Summary

ID	Name	Contribution
2020A7PS0080U	Bharathwaj M	Queries
2020A7PS0107U	Ishan Anthony Menezes	Queries, RA, RC
2020A7PS0128U	Anurag Kumar Jha	Application Backend
2020A7PS0198U	Ahmed Thahir	Diagrams, Documentation
2020A7PS0221U	Anmol Deepak Kumar	Normalization, Report

Title

Recruitment Database Management System

Repository

The code and the documentation for this project is available on this Github Repo.

Concepts Used

- [x] ER Model
- [x] ER Diagram
- [x] Relational Model
- [x] Schema Diagram
- [x] Tuple Relational Calculus
- [x] Domain Relational Calculus
- [x] Normalization (1NF, 2NF, 3NF)
- [x] mySQL
  - [x] Queries
  - [x] Subqueries
  - [x] Joins
  - [x] Functions
  - [x] Procedures
  - [x] Triggers
- [x] GUI implementation

Acknowledgement

Firstly, we would like to thank our family and friends for their constant support throughout our academic life and for this project in particular. They are who inspire us to keep marching forward in our academic journey.

Secondly, we would like to express our sincere gratitude to all Department of Computer Science Professors for allowing us to apply our expertise in this assignment. This project has been a very good opportunity to test our skills.

Thirdly, we would like to thank Mr. Ahamed Jameel, who proposed this idea to help out his (and Thahir's) hometown get better employment opportunities in the UAE. His guidance and ideas throughout this project have been insightful and valuable. We hope that this project turns out to be fruitful and helps out a lot of people.

Furthermore, we would like to thank our university BITS Pilani, Dubai Campus for providing us with the required infrastructure to facilate efficient learning, especially at the time of a [declining] pandemic.

Lastly, our humble and noteworthy appreciation is due to Ms. Sapna Sadhwani, Dr. Tamizharasan Periyaswamy and Dr. Pramod Gaur for their guidance and assistance in the completion of this assignment. We are also grateful to all the Department of Computer Science faculty for giving us the required knowledge to program using the mySQL querying language to implement our ideas for this project.

Table of Contents

Introduction

Historical Background

The job industry is booming with millions of job seakers each years. One of the most crucial elements which the job industry depends upon is the Database Management System, which is used to store, organize and retrieve the details of applicants. This requires a robust and efficient design of the Database to manage the data so that it can be accessed, modified, and stored quickly, with minimal storage space.

Thahir's hometown Kayalpatnam currently has a large number of job seekers in the UAE. We would like to use this application to help them reach potential employers.

Theory

The following is the theory relevant to this project.

Database

A database is a collection of data.

Relational Database

A database is a collection of data, in the form of rows and columns.

Transaction

A transaction is an atomic unit of a database operation. Hundreds of transactions may take place concurrently at any instant. A transaction may be one of the CRUD operations

- Create
- Read
- Update (or Insert)
- Delete

DBMS

A 'DataBase Management System' is a system for handling large amounts of data stored in one or more databases. It is also called as a 'Transaction Processing System'.

Querying Language

A querying language is a set of commands that facilitates database operations.

Database Design

There are various ways of designing the structure(schema) of a database. The database must be designed well before inserting values, to ensure inconsistencies.

The logical schema depicts the structure of the database, showing the tables, columns, and relationships with other tables in the database, and is a direct mapping of the Entity-Relationship diagram. The physical schema is created by actually generating the tables, columns, and relationships in the DBMS, using a querying language.

Relational databases are ACID-compliant, but NoSQL aren't

- Atomicity
  If any sub-steps of a transaction fails, the whole transaction must fail and the database must be in the same state as the original.
- Consistency
  Correct data is ensured through constraints
- Isolation
  Concurrent-Execution Safe
  Simultaneous transactions must be considered as multiple sequential transactions.
- Durability
  Committed transactions must be stored to a non-volatile memory, to prevent loss of data.

ER Model

A database is modelled as

- entity set
- relationship sets

Term	Meaning	Example

Term	Meaning	Example
Entity	unique object	specific person, company
Entity Set	set of entities	
Attributes	properties/features of an entity/relationship	name, age
Composite Attributes	sub-attributes	first name, last name
Relationship	association among several entites	
Relationship Sets	set of relationships	
Degree of Relationship Set	no of entity sets that participate in a relationship set	
Mapping Cardinalities	Type of mapping	One-One One-Many Many-One Many-Many

ER Diagram

A diagrammatic representation of the entities and relations used.

Shape	Meaning
Rectangle	Entity Set
Double Rectangle	Weak Entity Set entity without a primary key
Diamond	Relationship Set
Double Diamond	Weak Relationship Set relation connecting a weak entity with something else
Ellipse	Attribute
Dashed ellipse	Derived attribute
Double ellipse	Multi-valued attribute
Underline	Primary Key Attribute
Triangle	'is-a' relation
Lines	- Link attribute **to** entity set - Link entity set **to** relationship set
→	one
–	many

Relational Model

A database is a collection of relations, where each relations is a table.

Schema Diagram

A diagrammatic representation of the relations used.

Normalization

It is the process of structuring a database, usually a relational database, in accordance with a series of so-called normal forms in order to reduce data redundancy and improve data integrity.

	1NF	2NF	3NF	BCNF	4NF	5NF
No Multi-Valued Attributes	✓	✓	✓	✓	✓	✓
No Partial Dependency		✓	✓	✓	✓	✓
No Transitive Dependency			✓	✓	✓	✓
LHS = Candidate/Super Key				✓	✓	✓
No Multi-Attribute Dependency					✓	✓
Lossless Decomposition						✓

