Connect Link

Creating a Job Portal Web Application using Python and Django Module

BINUS University International

Algorithm and Programming

Final Project 2024

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Introduction to Connect Link

Connect Link is a job portal web application that is designed to break the gap between recruiters and employees. This platform aims to provide an easy and direct job searching and recruitment process through a friendly interface. Recruiters are able to post job opportunities, manage available jobs, and view candidate resumes. On the other hand, applicants are able to browse through a wide range of job choices from various industries. Hence, Connect Link is built to break the inequality in finding job opportunities.

Problem Analysis

Connect Link is built to address United Nations Sustainable Development Goals (UN SDG) 8, which is Decent Work and Economic Growth. This SDG highlights the importance of promoting a sustained and inclusive economic growth that improves living standards equally for all. Through providing a job portal that combines easy access to job opportunities and effective recruitment process, Connect Link contributes to achieving this SDG by improving employability.

Features

Recruiters	Applicants
Create and Update Company Details	Create and Update Resume Details
Create Job Ads	Apply to Jobs
Manage Jobs	Manage Applications

Use Case Diagram

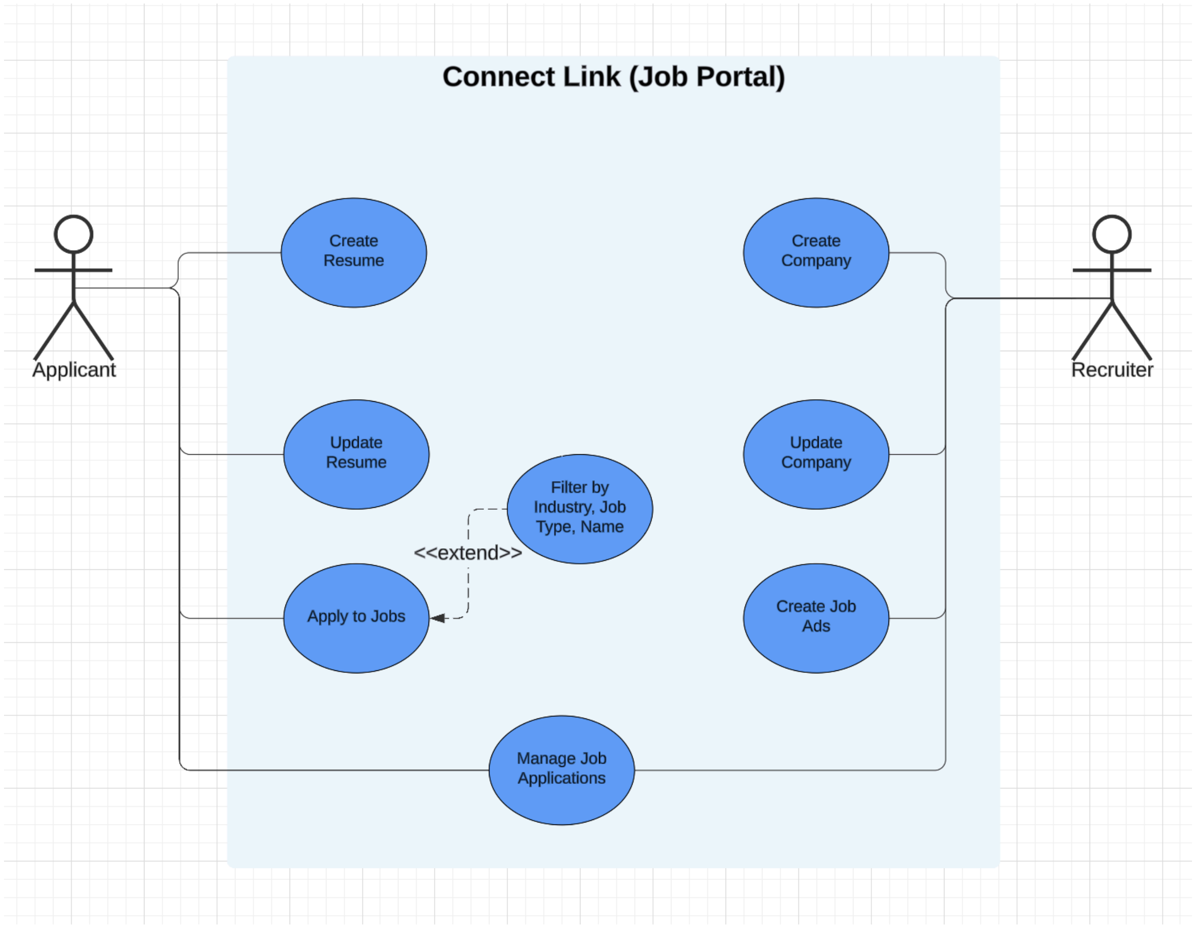
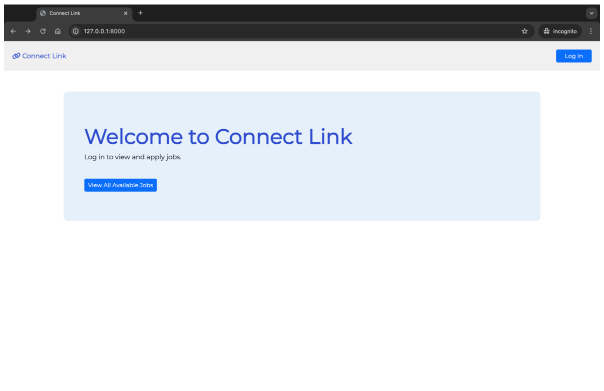


Figure 0. Use Case diagram.

