COS333 Final Project: AACCNJ Job Board

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* denotes equal contribution

# Project Overview

## Table of Contents

# Section 1: Identification

**Project name:** AACCNJ Opportunities for Success
**Project leader name and email address:** Chris Pan , chrispan@princeton.edu
**Team member names and email addresses:**
1. Tanushree Banerjee , tb21@princeton.edu
2. Chris Pan , chrispan@princeton.edu
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4. Haoyuan He , haoyuanh@princeton.edu

**The URL of your GitHub source code repository:** https://tinyurl.com/cos333-final-proj-github

**A statement confirming that the lead instructor and your TA adviser have access to your source code repository.** The lead instructor and our TA adviser have access to our source code repository.

# Section 2: Elevator Pitch

*AACCNJ Opportunities for Success* will be a centralized job board that allows members of the African-American Chamber of Commerce of New Jersey and other approved potential employers to publicize job openings at their business on the website, as well as allow job seekers to search for the most relevant jobs for them on the board. It also allows employers to search a database of job seekers based on keywords and view their resumes submitted to the resume book.

# Section 3: Overview

## The AACCNJ

The African American Chamber of Commerce of New Jersey (AACCNJ) is a Trenton-based 501(c)3 non-profit organization dedicated to economically empowering and sustaining African-American communities and businesses. The AACCNJ aims to address economic disparities of African-American business enterprises in New Jersey. They hope to bridge the gap between the often-overlooked contributions of African-Americans to New Jersey's economy and the fact that the growth of African-American businesses hasn't kept pace with the growth of other businesses despite their potential for contribution to the economy.

As part of one of its initiatives to empower African-American owned businesses, the Chamber allows its members, which consist of African-American owned businesses in New Jersey, to advertise job openings on the Chamber's website.

## Motivation for our project

The current website's interface is not very user friendly for job seekers. It simply presents the job openings with links to the respective external organization's website on a single web page, with no functionalities that allow users to browse job openings. This limits the efficiency with which job seekers are able to search for jobs relevant to their skills and interests. Moreover, the interface is very inefficient for the AACCNJ website administrator and Chamber members. In the current system, the website administrator needs to manually add each job opening requested to be advertised by the member business. They also need to manually remove postings that are very old, or when the member business requests for the opening to be removed. Additionally, there is a missed opportunity here to leverage the platform to allow businesses to recruit and hire job seekers they think are most suitable for their job openings, through the creation of a browsable resume book with resumes of job seekers. Lastly, there

is no centralized platform that allows the administrator to seamlessly manage the job postings on the website, making the entire process cumbersome and non-user friendly.

## General overview of our project

*AACCNJ Opportunities for Success* is a web application that serves as a centralized 'job opportunities board' where Chamber members are able to post job openings at their businesses, job seekers are able to search for openings and the administrator is able to manage postings. In addition, we want to integrate an online 'resume book' platform with the job opportunities board, that would seamlessly allow job seekers to post and update their resumes while also allowing Chamber members to browse the resume book online to look for viable candidates for their job openings.

## Goals of the project

1. Build a robust, networked three-tier system for a web application that centralizes the process of posting job opportunities for Chamber members, searching for opportunities for job seekers and managing the job opportunities posted for the website administrator.
2. Build an interface that allows job seekers to submit their resumes to the central AACCNJ resume book, searchable by potential employers via specified keywords, as well as browse all posted job openings
3. Build an interface that allows employers to post job openings to the central job board, that is searchable by title, keywords etc. by job seekers.
4. Build an interface that allows the website administrator to delete job postings and resumes submitted to the resume book, as well as browse all job postings and resumes submitted to the resume book

# Section 4: Requirements

**Problem that our system will solve:**

1. Lack of user-friendliness of the current job opportunities web page
2. Lack of ability for Chamber members to search for the most suitable candidates for their job openings
3. Untapped opportunity to allow job seekers to advertise themselves to potential employers by allowing their resume/profile to be searched for in a common resume book for employers.
4. Lack of a central platform for administrators to manage the job postings on the job board.

## Intended users and how our system will benefit them

1. Potential employers, including both AACCNJ-affiliated members and non-members:
    a. Eliminate the need to email the website administrator to manually add job opening to website for each job opening
    b. Provide the ability to search for most qualified candidates for their job openings
    c. Provide the ability to retrieve contact information (email etc.) of job seekers who have submitted their resumes to the resume book to contact them individually about job openings
2. Job seekers:
    a. Ability to easily search for the most relevant jobs by required skills, title, etc.
    b. Ability to advertise their availability for jobs via submitting resume, skill-set/keywords and contact information to the AACCNJ central resume book
3. Website administrators from AACCNJ
    a. Allow management of job postings and submitted resumes through a singular platform

b. Allow management of employer accounts and privileges associated with AACCNJ affiliated member organizations.

## Contrast with existing solutions

1. indeed.com: This platform is not specifically designed to target and support African-American owned businesses. The Chamber's goal is to bridge the gap between the growth in African-Americans' potential for contribution to New Jersey's economy and the relatively slower pace of growth in African-American owned businesses. A dedicated platform built to advertise and amplify the voice of African-American owned businesses is therefore crucial.
2. greenhouse.io: in addition to similar reasons as those mentioned above, greenhouse is a paid service. The AACCNJ is a non-profit looking to minimize their operational costs. Thus, ideally a platform that is free of cost is best suited to the needs of the Chamber.
3. Handshake: Aimed mostly at college students looking for jobs at relatively larger companies, and not geared towards small local businesses such as the members of the Chamber.

# Section 5: Functionality

In order to better illustrate the functionality we envision our web application will have, we present a few detailed scenarios involving intended users and how they would use our application. Mock sketches of the three interfaces are attached in the ***Appendix*** at the end of this document, illustrating the functionality in more detail.