Tools

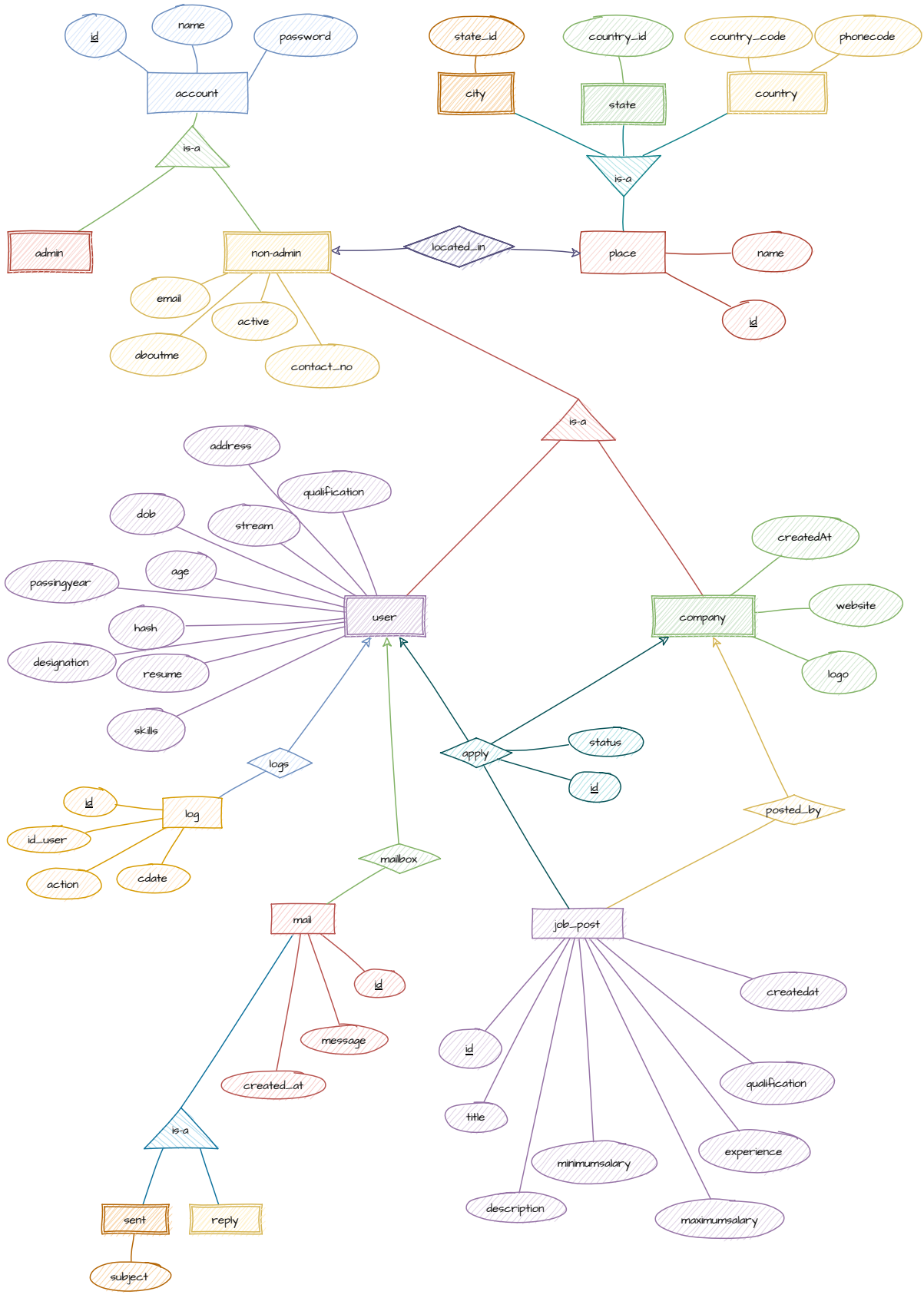
Tool	Full Form	Use
HTML	HyperText Markup Language	Layout of web pages
CSS	Cascading Style Sheets	Design of web pages
Bootstrap		CSS framework for developing responsive web pages
Php	Hypertext Preprocessor	Backend - Calling SQL - Serving dynamic content to user
mySQL	My Structured Query Language	Structured Relational Database Querying Language
Xampp	cross-platform, Apache, MySQL, PHP and Perl	- Database manipulation - Locally hosting the website

Limitations

The following are the drawbacks of our project. We plan on addressing these issues in the future.

1. Dynamic Sites are not as performant as static sites
2. Filters are not dynamic currently (it is hard-coded)
3. There are a few hyperlinks which don't work properly.
   For example, report button down as the site is not hosted on any server
4. The webpage is hosted locally at the moment. Needs to be run on the server
5. Relational database paradigm is not the most efficient to deal with a networking model, with unstructured data. A NoSQL paradigm could be used in the future to deal with large loads.

ER Diagram


id
name
password
account
is-a
admin
non-admin
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active
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state_id
city
country_id
state
country_code
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is-a
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apply
status
id
posted_by
mailbox
mail
id
message
created_at
is-a
sent
reply
subject
job_post
createdat
id
qualification
title
minimumsalary
experience
description
maximumsalary

Normalization

In this project, we have only reached till 3NF. This is because BCNF and onwards may lead to lossy decomposition, with respect to the functional dependencies.

Functional Dependencies

```
admin → id_admin, username, password
```

```
apply_job_post → id_apply, id_jobpost, id_company, id_user, status
```

```
cities → id,name,state_id
```

```
company → id_company, name, companyname, country, state, city,
contactno, website, email, password, aboutme, logo, createdAt,
active
```

```
countries → id, country_code, name, phonecode
```

```
job_post → id_jobpost, id_company, jobtitle, description,
minimumsalary, maximumsalary, experience, qualification, createdat
```

```
mailbox → id_mailbox, id_fromuser, fromuser, id_touser, subject,
message, createdAt
```

```
reply_mailbox → id_reply, id_mailbox, id_user, usertype, message,
createdAt
```

```
states → id, name, country_id
```

```
users → id_user, firstname, lastname, email, password, address,
city, state, contactno, qualification, stream, passingyear, dob,
age, designation, resume, hash, active, aboutme, skills
```

1NF

```
R(id_admin, username, password, id_apply, id_jobpost, id_company,
id_user, status, id, name, state_id, id_company, name, companyname,
country, state, city, contactno, website, email, password, aboutme,
logo, createdat, active, id, country_code, name, phonecode,
id_jobpost, id_company, jobtitle, description, minimumsalary,
maximumsalary, experience, qualification, createdat, id_mailbox,
id_fromuser, fromuser, id_touser, subject, message, createdAt,
id_reply, id_mailbox, id_user, usertype, message, createdAt, id,
name, country_id, id_user, firstname, lastname, email, password,
address, city, state, contactno, qualification, stream,
passingyear, dob, age, designation, resume, hash, active, aboutme,
skills)
```

3NF

```
R1(id_admin, username, password)
```

```
R2(id_apply, id_jobpost, id_company, id_user,status)
```

```
R3(id, name, state_id)
```

```
R4(id_company, name, companyname, country, state, city, contactno,
website, email, password, aboutme, logo, createdat, active)
```

```
R5(id, country_code, name, phonecode)
```

```
R6(id_jobpost, id_company, jobtitle, description, minimumsalary,
maximumsalary, experience, qualification, createdat)
```