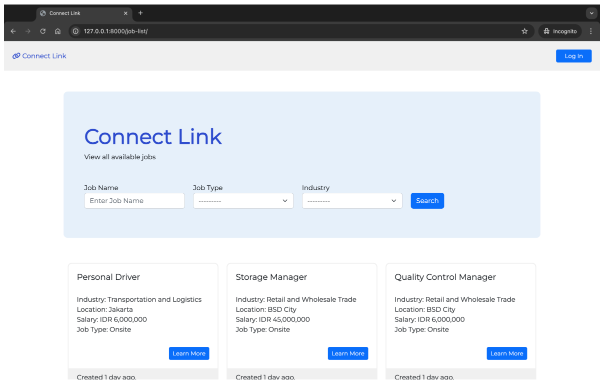
Application Walkthrough



Welcome to Connect Link

Log in to view and apply jobs.

Figure 1. Homepage.



Connect Link

View all available jobs

Personal Driver

Industry: Transportation and Logistics
Location: Jakarta
Salary: IDR 6,000,000
Job Type: Onsite

Created 1 day ago.

Storage Manager

Industry: Retail and Wholesale Trade
Location: BSD City
Salary: IDR 45,000,000
Job Type: Onsite

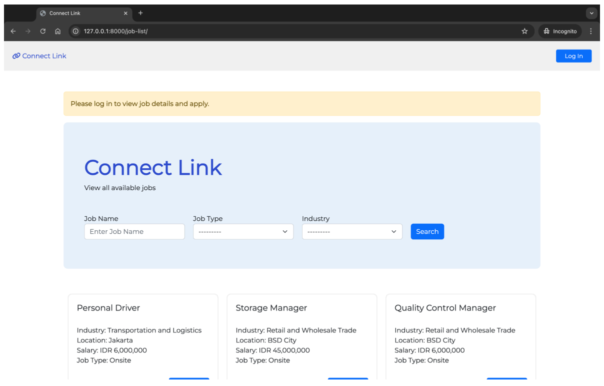
Created 1 day ago.

Quality Control Manager

Industry: Retail and Wholesale Trade
Location: BSD City
Salary: IDR 6,000,000
Job Type: Onsite

Created 1 day ago.

Figure 2. Job List.



Please log in to view job details and apply.

Connect Link

View all available jobs

Personal Driver

Industry: Transportation and Logistics
Location: Jakarta
Salary: IDR 6,000,000
Job Type: Onsite

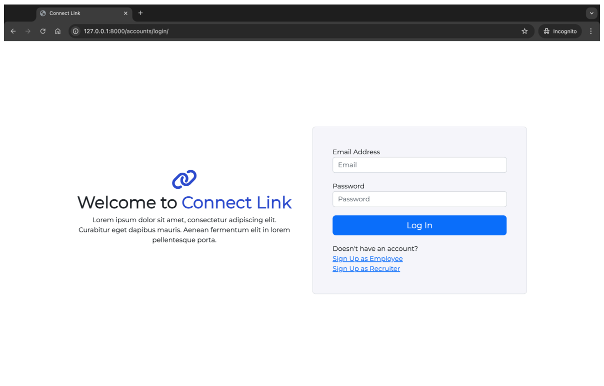
Storage Manager

Industry: Retail and Wholesale Trade
Location: BSD City
Salary: IDR 45,000,000
Job Type: Onsite

Quality Control Manager

Industry: Retail and Wholesale Trade
Location: BSD City
Salary: IDR 6,000,000
Job Type: Onsite

Figure 3. Notification to User.



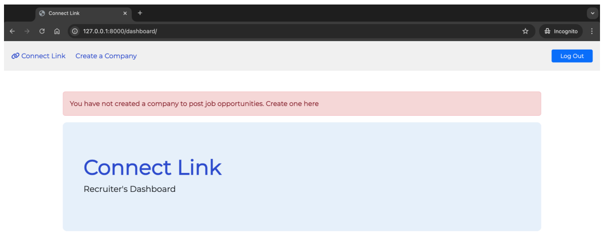
Welcome to Connect Link

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Curabitur eget dapibus mauris. Aenean fermentum elit in lorem pellentesque porta.

Doesn't have an account?

Figure 4. Login Page.

When the user first enters the web application without being authenticated, the main homepage will be displayed with a button "View All Available Jobs" which allows the user to view all currently active job opportunities.[1] The user is then able to view and filter job opportunities based on their name, job type, and industry.[2] However, upon clicking the "Learn More" button which signals the user as a place to view job details, the web app will notify the user to either log in with an existing account or sign up with a new account before proceeding.[3] Upon clicking the "Log In" button on the top right corner, the user will be redirected to the login page.[4]

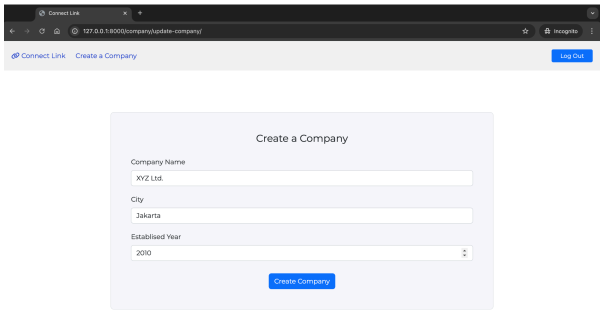


You have not created a company to post job opportunities. Create one here

Connect Link

Recruiter's Dashboard

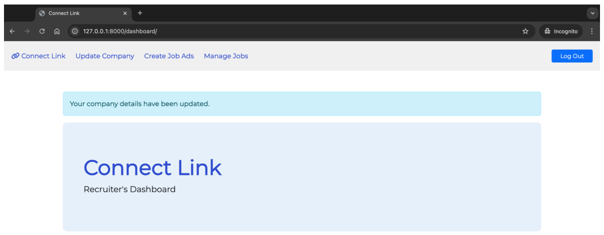
Figure 5. Recruiter’s Dashboard.