## Scenario 1: Alice, the potential employer (not a Chamber member)

Alice is the owner and manager of *Alice's Pancakes,* an African-American owned business based out of Princeton, NJ. They are a restaurant located on Nassau street - the high street of the Princeton town - serving diner food. Over the pandemic, they lost a lot of staff and are looking to hire more chefs with at least a year's worth of experience working in diners. While complaining about the difficulty she is facing in trying to hire an additional chef to help the restaurant keep up with the increasing demand. Alice hears about *AACCNJ Opportunities for Success* from a friend who is also the owner of a local business and a member of the AACCNJ, and recommends to her that she post a job opening there. She searches up 'AACCNJ' on google, and navigates to our web app through the 'Job Opportunities' tab on the AACCNJ main website. This takes her to a screen asking whether she is an employer looking to post a job opening or a job seeker. She clicks on the employer option, which takes her to a 'login via Google' page. Upon logging in, she sees a page saying she is not a member of the Chamber, so must first apply for approval to post job openings. The page contains a form asking Alice for her name, contact information, company information and website, as well as the description of her proposed job opening. She fills this form out. Once the website administrator approves her application (typically within a few days), Alice receives an email notification saying her application to allow her to post an opening has been approved, with a link back to the *AACCNJ Opportunities for Success* webapp. She then proceeds to the webpage, logs in via Google and is taken to a page showing her current Job postings (none), a button taking her to the current postings on the website, a button taking her to the resume book, and a button allowing her to add a posting to the website. She clicks on the button allowing her to post a job opening. This takes her to another page with a form asking for details on the job opening (company name and contact etc. pre-filled), along with suggested keywords associated with the job opening (cooking, chef, restaurant) as well as details on job (name of role, expected pay, location, hours, etc.). She has the option of adding a link to an external website for job seekers to be able to apply, but since she doesn't have a website set up, she just mentions that job seekers who are interested should email her instead (contact info is included in the form). She then clicks the submit button, which takes her back to her home page. Here, she now sees her new job

posting along with all the other buttons that were visible earlier. Out of curiosity, she navigates to the ‘resume book search’ button, which takes her to a new page with a search bar, allowing her to filter resumes by keywords selected from a drop down menu. She types in ‘chef’ and gets ~20 results of names of people and the keywords associated with their profiles. She clicks on the first name in the list, which then expands to show the person's contact information and link to a pdf resume.

## Scenario 2: Bob, the job seeker

Bob is an African American job seeker hoping to find a job as a software developer near Monmouth County, New Jersey. He has heard about the AACCNJ organization from a friend and would love to work for a black owned software company nearby. He goes to the website and navigates to the job openings tab. He clicks the link and is seamlessly redirected to our application.

Bob is immediately greeted by a webpage with job openings in a table form. There is a search bar for location and job opening title, and he searches for “monmouth NJ” and “software engineer.” He scrolls through a few positions, and doesn’t find anything matching his skillset as an experienced developer.

Bob sees a link for submitting his resume, and clicks this. He is redirected to a form asking him to fill out his name, location preference, and job title, as well as list his specific skills. He fills these out, and submits his resume. He submits his profile and logs out.

Later that week, Bob receives an email from an employer who really liked Bob’s resume. The employer notifies Bob that he found Bob through the AACCNJ portal, and would like to offer him a higher starting salary than was originally offered in the post. Bob is thrilled and accepts the offer.

## Scenario 3: Ms Gates, the website administrator from AACCNJ

Ms Gates is the administrator of AACCNJ job board. She wants to approve or decline pending job postings submitted by employers who are AACCNJ members and pending resumes submitted by job applicants; if non-AACCNJ-members want to post jobs, she wants to approve or decline their request as well.

In order to do so Ms Gates goes to the AACCNJ Job Board website and logs in with her email. After successfully logging in, she is taken to a page with three tabs, one for viewing and approving job postings, the second one for viewing and approving resumes, and the third one for viewing and approving non-members' requests. The postings or resumes are presented in a dashboard format, and she is able to search for specific entries, which is the same as the job seeker's and the employer's interface. For each pending entry, she is able to approve or decline them by clicking a button on its row. For each existing entry, she is able to delete it by clicking a button on its row.

# Section 6: Design

## Technologies used and why

We plan to use the course default technologies to build all three tiers of the application. The particular technologies and why we intend to use them is detailed below.

### User interface tier (client)

This tier allows users to access the app. The user interface tier will be a browser on a laptop computer.

1. **HTML**: It is easy to learn and use, and is supported by all browsers, allowing out application to be more likely to be compatible with most browsers

2. **CSS**: Allows separation of content (in HTML) with formatting, which allows us to develop the website structure and logic independently from the style and allows easier management of the system
3. **Bootstrap**: It is easy to set up and master, with styling for many HTML elements ranging from typography to buttons, as well as support of JavaScript plugins, making it even more flexible.
4. **JavaScript:** allow us to make the web pages dynamic
5. **AJAX:** in order to allow web pages to be updated asynchronously by exchanging small amounts of data with the server behind the scenes
6. **jQuery:** makes it easier to use JavaScript, replacing several lines of JavaScript code with a single line

## Processing tier (server)

This tier implements the logic.

1. **Python (programming language):** Easier to learn and use, with all of us having a fair amount of experience coding in Python.
2. **Flask (framework):** Flask is a relatively lightweight framework, allowing a quick and easy startup as well as the ability to scale up to complex applications easily. This would allow us the most flexibility in our application.
3. **Render (Hosting service):** We plan to deploy the web app to Render, since the other option Heroku is now a paid service, and we wish to minimize the cost involved in building the software.

## Data management tier

This tier stores data persistently.

1. **PostgreSQL (Data store):** provides more complex data types and allows objects to inherit properties. This feature makes it best for our project, and would allow us to develop our application while minimizing repetition of code.
2. **ElephantSQL: (Hosting service):** allows us to manipulate data in the database directly through our browser.

## Database schema

The database schema, including table names, their fields, and the datatype of each field is given below. The relationship between each table is also described below.

**Table 1: Resume book profiles**

1. id(str): Unique applicant id
2. first_name(str): Applicant's first name
3. last_name(str): Applicant's last name
4. skills(list[str]): Applicant's skills
5. resume_link(str): Url to resume
6. profile_stat(str):Profile status

Resume book profile table stores data of applicants' resumes. When an applicant submits its resume to the board, its information will appear as one row in the table. The table only has one unique row per each applicant(only shows the latest version). When the admin deletes a resume, that row will be removed from the table. The resume book profile table is independent from the other two tables that only support the resume book and administration features of the board.