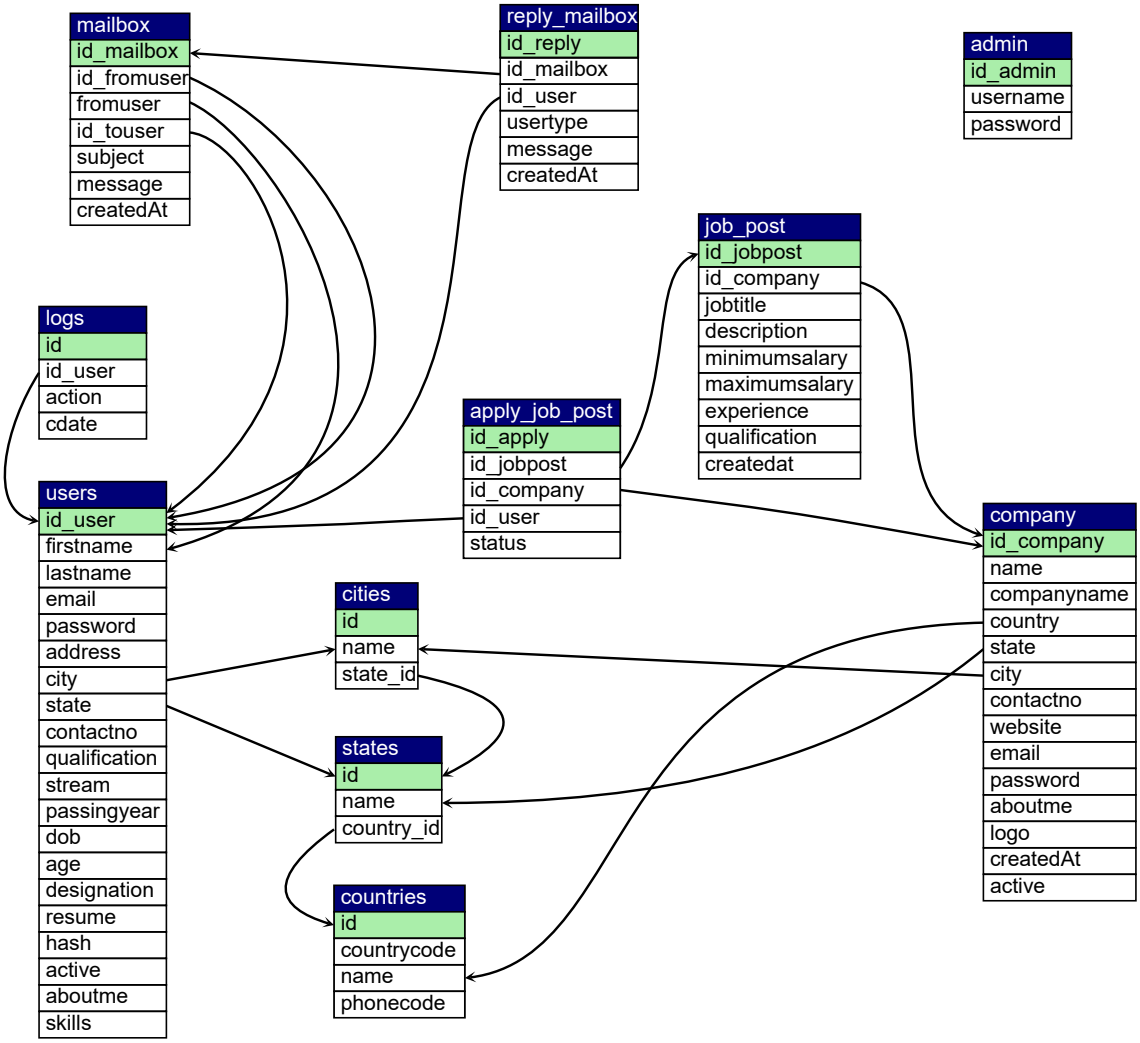
```
R7(id_mailbox, id_fromuser, fromuser, id_touser, subject, message,
createdat)
```

```
R8(id_reply, id _mailbox, id_user, usertype, message, createdAt)
```

```
R9(id, name, country_id)
```

```
R10(id_user, firstname, lastname, email, password, address, city,
state, contactno, qualification, stream, passingyear, dob, age,
designation, resume, hash, active, aboutme, skills)
```

Schema Diagram



Design

Table	Details
`admin`	- admin username - admin password - Holds details about the active companies registered, candidates registered, total job posts and total applications. - Permissions to remove any user or candidate - Any company before being able to recruit and post jobs must be verified by the admin.
`job_post table`	- details of jobs posted by a company. - contains the id of the company which posted the job, the job title and desription. - contains minimum salary , maximum salary, and qualifications for filtering out candidates. - `createdat` attribute is used for showcasing the latest 4 jobs in the home page.
`apply_job_post`	Id_apply: acts as primary key with auto increment on Id_job_post: acts as the id for the GET method of php for opening the specific webpage having job decription Id company/user : id of user or the company Status: status of the job post depending on the admin. A job post is published only after validation by the admin.

`City`
`state`
`country`
	- Large database of the cities, states and tables connected together by id of state and
	countries.
	- Created separately since while creating forms the option to select country comes first, then the state and then the city.
	- None of these are compulsory so the 3 tables are kept separately so that if a user only provides country or country-state it works as well.

`Company`	- Consists of all the details of the country. The logo is stored as image format in the uploads folder. - Any company before being to operate must be able to be verified from the admin when their active column changes from 2 to 1.
`Users`	- Similar to the companies these include all the users looking for jobs. - The resume is stored as pdf(size smaller than 5 mb) and is stored in the uploads folder. - The passwords are stored after applying decoding so that even the admin or the superuser can’t access the password.
`Logs`	- contains the log of user activity - updated with the activity of user whenever a new user is created, updated or deleted.
`Mailbox` `Reply`	- Inbuilt mailing technique b/w the users and the companies, the user can have converstion with the employee who have interest in their application. - The design is similar to Gmail - all the information is stored in the sql file i.e. the message, from, to and the date.

Implementation

Connections

Let's see how a connection with mysql is made.

In all the php pages which require access to database we include the db.php. db.php is a php which is used for establishing the sql connection. Rather than writing all of that separately in all the php files, we have created one db file and included this in all which we require.

For running any SQL query we just write the query similar to that in SQL and then run it using the
connection established.

```
$result = $conn→query($sql);
```

PHP File Roles

PHP File	Role
`index`	The main php file that opens up at the start. Contains link to other pages like login and register and also the admin login. Shows 4(using sql limit) recently available job offers at the centre.
`jobs`	Contains the job offers 4 per page(again by using limit 4, for this code is written in `jobpagination.php`). The filters applied are using the help of search.php which applies the filters of city and experience. Currently the cities are navi-mumbai and Bengaluru but more can be added as required. Clicking on any of these open the `view-job-post.php`
`view-job-post`	- also has an id at the end of url required to identified which job post page to open as all have the same format. - This id is sent using the GET method of php.

`login`
`signup`
`register`
	- These are the pages which open the login and signup pages.
	- The details of username and password are checked using the `checklogin.php` and `checkcompanylogin.php`.
	- All the login and register pages have the standard php code for validation of phone number, email id, pdf size etc.
	- These can be seen at W3Schools itself.

Folders of
`user`
`company`
`admin`
	- These contain the php pages to be loaded when the corresponding people are logged in.
	- This is known by using the session global variable of php to know which of these is set.
	- The php files within are pretty simple to those mentioned above with the exception that these are a little more specified for the particular kind of user.

Inbuilt Queries

`addcompany.php`

Check if the email already exists so that every new company created has a new email.

```
$sql = "SELECT email FROM company WHERE email='$email'";
```

Inserting new data retrieved from the form into the company table

```
$sql = "INSERT INTO company(name, companyname, country, state,
city,
contactno, website, email, password, aboutme, logo) VALUES
('$name',
'$companyname', '$country', '$state', '$city', '$contactno',
'$website',
'$email', '$password', '$aboutme', '$file')";
```

adduser.php

Similar to the above to check if the file already exists.

```
$sql = "SELECT email FROM users WHERE email='$email'";
```

Inserting data into the user table

```
$sql = "INSERT INTO users(firstname, lastname, email, password,
address, city, state, contactno, qualification, stream,
passingyear, dob, age, designation, resume, hash, aboutme, skills)
VALUES ('$firstname', '$lastname', '$email', '$password',
'$address', '$city', '$state', '$contactno', '$qualification',
'$stream', '$passingyear', '$dob', '$age', '$designation', '$file',
'$hash', '$aboutme', '$skills')";
```

apply.php

This is not a file directly associated with the front end but called for processing of another file.