Create a Company

Company Name	XYZ Ltd.
City	Jakarta
Establised Year	2010

Figure 6. Creating a Company.

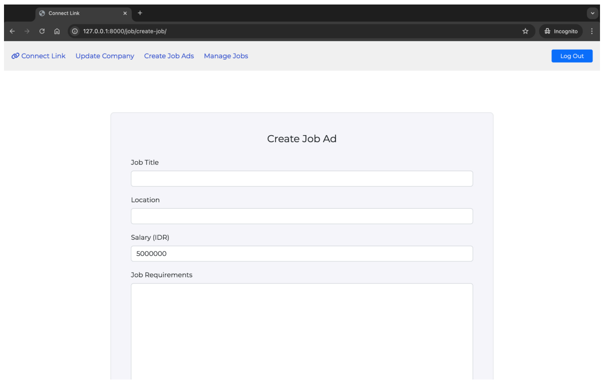


Your company details have been updated.

Connect Link

Recruiter's Dashboard

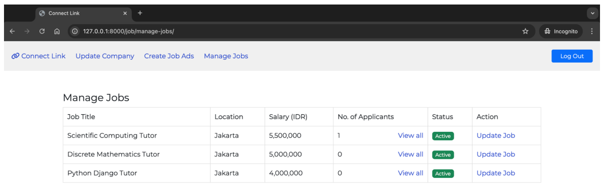
Figure 7. Notification to User.



Create Job Ad

Job Title	
Location	
Salary (IDR)	5000000
Job Requirements	

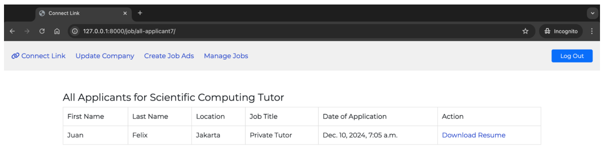
Figure 8. Creating a Job Ad.



Manage Jobs

Job Title	Location	Salary (IDR)	No. of Applicants	Status	Action
Scientific Computing Tutor	Jakarta	5,500,000	1 View all	Active	Update Job
Discrete Mathematics Tutor	Jakarta	5,000,000	0 View all	Active	Update Job
Python Django Tutor	Jakarta	4,000,000	0 View all	Active	Update Job

Figure 9. Managing Jobs.

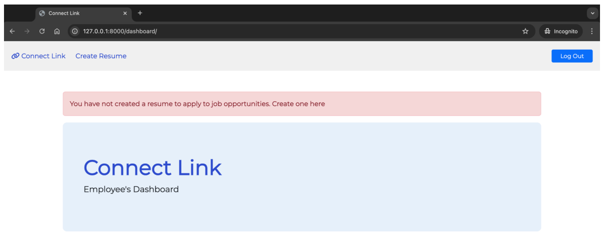


All Applicants for Scientific Computing Tutor

First Name	Last Name	Location	Job Title	Date of Application	Action
Juan	Felix	Jakarta	Private Tutor	Dec. 10, 2024, 7:05 a.m.	Download Resume

Figure 10. Managing Applicants for a Job.

Upon successfully signing in as a recruiter, the user will be brought to the Recruiter's Dashboard page.[5] In this page, the user will be notified to create a company as soon as possible to create job opportunities.[6] The user can either click the link on the navigation bar or click the text "Create one here." to proceed. The user will then be redirected to the company creation page. On this page, the user is required to enter the name of the company, location, and established date. Upon successfully submitting the form, the user will be redirected back to the Recruiter's Dashboard page with a success notification.[7] Now, more features are opened and can be seen in the navigation bar. This includes updating the company details, creating job ads, as well as managing jobs. Next, the recruiter is now able to create a job ad through inputting job title, location, salary, and descriptions.[8] The recruiter is also able to manage posted job opportunities by clicking the link on the navigation bar.[9] This page also allows the recruiter to update or make changes to a specific job by clicking the "Update Job" link. When the recruiter clicks "View All" for a particular job, they will be redirected to a page where a table containing the details for all applicants will be displayed.[10] The recruiter also has the option to download the applicant's resume by clicking the link under the "Action" table header.

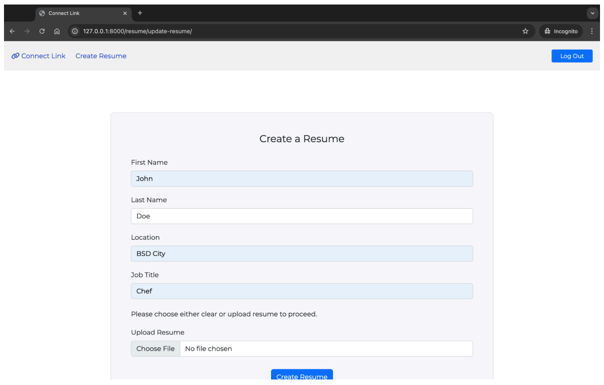


You have not created a resume to apply to job opportunities. Create one here

Connect Link

Employee's Dashboard

Figure 11. Employee’s Dashboard.