**Table 2: Job postings**

1. id(str): Unique job id
2. title(str): Job title
3. role_name(str): Name of the role
4. company_name(str): Company's name
5. location(str): Job's location
6. zip_code(str): Zip code of the job location
7. hours_per_week(int): Work hour / week
8. work_style(style): In-person/Hybrid/Remote
9. app_link(str): Url to apply
10. description(str): Job description
11. summary(str): Summary of job description
12. skills(list[str]): Expected skills
13. post_stat(str):Post status
14. post_date(date): Post date

Job posting table stores data of all jobs posted by companies on the board. When a job posting is submitted by the company, its information will appear as one row in the table. The table has multiple rows for a company(shows all its posts). When the admin deletes a job posting, that row will be removed from the table. The job posting table is used with the employer information table for the applicant/employer/admin interface, and it supports job sorting/searching and adding/deleting features.

**Table 3: Employer information**

1. id(str): Unique company id
2. comp_name(str): Company's name
3. com_url(str): Url to company web
4. email(str): Email of contact
5. logo(str): url to company logo
6. status(str): Registration status

The employer information table stores data of employers' information. When an employer creates an account from the login portal, its information will appear as one row in the table. The table only has one unique row per each employer(identified by company). When the admin declines a registration, that row will be removed from the table. The employer information is used with the job postings information table, and mainly supports the admin interface.

**Table 4: Admin information**

1. id(str): Unique company id
2. first_name(str): First name of the admin
3. last_name(str): Last name of the admin
4. email(str): Email of contact

# Section 7: Milestones

## Minimal Viable Product

1. Employer interface (approved account)
    a. **Post a job opening**
    b. View posted job openings and whether they have been approved by admin
    c. Ability to delete/amend posted job openings

2. Employer interface (unapproved account)
    a. **Login via email, take to page saying their account is not approved, with a account approval form**
    b. **Fill in form, receive confirmation that their application was received on the website via email**
    c. Receive email when the admin approves their account with a link back to the webapp.

3. Job-seeker interface
    a. **Login via email, take to home page**
    b. **View list of job openings with links to apply externally and contact information**

4. Administrator interface
    a. **List of unapproved job openings and ability to approve and reject job openings**
    b. **List of approved job openings, with ability to delete any of them**
    c. *List of unapproved resumes*
    d. *Ability to approve and reject pending resumes*
    e. *List of approved resumes, ability to delete resumes*
    f. Receive email every time a new employer seeks for permission to post job openings

## Stretch Goals (in the order we will attempt to achieve them)

1. **Ability to search job openings by keywords, title, location etc.: interface 1, 3, and 4**
2. **Ability to upload resume with contact information, name and keywords: interface 3**
3. Ability to search resumes by keyword, name etc.: interface 1 and 4
4. Automatic purge of job postings more than 60 days old, with email notification sent to employer and admin
5. Build a responsive website, viewable on both phones and desktop browsers
6. **Click for more information on posting** and job seeker profile (interface 1, 3, 4)

# Anticipated Project Schedule

*Week 4: 9/26 - 10/2: Approval meeting with course instructors*

- Meet with Ms Nixon from AACCNJ to discuss exact functionality of the app and possible stretch goals

*Week 5: 10/3 - 10/9: Project Overview document; first weekly meeting with TA advisor*

- Finalize the project schedule
- sketch the layout of the job board

*Week 6: 10/10 - 10/16:*

- Code the database queries with SQL for the functions of job post searching, resume searching and admin approvals. (Jacqueline and Yutong)
    - Queries for listing current resumes that are displayed.
    - Queries for listing current job-postings that are displayed.
    - Queries for listing pending resumes. (For administrators)
    - Queries for listing pending job-postings. (For administrators)
    - Add test cases to ensure the project's functionality
- Link the server back-end to a client front-end that can call functions to access the data frame. (Chris and Tanushree)
    - Support filtering through job-postings
    - Support filtering through resumes.
    - Ability to search job openings / resumes by keywords.

*Week 7: 10/17 - 10/23: Fall Break*

*Week 8: 10/24 - 10/30:*

- Code the front end of the job board website for the employer and admin interfaces with expected layout (web-app) (Tanushree + Yutong)
- Integrate the backend code with the front-end (Chris + Jacqueline)
    - Add test cases to ensure the project's functionality

*Week 9: 10/31 - 11/6: Demonstration of prototype*

- Have the prototype ready, barebones GUI.
    - Front-end web interface for now.
    - No log-in package + account management for now.
- Start working on the Google login system + account management tools. These include data queries and server functions (Chris + Yutong)
- Finish working on Web-app front-end interface. (Tanushree and Jacqueline).

*Week 10: 11/7 - 11/13*

- Finalize the backend code to meet all project goals. (All members)
    - Ability to upload resume with contact information, name and keywords: interface 3 (Jacqueline)
    - Add additional edge test cases to ensure the project's functionality (Yutong)
    - Automatic purge of job postings more than 60 days old, with email notification sent to employer and admin (Chris)
- Continue working on the Google login system + account management tools. These include data queries and server functions (Chris + Yutong)
- Continue working on Web-app front-end interface. (Tanushree and Jacqueline).
- First iteration of the front-end design. (All members)

*Week 11: 11/14 - 11/20: Demonstration of alpha version*

- Finish working on the Google login system + account management tools, including data queries and server functions (Chris + Yutong)
- Finish working on Web-app front-end interface. (Tanushree and Jacqueline).
- Work on building a responsive website (All members, time permitting)
- Present the design with to AACCNJ contact Ms Gates

*Week 12: 11/21 - 11/27: Thanksgiving break*

*Week 13: 11/28 - 12/4: Demonstration of beta version*

- Improve the project based on the feedback from the demo + AACCNJ member. (All members)
- Present the updated design to the AACCNJ member to get her approval

