UI Design for Admins

This UI design is for Admins only.

5.14.1 Check Request Page



UI designs for review pages for a particular company is same with the user's design. The only difference is instead of upvote button, it has delete review and ban the user button.

6.ADVANCED DATABASE COMPONENTS

6.1.Top10 users

A view to see top 10 users with most liked reviews is below.

```
CREATE VIEW users_top10(name,rank)
SELECT username, MAX(likeCount/viewCount) AS m
FROM Post NATURAL JOIN Review NATURAL JOIN User
GROUP BY username
ORDER BY m DESC
LIMIT 10
```

6.2. Sorting reviews for a particular company

```
CREATE VIEW users_top10c(name,rank)
SELECT username, MAX(likeCount/viewCount) AS m
FROM Post NATURAL JOIN Review NATURAL JOIN User
WHERE CompanyName = @CompanyName
GROUP BY username
ORDER BY m DESC
```

6.3. Follow Rank

A view to see top 10 followed companies.

```
CREATE VIEW (CompanyName, follower)
SELECT CompanyName, count(CompanyID) AS c
```

```
FROM Company NATURAL JOIN Follows
GROUP BY CompanyName
ORDER BY c DESC
LIMIT 10
```

6.4 Triggers

- When a new review is added to the database, the related top10 list can change and this feature requires trigger.
- When an user is banned, s/he cannot send any reviews and this procedure starts as soon as after the ban by adding this user to the ban table.
- When a company approve an application, the user will immediately informed by his/her profile.

7.IMPLEMENTATION PLAN

To implement our project, we planned to use PHP, JSP, JQuery, HTML and CSS and for the data management, we will use MySQL.

8.WEBSITE

https://github.com/gmuslu/CS353/tree/master/doc