Create a Resume

First Name: John

Last Name: Doe

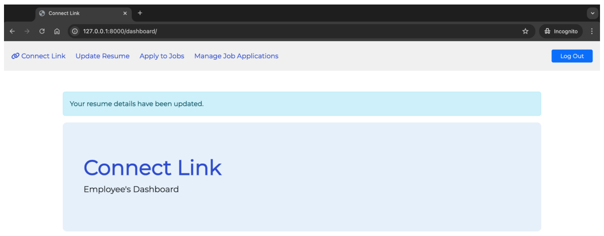
Location: BSD City

Job Title: Chef

Please choose either clear or upload resume to proceed.

Upload Resume: No file chosen

Figure 12. Creating a Resume.

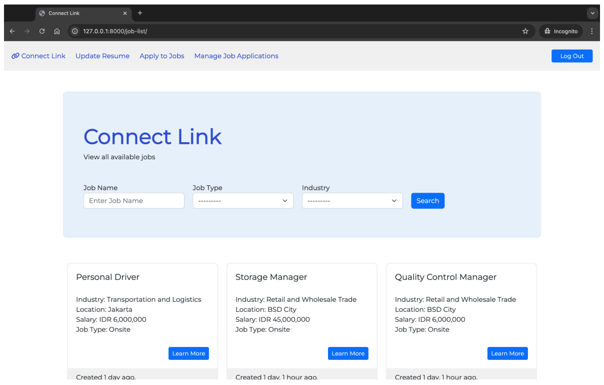


Your resume details have been updated.

Connect Link

Employee's Dashboard

Figure 13. Notification to User.



Connect Link

View all available jobs

Job Name | Job Type: --------- | Industry: ---------

Personal Driver

Industry: Transportation and Logistics
Location: Jakarta
Salary: IDR 6,000,000
Job Type: Onsite

Created 1 day ago.

Storage Manager

Industry: Retail and Wholesale Trade
Location: BSD City
Salary: IDR 45,000,000
Job Type: Onsite

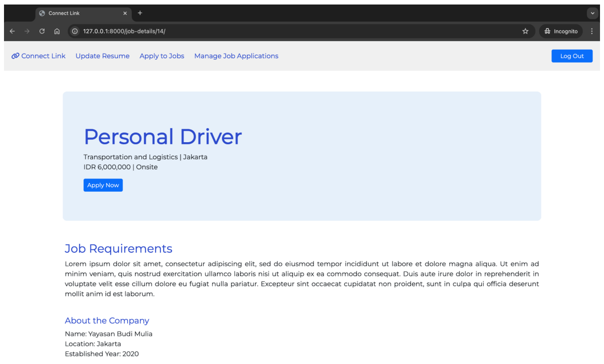
Created 1 day, 1 hour ago.

Quality Control Manager

Industry: Retail and Wholesale Trade
Location: BSD City
Salary: IDR 6,000,000
Job Type: Onsite

Created 1 day, 1 hour ago.

Figure 14. Job List.



Personal Driver

Transportation and Logistics | Jakarta
IDR 6,000,000 | Onsite

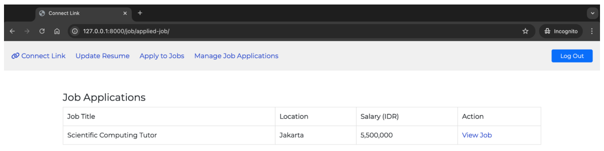
Job Requirements

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.

About the Company

Name: Yayasan Budi Mulia
Location: Jakarta
Established Year: 2020

Figure 15. Applying to a Job.



Job Applications

Job Title	Location	Salary (IDR)	Action
Scientific Computing Tutor	Jakarta	5,500,000	View Job

Figure 16. Managing Job Applications.

On the other hand, upon successfully signing in as an employee, the user will be brought to the Employee's Dashboard page.[11] In this page, the user will be notified to create a resume as soon as possible to apply to job opportunities.[12] The user can either click the link on the navigation bar or click the text "Create one here." to proceed. The user will then be redirected to the resume creation page. On this page, the user is required to enter their first name, last name, location, job title, and resume file. Upon successfully submitting the form, the user will be redirected back to the Recruiter's Dashboard page with a success notification.[13] Now, more features are opened and can be seen in the navigation bar. This includes updating resume details, applying to jobs, and managing job applications. Upon clicking the link for applying to jobs, the user will be redirected to the job list page similar to before.[14] However, the user is now able to view job details through clicking the "Learn More" button.[15] To apply to this job, simply click the "Apply" button. The applicant is also able to manage job applications through clicking the "Manage Job Applications" link on the navigation bar.[16]

Program Walkthrough

As this web application requires the use of a database, the building process of Connect Link mainly uses Django as a module to support the creation of most features. Django is chosen as it provides many useful shortcuts, such as login, logout, render, and request, that allow easier and faster platform design. To start a django project, it is necessary to complete the following instructions:

1. Open the terminal.
2. Install Django: *pip3 install django* (use *pip* for Windows / Linux).
3. Start a project: *django-admin startproject project_name.*

4. Navigate to project directory: *cd project_name.*
5. Migrate the database: *python3 manage.py migrate* (use *python* for Windows / Linux).
6. Start the server: *python3 manage.py runserver* (use *python* for Windows / Linux).