Retrieve all the data from the job_post table where id is taken from the GET function of php.

```
$sql = "SELECT * FROM job_post WHERE id_jobpost='$_GET[id]'";
```

Check if the user has applied to the job post or not.

```
$sql1 = "SELECT * FROM apply_job_post WHERE
id_user='$_SESSION[id_user]' AND
id_jobpost='$row[id_jobpost]'";
```

Whenever a user applies for a job the details need to be added to the apply_job_post table.

```
$sql = "INSERT INTO apply_job_post(id_jobpost, id_company, id_user)
VALUES ('$_GET[id]', '$id_company', '$_SESSION[id_user]')";
```

checkcompanylogin.php

Check if the login is correct or not.

```
$sql = "SELECT id_company, companyname, email, active FROM company
WHERE email='$email' AND password='$password'";
```

checklogin.php

Check if the login is correct or not.

```
$sql = "SELECT id_company, companyname, email, active FROM company
WHERE email='$email' AND password='$password'";
```

`city.php`
Select the cities from states. Similar is with the case in `state.php` in a layer by layer like fashion.

```
$sql = "SELECT * FROM cities WHERE state_id='$_POST[id]'";
```

`index.php`
Select 4 most recent job offers to display at the main screen.

```
$sql = "SELECT * FROM job_post Order By createdat Limit 4";
```

Other sql commands are the simple select commands to get the count of various elements.

`jobpagination.php`
Choosing 4 job posts at a time.

```
$sql = "SELECT * FROM job_post LIMIT $start_from, $limit";
```

`search.php`
Search specific company on the basis of inputted name.

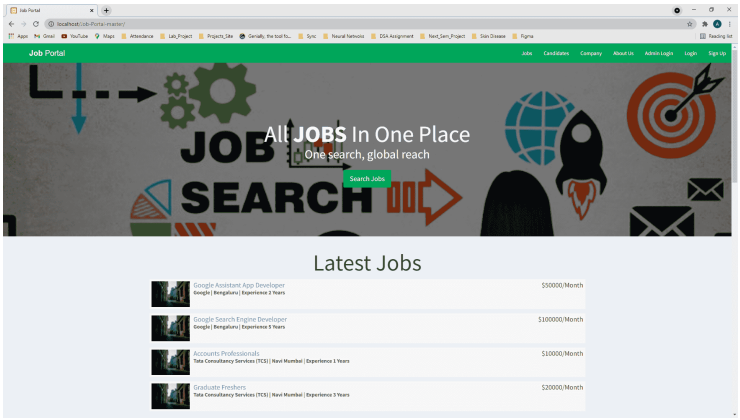
```
$sql = "SELECT * FROM job_post WHERE jobtitle LIKE '%$search%'
LIMIT $start_from, $limit";
```

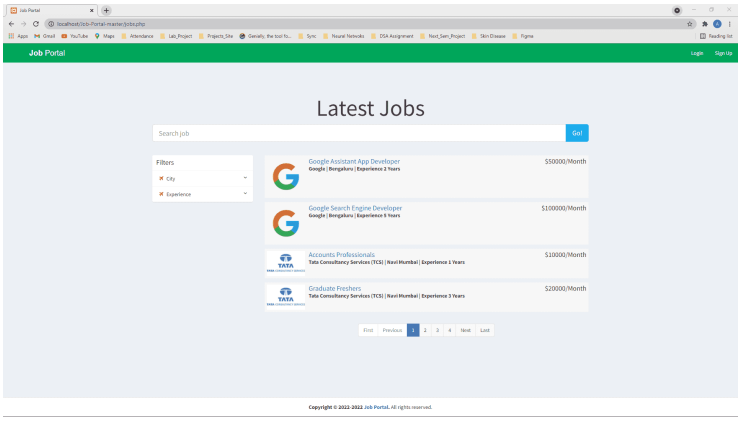
`view-job-post.php`
Select details of the specific company on on the page on the basis of id sent by GET method of php.

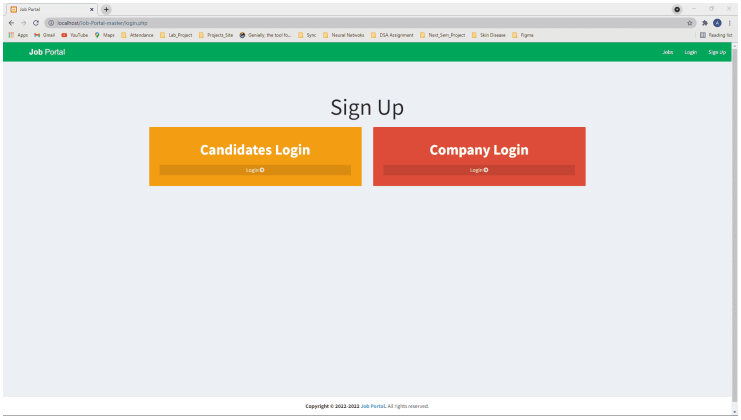
```
$sql = "SELECT * FROM job_post INNER JOIN company ON
job_post.id_company=company.id_company WHERE
id_jobpost='$_GET[id]'";
```

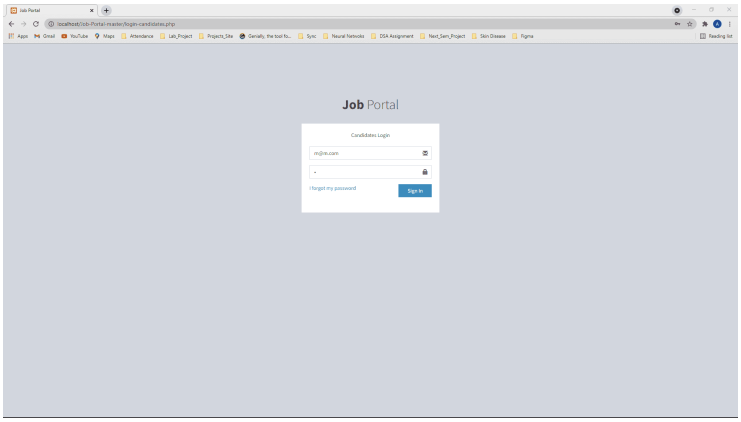
Similar queries in the user, company and admin php files for the specific user types.