*Week 14: 12/5 - 12/11: Final presentation*

*Week 15: 12/12 - 12/18:*

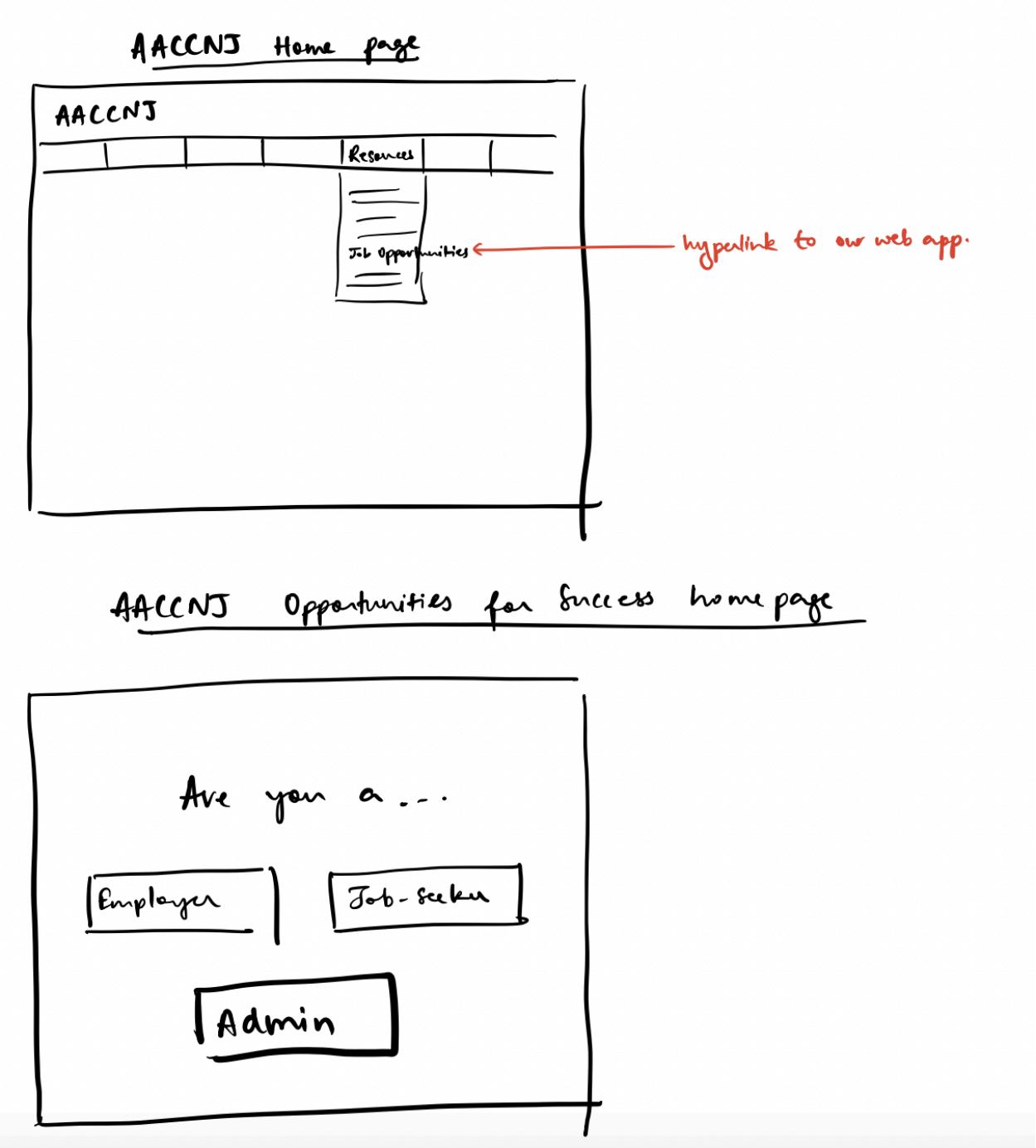
- Write the User's Guide, Programmer's Guide, Product Eval, Project Eval, source code
- Transfer the project to the AACCNJ members

# Section 8: Risks

1. **Risk**: There is some current job posting data in the AACCNJ website. At the deployment and integration stage of our project, we may need to migrate the current data in the old free-format AACCNJ job board to our system, and we have the risk of data format miss-matching, or cannot acquire data.
   **Mitigation**: We should work closely with Ms Gates to acquire the data. If we cannot acquire data, or the data format miss matching problem is unsolvable, we should test our website with dummy data created by ourselves.
2. **Risk:** To polish the GUI, we may need to learn some frontend frameworks (React, Node.js) aside from Javascript, which may be time-consuming.
   **Mitigation:** Jacqueline knows React already. In the worst case if other teammates don't have time to learn frontend frameworks, we can write the frontend in React.
3. **Risk:** It is possible that Ms Gates is not satisfied with our first few versions of designs and we need to revise accordingly.
   **Mitigation:** We should communicate closely with Ms Gates and make sure she approves the UI sketch and functionalities before we start coding.

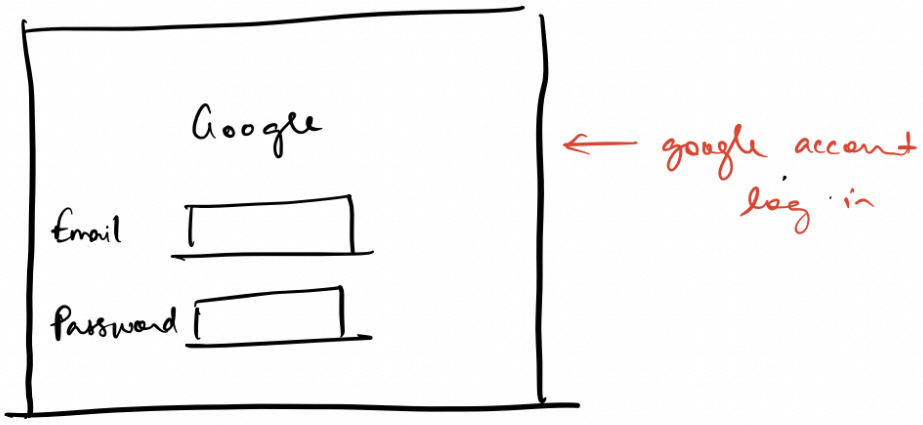
# Appendix

**Sketches illustrating the functionality of each of the three interfaces of the application:** mock-sketch-tanushree-oct9.pdf