Creating a new Django project will create several files by default under the directory, which includes:

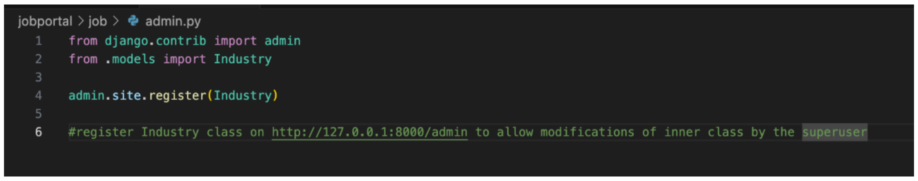
```
manage.py
project_name/
        __init__.py
        settings.py
        urls.py
        asgi.py
        wsgi.py
```

manage.py is mainly used to interact with the Django project as a command-line utility. Common commands include runserver, makemigrations, migrate, and startapp. Next, *settings.py* acts as a configuration app under the Django project. It is mainly used to add installed apps to the project. In addition, *urls.py* contains the URL configuration for the Django project. The next step to start coding is to create an app. In Django, an app is simply a way to organize the code such that it can be reused in another Django project. As such, an app must only be created in a way that it only serves a single purpose. This is another benefit provided by Django, allowing users to minimize effort to install new apps whenever starting a new, similar project. To start a new app, enter *python3 manage.py startapp app_name*. Whenever starting a new app, the following files will be created by default:

```
app_name/
    __init__.py
    admin.py
    apps.py
    migrations/
        __init__.py
    models.py
    tests.py
    views.py
```

Each default file created serves a unique purpose. __init__.py, apps.py, migrations, and tests.py are not commonly used for simple projects, hence they are not being used in this case. Below is the detailed explanation about each file with the example implementation.

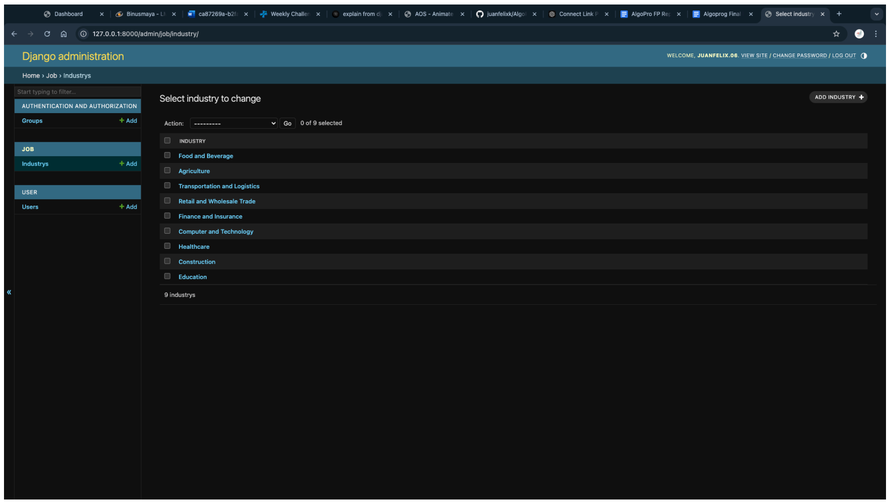
1. admin.py



```python
from django.contrib import admin
from .models import Industry

admin.site.register(Industry)

#register Industry class on http://127.0.0.1:8000/admin to allow modifications of inner class by the superuser
```

Figure 17. admin.py.

admin.py is mainly used for registering models to the Django admin site, hence allowing modifications to the models from the admin interface. In Figure 17, it is being used to register the Industry class to the admin site. However, it is essential to note that only the superuser is able to create changes to the model. Hence, to create a superuser, type *python3 manage.py createsuperuser* in the terminal. Credential details will be required in the next step. To open the admin site after successfully creating a superuser, visit http://127.0.0.1:8000/admin/. In this case, I added 9 industry categories under the industry option selector in several forms in the front-end.



127.0.0.1:8000/admin/job/industry/

Django administration

WELCOME, JUANFELIX.06. VIEW SITE / CHANGE PASSWORD / LOG OUT

Home › Job › Industrys

Start typing to filter...

AUTHENTICATION AND AUTHORIZATION
Groups + Add

JOB
Industrys + Add

USER
Users + Add

Select industry to change

ADD INDUSTRY +

Action: --------- Go 0 of 9 selected

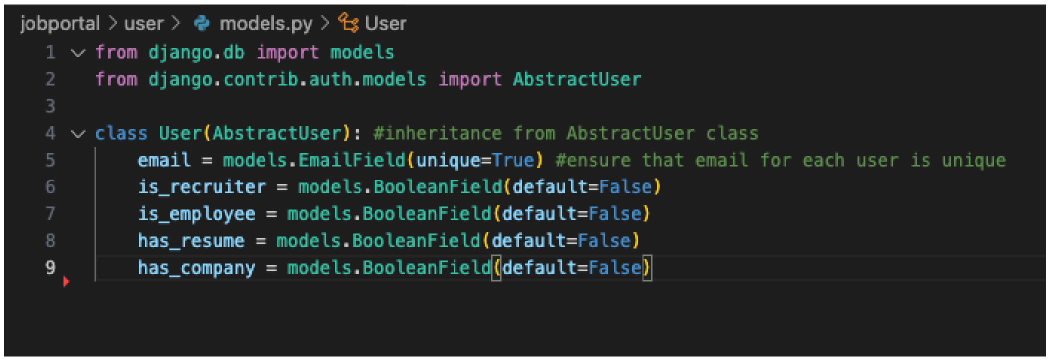
INDUSTRY
Food and Beverage
Agriculture
Transportation and Logistics
Retail and Wholesale Trade
Finance and Insurance
Computer and Technology
Healthcare
Construction
Education

9 industrys

Figure 18. Django admin site.