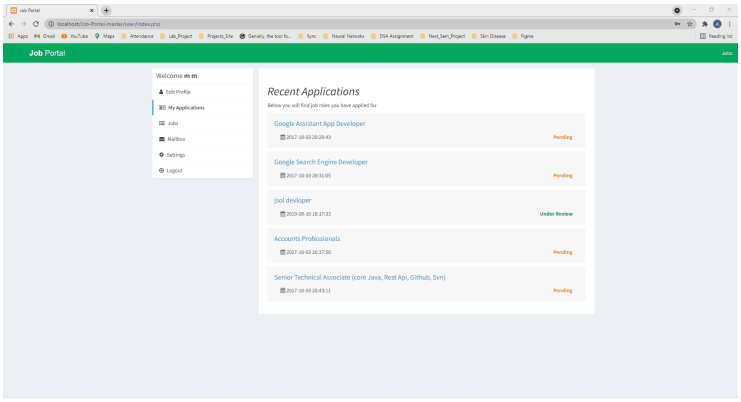
Screenshots










Job Portal
Welcome m m
Edit Profile
My Applications
Jobs
Mailbox
Settings
Logout
Recent Applications
Below you will find job roles you have applied for
Google Assistant App Developer
Pending
Google Search Engine Developer
Pending
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Under Review
Accounts Professionals
Pending
Senior Technical Associate (core Java, Rest Api, Github, Svn)
Pending
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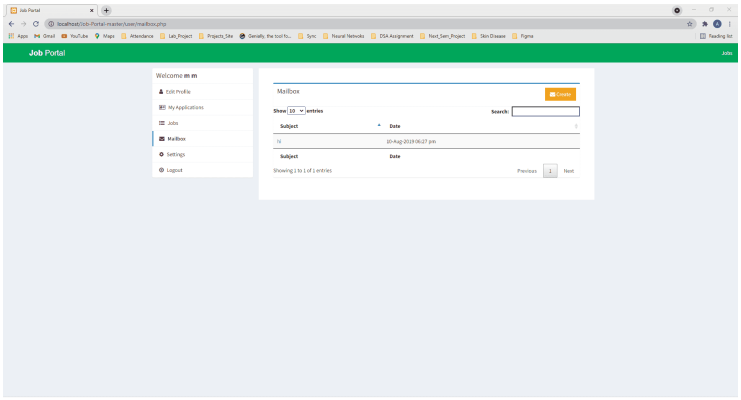
Job Portal
Welcome m m
Edit Profile
My Applications
Jobs
Mailbox
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Show 10 entries
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Subject
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Showing 1 to 1 of 1 entries
Previous
Next
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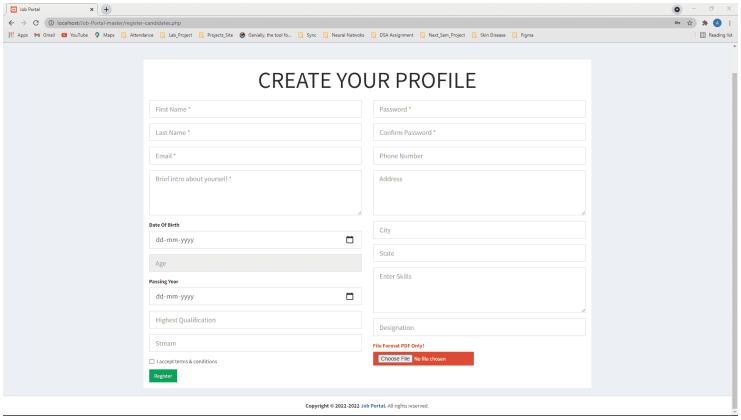
CREATE YOUR PROFILE
First Name *
Last Name *
Email *
Brief intro about yourself *
Date Of Birth
dd-mm-yyyy
Age
Passing Year
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Highest Qualification
Stream
I accept terms & conditions
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Password *
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Designation
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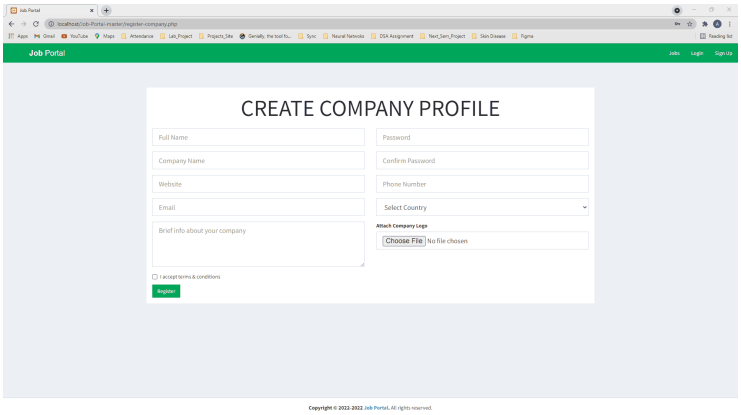
Job Portal
Jobs
Login
Sign Up
CREATE COMPANY PROFILE
Full Name
Company Name
Website
Email
Brief info about your company
I accept terms & conditions
Register
Password
Confirm Password
Phone Number
Select Country
Attach Company Logo
Choose File No file chosen
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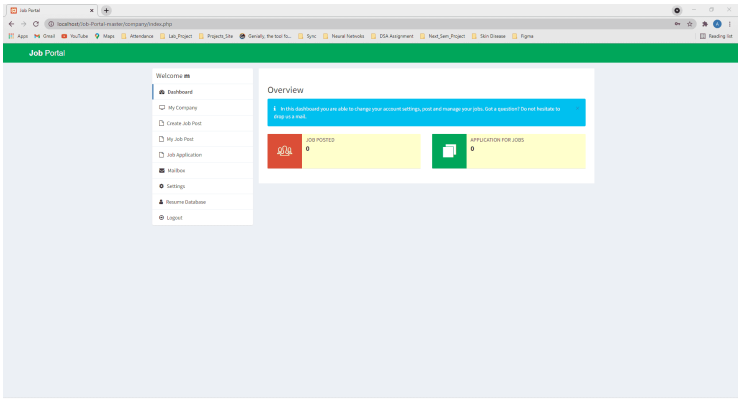