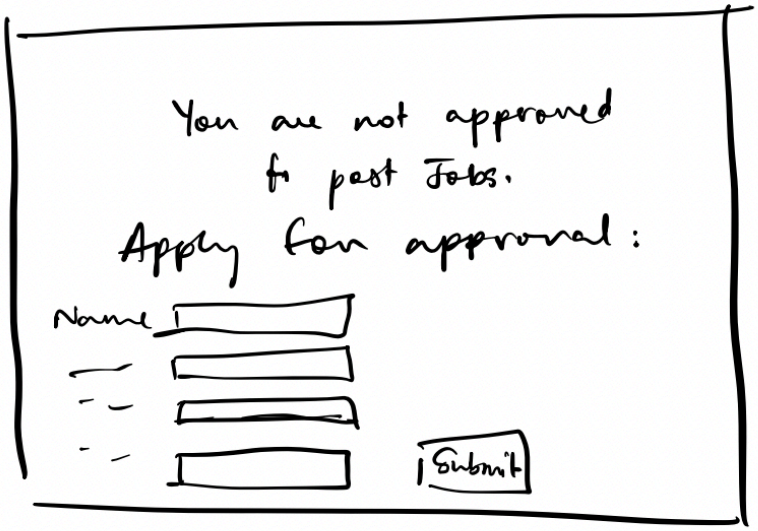


# (A) EMPLOYER INTERFACE

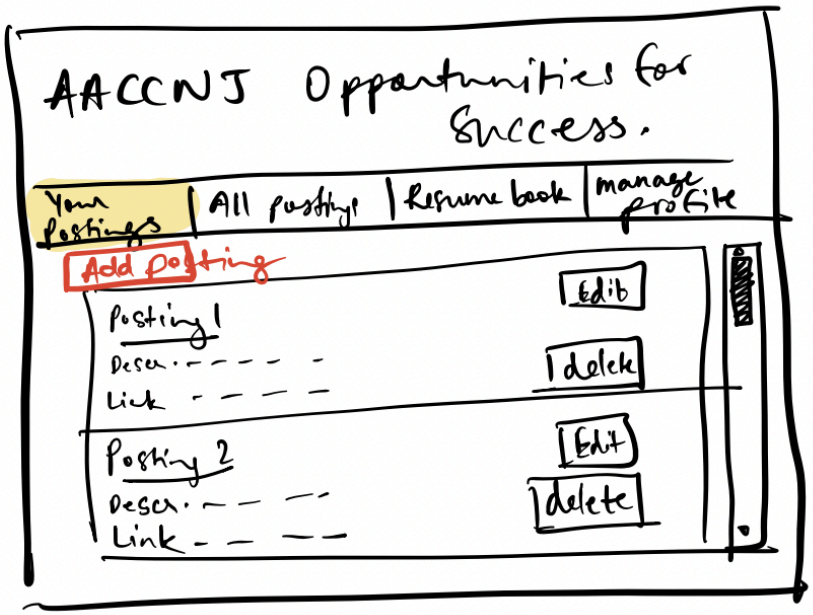
## (1) Employer log in



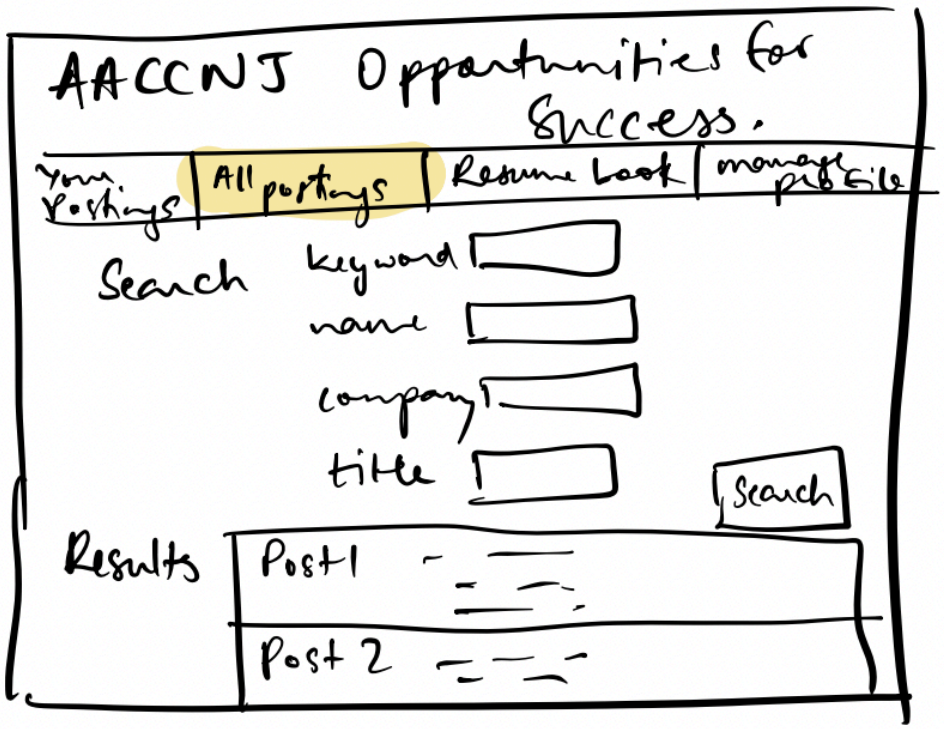

## (2) Non member application form



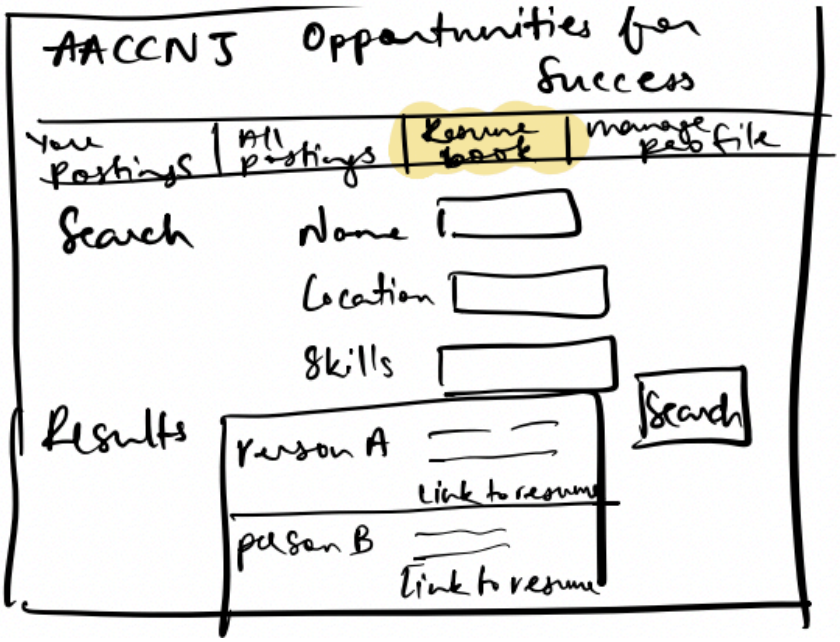
## (3) Employer portal – home page (your postings)