2. models.py

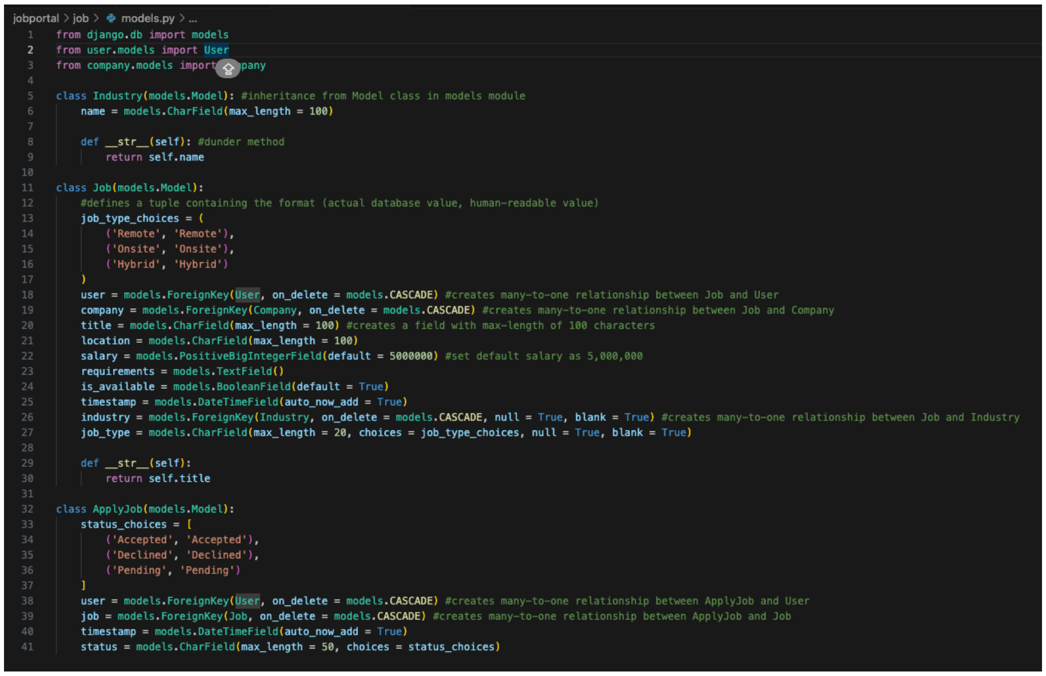
models.py file is used to create a database schema for the application by creating model classes. In creating Connect Link, several classes made are inheritances of the default class in Django. This includes the classes User, Industry, Job, ApplyJob, Resume, and Company. Some examples are shown below.



jobportal > user > models.py > User

```python
from django.db import models
from django.contrib.auth.models import AbstractUser

class User(AbstractUser): #inheritance from AbstractUser class
    email = models.EmailField(unique=True) #ensure that email for each user is unique
    is_recruiter = models.BooleanField(default=False)
    is_employee = models.BooleanField(default=False)
    has_resume = models.BooleanField(default=False)
    has_company = models.BooleanField(default=False)
```

Figure 19. The User class.

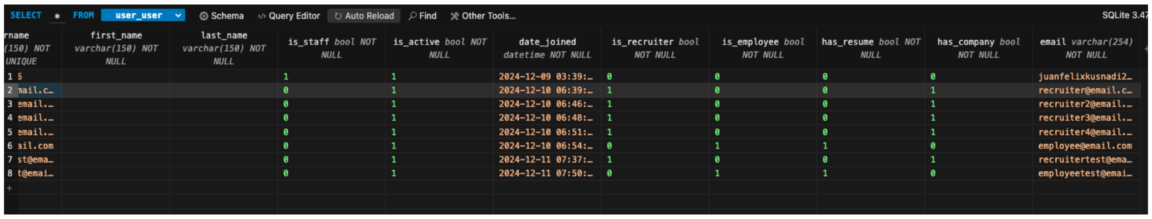


jobportal > job > models.py > ...

```python
from django.db import models
from user.models import User
from company.models import [illegible]pany

class Industry(models.Model): #inheritance from Model class in models module
    name = models.CharField(max_length = 100)

    def __str__(self): #dunder method
        return self.name

class Job(models.Model):
    #defines a tuple containing the format (actual database value, human-readable value)
    job_type_choices = (
        ('Remote', 'Remote'),
        ('Onsite', 'Onsite'),
        ('Hybrid', 'Hybrid')
    )
    user = models.ForeignKey(User, on_delete = models.CASCADE) #creates many-to-one relationship between Job and User
    company = models.ForeignKey(Company, on_delete = models.CASCADE) #creates many-to-one relationship between Job and Company
    title = models.CharField(max_length = 100) #creates a field with max-length of 100 characters
    location = models.CharField(max_length = 100)
    salary = models.PositiveBigIntegerField(default = 5000000) #set default salary as 5,000,000
    requirements = models.TextField()
    is_available = models.BooleanField(default = True)
    timestamp = models.DateTimeField(auto_now_add = True)
    industry = models.ForeignKey(Industry, on_delete = models.CASCADE, null = True, blank = True) #creates many-to-one relationship between Job and Industry
    job_type = models.CharField(max_length = 20, choices = job_type_choices, null = True, blank = True)

    def __str__(self):
        return self.title

class ApplyJob(models.Model):
    status_choices = [
        ('Accepted', 'Accepted'),
        ('Declined', 'Declined'),
        ('Pending', 'Pending')
    ]
    user = models.ForeignKey(User, on_delete = models.CASCADE) #creates many-to-one relationship between ApplyJob and User
    job = models.ForeignKey(Job, on_delete = models.CASCADE) #creates many-to-one relationship between ApplyJob and Job
    timestamp = models.DateTimeField(auto_now_add = True)
    status = models.CharField(max_length = 50, choices = status_choices)
```

Figure 20. Industry, Job, and ApplyJob class.