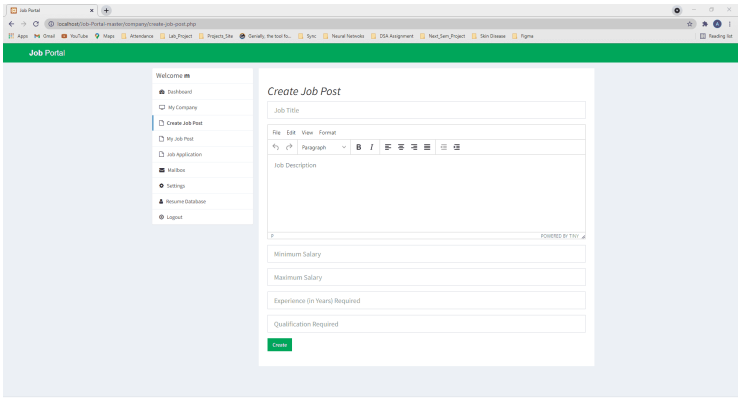

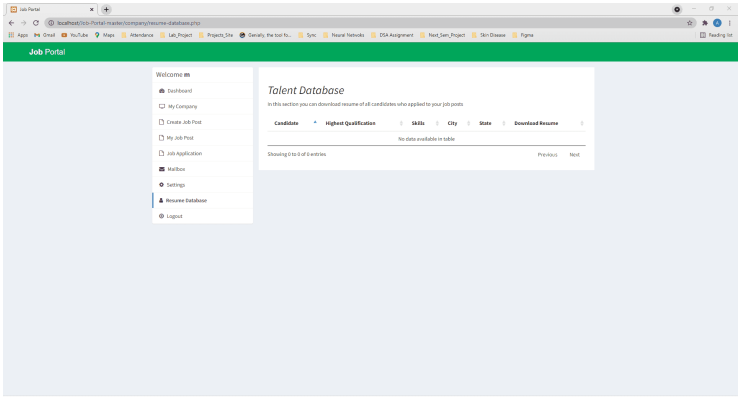

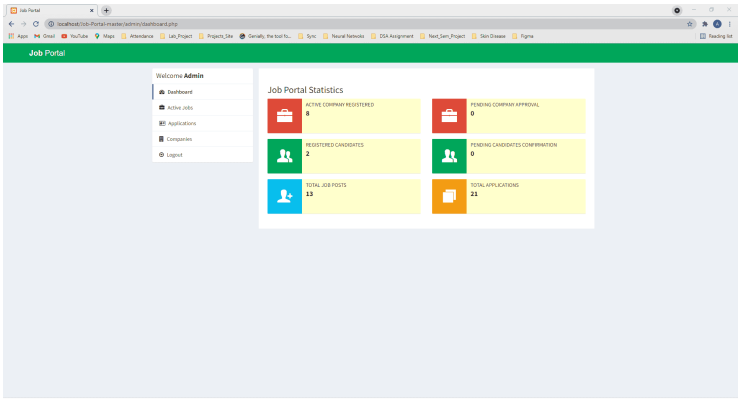

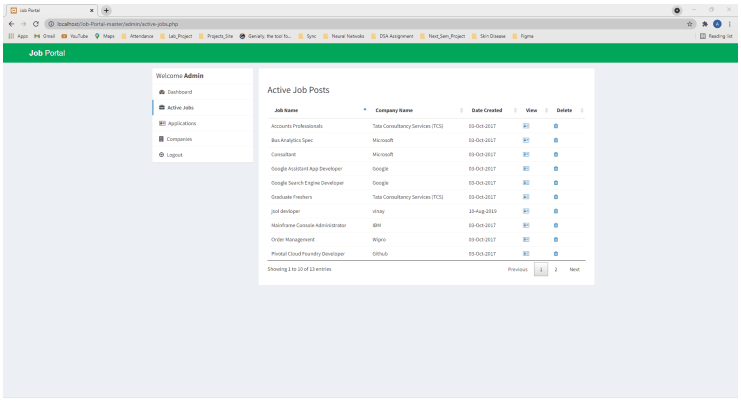

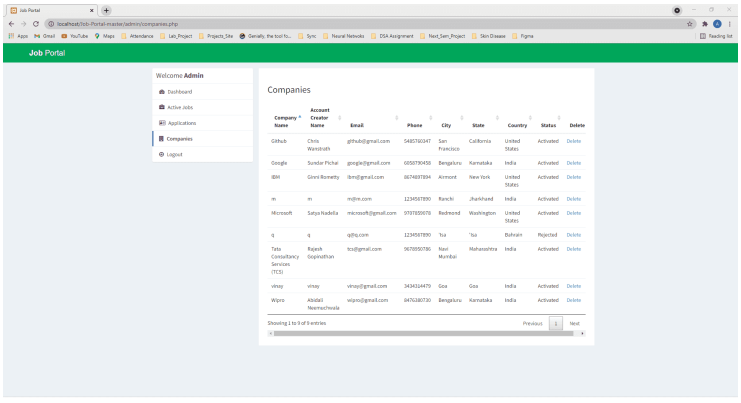

Other Queries

Retrieve company number from name

```
delimiter //
create function contact_from_company(input_companyname
varchar(255))
returns varchar(255)
begin
  return (select contactno
    from company
    where company.companyname= input_companyname);
end //
delimiter ;

select * from contact_from_company(*some company name*);
```

RA

$$\pi_{\text{contactno}}(\sigma_{\text{companyname='companyname'}}(\text{company}))$$

TRC

$$\{t|\exists c \in \text{company}(t[\text{contactno}]=c[\text{contactno}] \wedge c[\text{companyname}]='\text{companyname}')\}$$

DRC

$$\{< co > |\exists ic,n,cn,c,st,ci,w,e,p,a,l,cd,ac(\ < ic,n,cn,c,st,ci,co,w,e,p,a,l,cd,ac >\in \text{company} \wedge cn='\text{companyname}')\}$$

Retrieve qualifying jobs

```
delimiter //
create procedure job_from_qualification(input_id_user int(11))
begin
select companyname, jobtitle, description, minimumsalary,
maximumsalary, experience
from users
where users.id_user=input_id_user
inner join job_post
on users.qualification=job_post.qualification;
end //
delimiter ;

call job_from_qualification(*some userid*);
```

RA

$$\pi_{\text{jobtitle,description,minimumsalary,maximumsalary,experience}}(\sigma_{\text{id\_user='userid'}}(\text{users} \bowtie \text{job\_post}))$$

TRC

$$\{t|\exists u \in \text{users}(u[\text{id\_user}]='\text{userid}' \wedge \exists j \in \text{job\_post}(\\ t[\text{jobtitle}]=j[\text{jobtitle}] \wedge t[\text{description}]=j[\text{description}]\wedge \\ t[\text{minimumsalary}]=j[\text{minimumsalary}] \wedge t[\text{maximumsalary}]=j[\text{maximumsalary}]\wedge \\ t[\text{experience}]=j[\text{experience}] \wedge u[\text{qualification}]=j[\text{qualification}]))\}$$

DRC

$$\{< \text{jt,desc,mins,maxs,ex} > | \exists \text{iu,fn,ln,em,pa,ad,ci,st,con,q,s,py,dob,age,desg,res,h,act,abt,sk}(< \text{iu,fn,ln,em,pa,ad,ci,st,con,q,s,py,dob,age,desg,res,h,act,abt,sk} > \in \text{users} \wedge \text{iu='userid'} \wedge \exists \text{ij,ic,crd}(< \text{ij,ic,jt,desc,mins,maxs,ex,crd} > \in \text{job\_post}))\}$$

Retrieve jobs in a city

```
SELECT j.companyname, j.jobtitle, j,description, j.minimumsalary,
j.maximumsalary, j.experience
FROM job_post as j, (SELECT id_jobpost, city
        FROM job_post, company
        WHERE job_post.id_company= company.id_company) as c
WHERE j.id_jobpost=c.id_jobpost AND c.city='city';
```

RA

$$\pi_{\text{companyname,jobtitle,description,minimumsalary,maximumsalary,experience}}(\sigma_{\text{city='city'}}(\text{job\_post} \bowtie \text{company}))$$

TRC

$$\{t|\exists j \in \text{job\_post}(t[\text{jobtitle}]=j[\text{jobtitle}] \wedge t[\text{description}]=j[\text{description}] \wedge t[\text{minimumsalary}]=j[\text{minimumsalary}] \wedge t[\text{maximumsalary}]=j[\text{maximumsalary}] \wedge t[\text{experience}]=j[\text{experience}] \wedge \exists c \in \text{company}(j[\text{id\_company}]=c[\text{id\_company}] \wedge c[\text{city}]=\text{'city'}))\}$$

DRC

$$\{< \text{cn,jt,desc,mins,maxs,ex} > | \exists \text{ij,ic,q,crd}(< \text{ij,ic,jt,desc,mins,maxs,ex,crd} > \in \text{job\_post} \wedge \exists \text{n,c,st,ci,co,w,e,p,ab,l,cd,a}(< \text{ic,n,cn,c,s,ci,co,w,e,p,a,l,cd,ac} > \in \text{company} \wedge \text{ci='city'}))\}$$