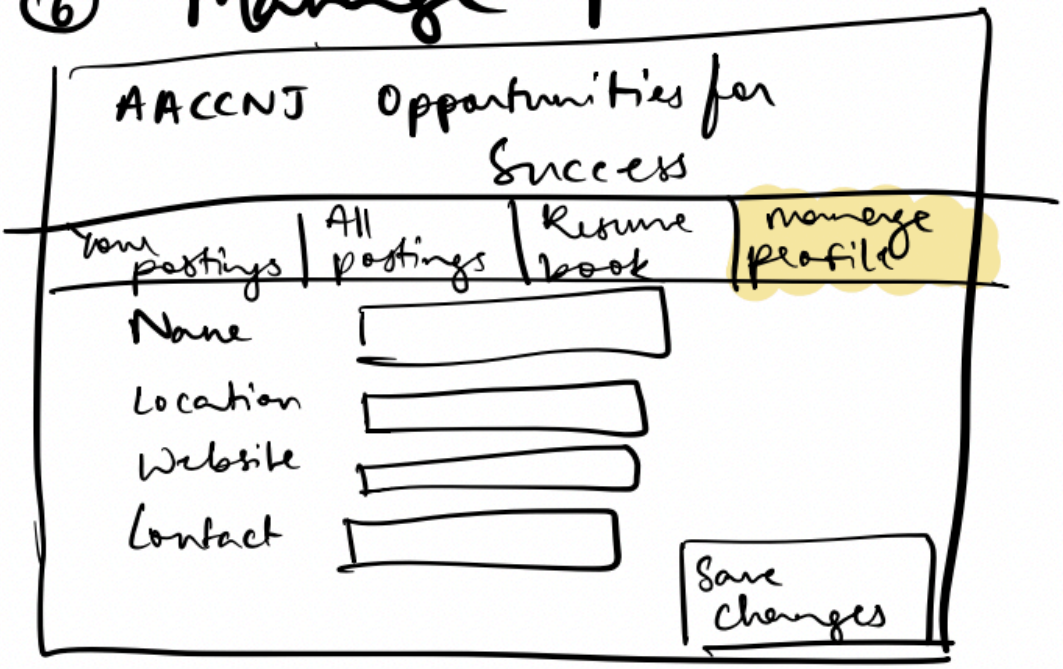
④ All postings



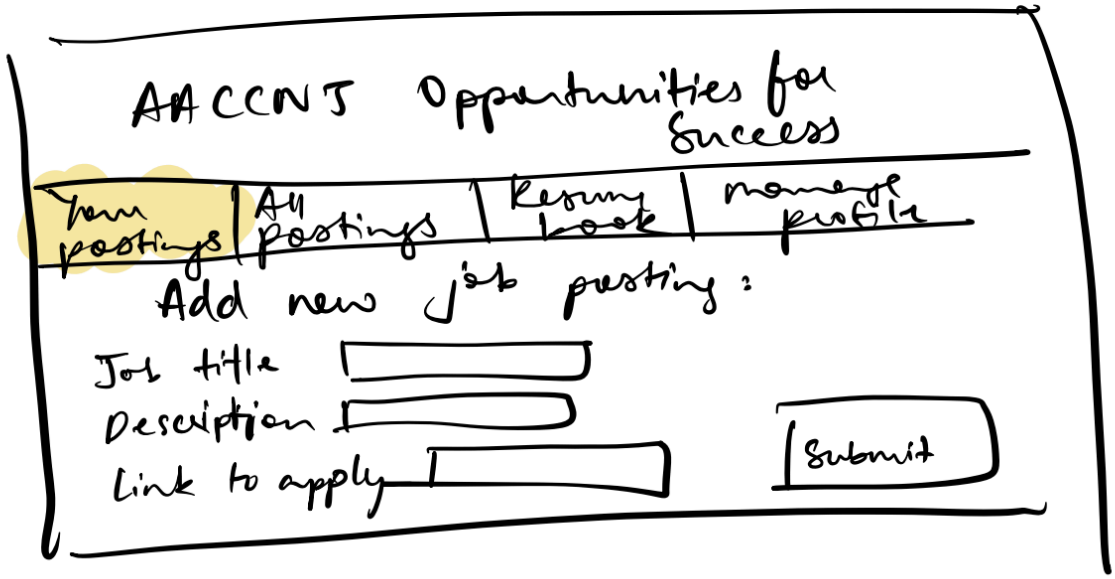
## (5) Resume book




## (6) Manage profile

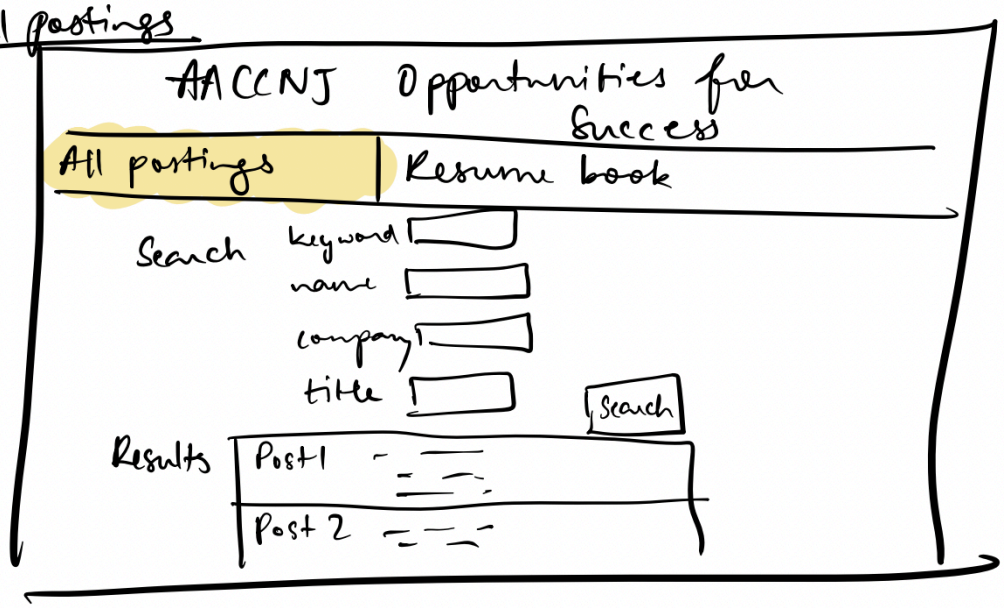


⑦ Add posting