As an example, the class User contains 5 different fields, which are email, is_recruiter, is_employee, has_resume, and has_company. These fields, with their respective values are reflected on the database in the form of a table. Figure 21 shows this table.



	rname (150) NOT UNIQUE	first_name varchar(150) NOT NULL	last_name varchar(150) NOT NULL	is_staff bool NOT NULL	is_active bool NOT NULL	date_joined datetime NOT NULL	is_recruiter bool NOT NULL	is_employee bool NOT NULL	has_resume bool NOT NULL	has_company bool NOT NULL	email varchar(254) NOT NULL
1	5			1	1	2024-12-09 03:39:…	0	0	0	0	juanfelixkusnadi2…
2	nail.c…			0	1	2024-12-10 06:39:…	1	0	0	1	recruiter@email.c…
3	email.…			0	1	2024-12-10 06:46:…	1	0	0	1	recruiter2@email.…
4	email.…			0	1	2024-12-10 06:48:…	1	0	0	1	recruiter3@email.…
5	email.…			0	1	2024-12-10 06:51:…	1	0	0	1	recruiter4@email.…
6	ail.com			0	1	2024-12-10 06:54:…	0	1	1	0	employee@email.com
7	st@ema…			0	1	2024-12-11 07:37:…	1	0	0	1	recruitertest@ema…
8	t@emai…			0	1	2024-12-11 07:50:…	0	1	1	0	employeetest@emai…

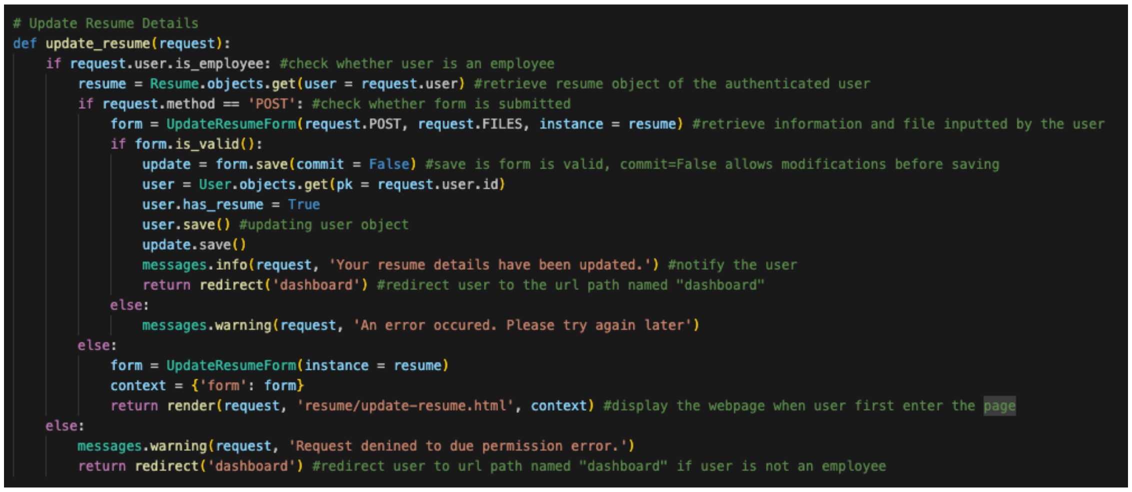
Figure 21. user_user table.

3. views.py

views.py is a file under an application that contains functions and/or classes that handle HTTPResponse request objects and return responses. As such, views.py is mainly used to return render or redirect function to the user, with the purpose of rendering (displaying) and redirecting (bringing to another page). A further discussion about views.py will be done in the following section.

Algorithm Walkthrough

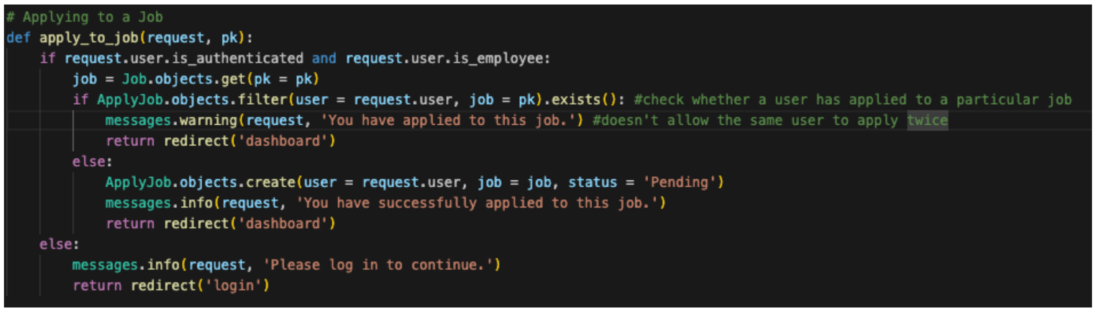
This walkthrough will summarize the major algorithms used in this project.



```python
# Update Resume Details
def update_resume(request):
    if request.user.is_employee: #check whether user is an employee
        resume = Resume.objects.get(user = request.user) #retrieve resume object of the authenticated user
        if request.method == 'POST': #check whether form is submitted
            form = UpdateResumeForm(request.POST, request.FILES, instance = resume) #retrieve information and file inputted by the user
            if form.is_valid():
                update = form.save(commit = False) #save is form is valid, commit=False allows modifications before saving
                user = User.objects.get(pk = request.user.id)
                user.has_resume = True
                user.save() #updating user object
                update.save()
                messages.info(request, 'Your resume details have been updated.') #notify the user
                return redirect('dashboard') #redirect user to the url path named "dashboard"
            else:
                messages.warning(request, 'An error occured. Please try again later')
        else:
            form = UpdateResumeForm(instance = resume)
            context = {'form': form}
            return render(request, 'resume/update-resume.html', context) #display the webpage when user first enter the page
    else:
        messages.warning(request, 'Request denied to due permission error.')
        return redirect('dashboard') #redirect user to url path named "dashboard" if user is not an employee
```

Figure 22. update_resume function.