Retrieve user details if applied to a certain job

```
delimiter //
create procedure resume_from_apply_jobpost(input_id_jobpost
int(11))
begin
select id_user, email, resume
from users, apply_job_post
where apply_job_post.id_jobpost =input_id_jobpost and
apply_jobpost.id_user = users.id_user;
end //
delimiter ;

select * from resume_from_apply_jobpost(*some id_jobpost*);
```

RA

$$\pi_{\text{id\_user, email, resume}}(\sigma_{\text{id\_jobpost='jobpostid'}}(\text{users} \bowtie \text{apply\_job\_post}))$$

TRC

$$\{t|\exists u \in \text{users}(t[\text{id\_user}]=u[\text{id\_user}] \wedge t[\text{email}]=u[\text{email}] \wedge t[\text{resume}]=u[\text{resume}] \wedge \exists aj \in \text{apply\_job\_post}(aj[\text{id\_jobpost}]=\text{'jobpostid'} \wedge u[\text{id\_user}]=aj[\text{id\_user}]))\}$$

DRC

$$\{< \text{iu,em,res} > | \exists \text{fn,ln,pa,ad,ci,st,con,q,s,py,dob,age,desg,h,act,abt,sk}(< \text{iu,fn,ln,em,pa,ad,ci,st,con,q,s,py,dob,age,desg,res,h,act,abt,sk} > \in \text{users} \wedge \exists \text{ia,ij,ic,stat}(< \text{ia,ij,ic,iu,stat} > \in \text{apply\_job\_post} \wedge \text{ij='jobpostid'}))\}$$

Retrieve qualified jobs greater than some salary

```
delimiter //
create procedure job_from_minimumsalary(input_id_user int(11),
input_minimumsalary varchar(255))
begin
select companyname, jobtitle, description, minimumsalary,
maximumsalary, experience
from users
where users.id_user=input_id_user
inner join job_post
on users.qualification=job_post.qualification and
job_post.maximumsalary>input_minimumsalary;
end //
delimiter ;

call job_from_minimumsalary(*some user_id*, *some minimumsalary*);
```

RA

$$\pi_{\text{jobtitle,description,minimumsalary,maximumsalary,experience}}(\sigma_{\text{id\_user='userid'} \wedge \text{maximumsalary} > \text{'minimumsalary'}}(\text{users} \bowtie \text{job\_post}))$$

TRC

$$\{t|\exists u \in \text{users}(u[\text{id\_user}]=\text{'userid'} \wedge \exists j \in \text{job\_post}(t[\text{jobtitle}]=j[\text{jobtitle}] \wedge t[\text{description}]=j[\text{description}] \wedge t[\text{minimumsalary}]=j[\text{minimumsalary}] \wedge t[\text{maximumsalary}]=j[\text{maximumsalary}] \wedge t[\text{experience}]=j[\text{experience}] \wedge u[\text{qualification}]=j[\text{qualification}] \wedge j[\text{maximumsalary}]>\text{'minimumsalary'}))\}$$

DRC

$$\{< \text{jt,desc,mins,maxs,ex} > | \exists \text{iu,fn,ln,em,pa,ad,ci,st,con,q,s,py,dob,age,desg,res,h,act,abt,sk}(< \text{iu,fn,ln,em,pa,ad,ci,st,con,q,s,py,dob,age,desg,res,h,act,abt,sk} > \in \text{users} \wedge \text{iu='userid'} \wedge \exists \text{ij,ic,crd}(< \text{ij,ic,jt,desc,mins,maxs,ex,crd} > \in \text{job\_post} \wedge \text{maxs}>\text{'minimumsalary'}))\}$$

Retrieve users with applications sent out

```
SELECT id_user,firstname,lastname
FROM users
WHERE id_user IN (SELECT id_user FROM apply_job_post);
```

RA

$$\pi_{\text{id\_user,firstname,lastname}}(\text{users} \bowtie \text{apply\_job\_post})$$

TRC

$$\{t|\exists u \in \text{users}(t[\text{id\_user}]=u[\text{id\_user}] \wedge t[\text{firstname}]=u[\text{firstname}] \wedge t[\text{lastname}]=u[\text{lastname}] \wedge \exists aj \in \text{apply\_job\_post}(u[\text{id\_user}]=aj[\text{id\_user}]))\}$$

DRC

$$\{< \text{iu,fn,ln} > | \exists \text{em,pa,ad,ci,st,con,q,s,py,dob,age,desg,res,h,act,abt,sk}(< \text{iu,fn,ln,em,pa,ad,ci,st,con,q,s,py,dob,age,desg,res,h,act,abt,sk} > \in \text{users} \wedge \exists \text{ia,ij,ic,stat}(< \text{ia,ij,ic,iu,stat} > \in \text{apply\_job\_post}))\}$$

Retrieve cities with jobs available

```
SELECT city
FROM company
WHERE company.id_company IN (SELECT id_company FROM job_post);
```

RA

$$\pi_{\text{city}}(\text{company} \bowtie \text{job\_post})$$

TRC

$$\{t|\exists c \in \text{company}(t[\text{city}]=c[\text{city}] \wedge \exists j \in \text{job\_post}(c[\text{id\_company}]=j[\text{id\_company}]))\}$$

DRC

$$\{< ci > |\exists ic,n,cn,c,st,co,w,e,p,a,l,cd,ac(\\ < ic,n,cn,c,st,ci,co,w,e,p,a,l,cd,ac > \in \text{company} \wedge \\ \exists ij,jt,desc,mins,maxs,ex,crd(< ij,ic,jt,desc,mins,maxs,ex,crd > \in \text{job\_post}))\}$$

Check if company email exists

```
SELECT email
FROM company
WHERE email ='$email';
```

RA

$$\pi_{\text{email}}(\sigma_{\text{email='\$email'}}(\text{company}))$$

TRC

$$\{t|\exists c \in \text{company}(t[\text{email}]=c[\text{email}] \wedge c[\text{email}]=\text{'\$email'})\}$$

DRC

$$\{< e > |\exists ic,n,cn,c,st,ci,co,w,p,a,l,cd,ac(< ic,n,cn,c,st,ci,co,w,e,p,a,l,cd,ac > \in \text{company} \wedge e=\text{'\$email'})\}$$

Check if user email exists

```
SELECT email
FROM users
WHERE email ='$email';
```

RA

$$\pi_{\text{email}}(\sigma_{\text{email='\$email'}}(\text{users}))$$

TRC

$$\{t|\exists u \in \text{users}(t[\text{email}]=u[\text{email}] \wedge u[\text{email}]=\text{'\$email'})\}$$

DRC

$$\{< em > |\exists iu,fn,ln,pa,ad,ci,st,con,q,s,py,dob,age,desg,res,h,act,abt,sk(\\ < iu,fn,ln,em,pa,ad,ci,st,con,q,s,py,dob,age,desg,res,h,act,abt,sk > \in \text{users} \\ \wedge em=\text{'email'})\}$$

Retrieve jobpost details from matching jobpost

```
SELECT *
FROM job_post
WHERE id_jobpost ='$_GET[id]';
```