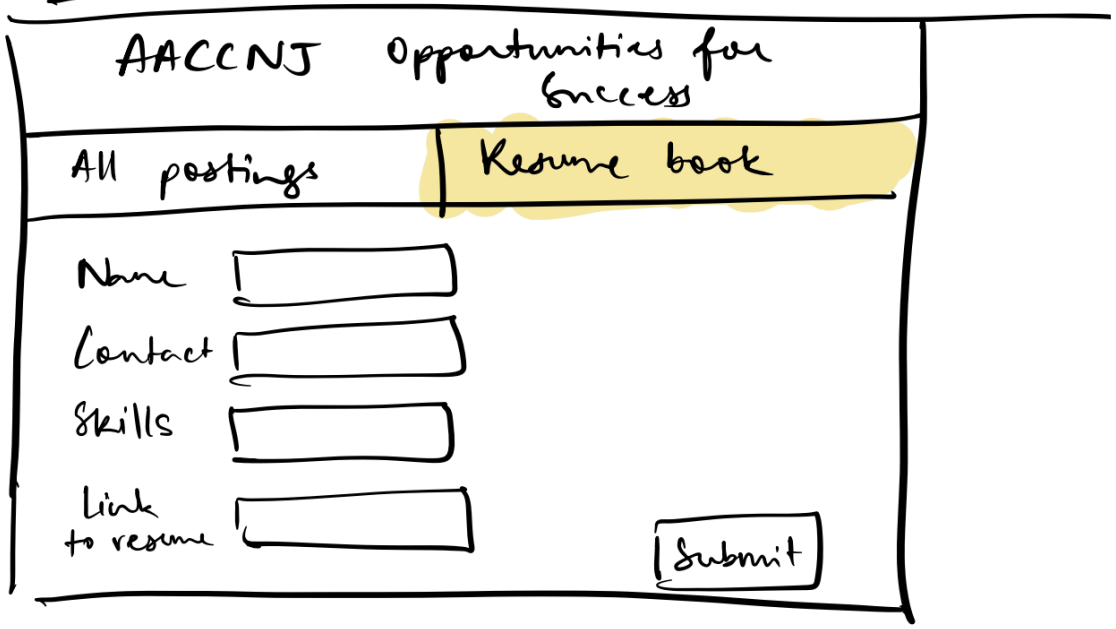



## ⑧ JOB SEEKER INTERFACE

① All postings

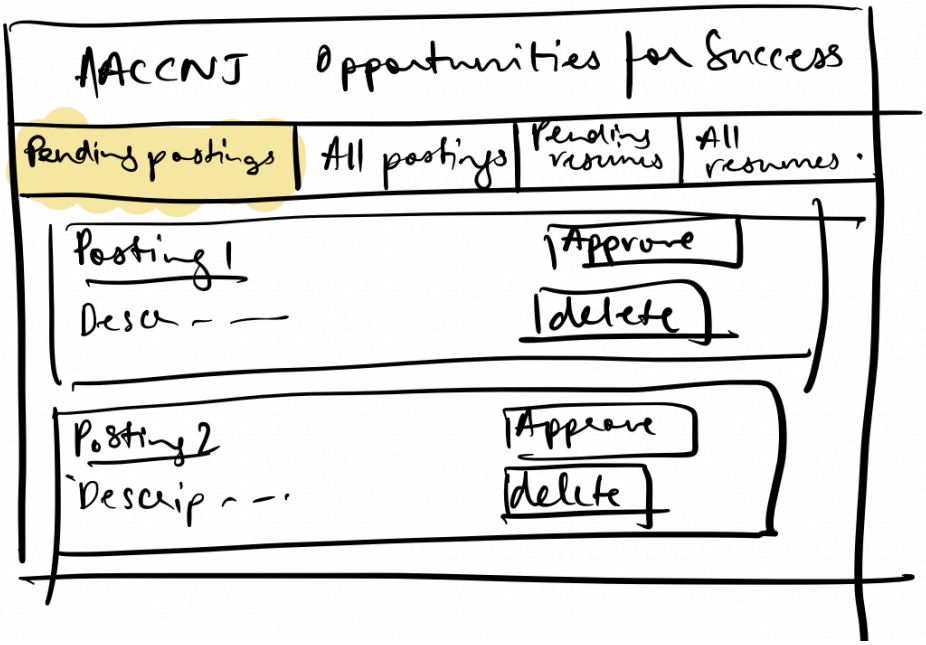


② Resume book entry submission

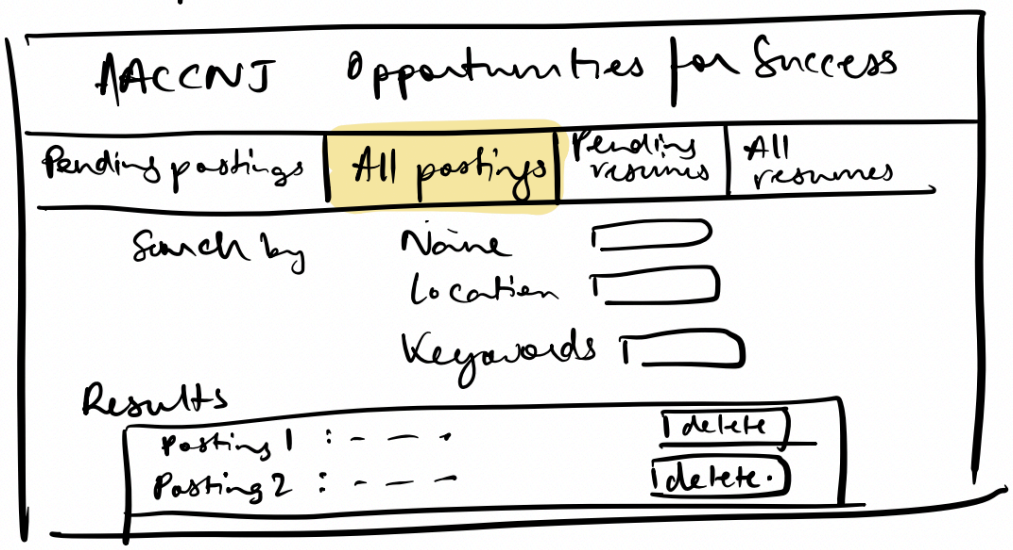



## © ADMIN INTERFACE

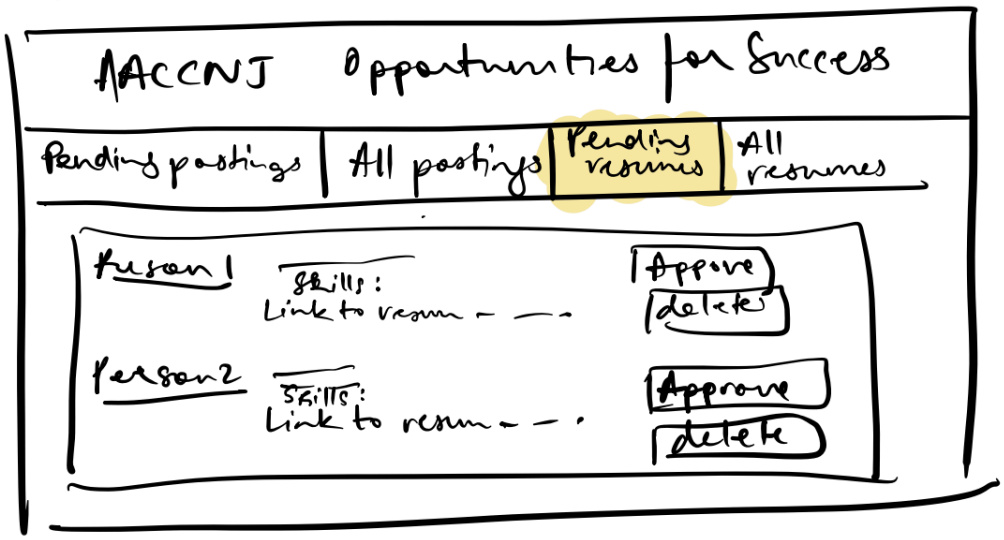
① Pending Job postings for approval.



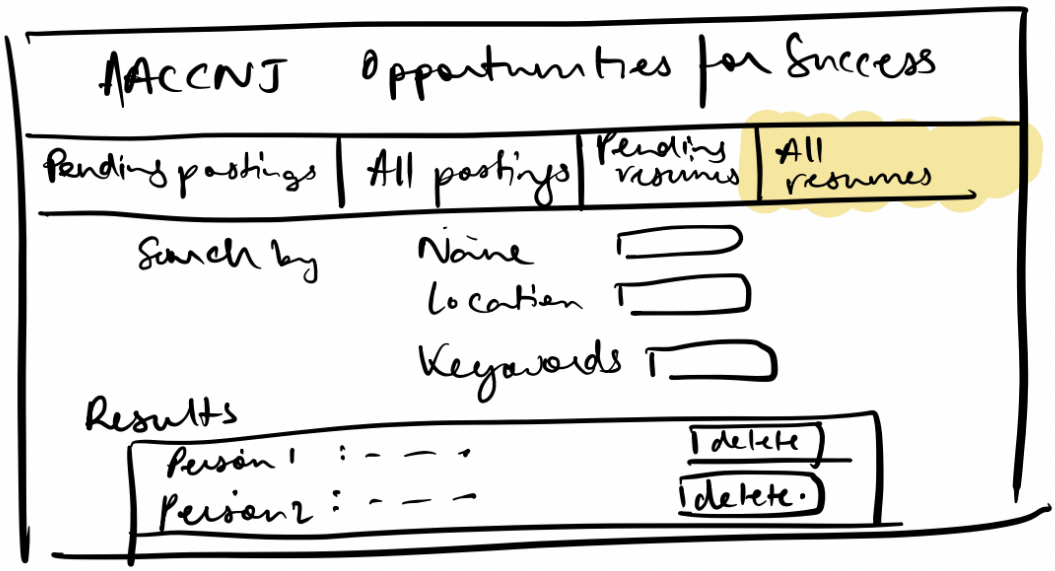
② All postings




③ Pending Resumes



④ All Resumes




⑤ Login for admin