RA

$$\sigma_{\text{id\_jobpost='\$\_GET[id]}}(\text{job\_post})$$

TRC

$$\{t|\exists j \in \text{job\_post}(t[\text{id\_jobpost}]=j[\text{id\_jobpost}] \wedge t[\text{id\_company}]=j[\text{id\_company}] \wedge t[\text{jobtitle}]=j[\text{jobtitle}] \wedge t[\text{description}]=j[\text{description}] \wedge t[\text{minimumsalary}]=j[\text{minimumsalary}] \wedge t[\text{maximumsalary}]=j[\text{maximum salary}] \wedge t[\text{experience}]=j[\text{experience}] \wedge t[\text{qualification}]=j[\text{qualification}] \wedge t[\text{createdat}]=j[\text{createdat}] \wedge j[\text{id\_jobpost}]='\$\_GET[id]')\}$$

DRC

$$\{< \text{ij,ic,jt,desc,mins,max,ex,q,crd} > | < \text{ij,ic,jt,desc,mins,max,ex,q,crd} > \in \text{job\_post} \wedge \text{ij}='\$\_GET[id]'\}$$

Retrieve company details

```
SELECT id_company,companyname,email,active
FROM company
WHERE email='$email' AND password='$password';
```

RA

$$\pi_{\text{id\_company,companyname,email,active}}(\sigma_{\text{email='\$email'} \wedge \text{password ='\$password'}}(\text{company}))$$

TRC

$$\{t|\exists c \in \text{company}(t[\text{id\_company}]=c[\text{id\_company}] \wedge t[\text{companyname}]=c[\text{companyname}] \wedge t[\text{email}]=c[\text{email}] \wedge t[\text{active}]=c[\text{active}] \wedge c[\text{email}]='\$email')\}$$

DRC

$$\{< \text{ic,cn,e,ac} > |\exists n,c,st,ci,co,w,p,a,l,cd(< \text{ic,n,cn,c,st,ci,co,w,e,p,a,l,cd,ac} > \in \text{company} \wedge p='\$password' \wedge e='\$email')\}$$

Retrieve applications that user has applied for

```
SELECT *
FROM apply_job_post
WHERE id_user='$_SESSION[id_user]' AND
id_jobpost='$row[id_jobpost]';
```

RA

$$\sigma_{\text{id\_user='\$\_SESSION[id\_user]'} \wedge \text{id\_jobpost='\$row[id\_jobpost]'}}(\text{apply\_job\_post})$$

TRC

$$\{t|\exists aj \in \text{apply\_job\_post}(t[\text{id\_apply}]=aj[\text{id\_apply}] \wedge t[\text{id\_jobpost}]=aj[\text{id\_jobpost}] \wedge t[\text{id\_company}]=aj[\text{id\_company}] \wedge t[\text{id\_user}]=c[\text{id\_user}] \wedge t[\text{status}]=aj[\text{status}] \wedge aj[\text{id\_user}]='\$\_SESSION[id\_user] \wedge \text{id\_jobpost}='\$row[id\_jobpost])\}$$

DRC

$$\{< \text{ia,ij,ic,iu,stat} > \mid < \text{ia,ij,ic,iu,stat} > \in \text{apply\_job\_post} \wedge \text{iu}=\text{`\$\_SESSION[id\_user]'} \wedge \text{ij}=\text{'\$row[id\_jobpost]'}\}$$

Retrieve cities in a state

```
SELECT *
FROM cities
WHERE state_id ="$_POST[id]";
```

RA

$$\sigma_{\text{state\_id} = \text{'\$\_POST[id]}}(\text{cities})$$

TRC

$$\{t \mid \exists ci \in \text{cities}(t[id]=ci[id] \wedge t[name]=ci[name] \wedge t[state\_id]=ci[state\_id] \wedge c[state\_id]=\text{'\$\_POST[id]'})\}$$

DRC

$$\{< \text{id,n,si} > \mid < \text{id,n,si} > \in \text{cities} \wedge \text{si}=\text{`\$\_POST[id]}\}$$

Retrieve certain jobpost and their company details

```
SELECT * job_post
INNER JOIN company
ON job_post
WHERE id_jobpost='$_GET[id]';
```

RA

$$\sigma_{\text{id\_jobpost}=\text{'\$\_GET[id]'}}(\text{job\_post} \bowtie \text{company})$$

TRC

$$\{t \mid \exists j \in \text{job\_post}(t[id\_jobpost]=j[id\_jobpost] \wedge t[id\_company]=j[id\_company] \wedge t[jobtitle]=j[jobtitle] \wedge t[description]=j[description] \wedge t[minimumsalary]=j[minimumsalary] \wedge t[maximumsalary]=j[maximumsalary] \wedge t[experience]=j[experience] \wedge t[qualification]=j[qualification] \wedge t[createdat]=j[createdat] \wedge j[id\_jobpost]=\text{'\$\_GET[id]'} \wedge \exists c \in \text{company}(t[id\_company]=c[id\_company] \wedge t[name]=c[name] \wedge t[companyname]=c[companyname] \wedge t[country]=c[country] \wedge t[state]=c[state] \wedge t[city]=c[city] \wedge t[contactno]=c[contactno] \wedge t[website]=c[website] \wedge t[email]=c[email] \wedge t[password]=c[password] \wedge t[aboutme]=c[aboutme] \wedge t[logo]=c[logo] \wedge t[createdAt]=c[createdAt] \wedge t[active]=c[active]))\}$$

DRC

$$\{< \text{ij,ic,jt,desc,mins,max,ex,q,crd,n,cn,c,st,ci,co,w,e,p,a,l,cd,ac} > \mid < \text{ij,ic,jt,desc,mins,max,ex,q,crd} > \in \text{job\_post} \wedge < \text{ic,n,cn,c,st,ci,co,w,e,p,a,l,cd,ac} > \in \text{company} \wedge \text{ij}=\text{'\$\_GET[id]'}\}$$

Triggers

The following are the triggers used for this project. Note that: Since the `id` uses auto incremented, we do not need to explicitly specify an ID, so we write `null` instead.

Add inserted to the logs when a new user is created.

```
CREATE TRIGGER 'insertLog'
AFTER INSERT ON 'users'
FOR EACH ROW
INSERT INTO logs VALUES(null, NEW.id_user, "Inserted" , NOW())
```

Add updated to the logs when a user's detail(s) are updated

```
CREATE TRIGGER 'updateLog'
AFTER UPDATE ON 'users'
FOR EACH ROW
INSERT INTO logs VALUES(null, NEW.id_user, "Updated" , NOW())
```

Add deleted to the logs when a user is deleted

```
CREATE TRIGGER 'deleteLog'
AFTER DELETE ON 'users'
FOR EACH ROW
INSERT INTO logs VALUES(null, OLD.id_user, "Deleted" , NOW())
```

Usage

The following are the steps to run this project yourself

1. Clone the Github Repo
2. Import the `git_repos_jobportal.sql` in the xampp mysql database
3. Paste the `Job_Portal` folder into `htdocs` folder. (found in WAMPP, XAMMP, MAMPP installation folder)
4. Start the Apache and Mysql services from the MAMPP server (mac), XAMPP server (windows).
5. Run the following commands in the terminal

```
cd Job-Portal
open db.php
```

6. Check that credentials for username and password are matching according to your system.
7. Go to `localhost` and job posts will now be visible.
8. Login with any of the below default accounts

Type	Username	Password
Admin	admin	12345
Candidate	m@m.com	m
Company	m@m.com	m

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