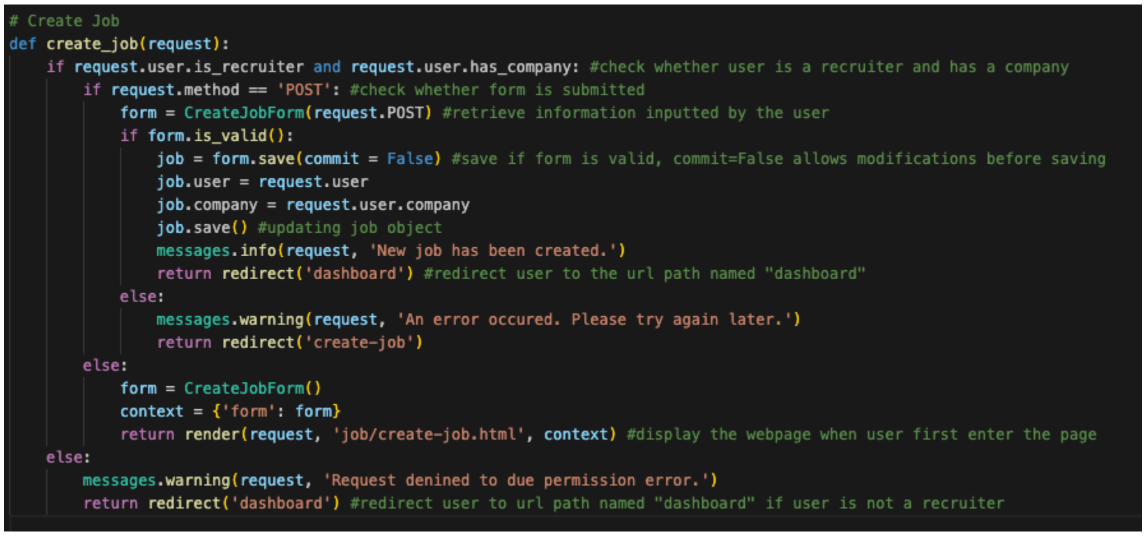
Figure 22 shows a function named *update_resume*, whose main purpose is to update an existing resume that has been previously created by the user. This function takes the *request* object as an argument. First, it checks whether the user is an employee since this feature should only be accessible to employees. Next, it displays the webpage to the user when the user first enters the url. When the method is *POST*, meaning that the form is submitted, the function retrieves the data inputted from the user and saves this to the database. It finally returns a redirect, which redirects the user to another web page with a url path *dashboard*.



```python
# Applying to a Job
def apply_to_job(request, pk):
    if request.user.is_authenticated and request.user.is_employee:
        job = Job.objects.get(pk = pk)
        if ApplyJob.objects.filter(user = request.user, job = pk).exists(): #check whether a user has applied to a particular job
            messages.warning(request, 'You have applied to this job.') #doesn't allow the same user to apply twice
            return redirect('dashboard')
        else:
            ApplyJob.objects.create(user = request.user, job = job, status = 'Pending')
            messages.info(request, 'You have successfully applied to this job.')
            return redirect('dashboard')
    else:
        messages.info(request, 'Please log in to continue.')
        return redirect('login')
```

Figure 23. apply_to_job function.

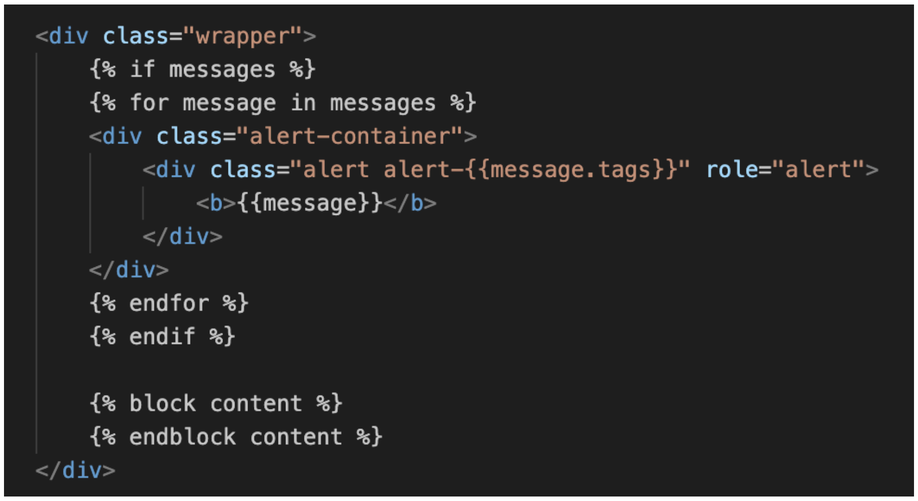
Figure 23 shows a function named *apply_to_job*, whose main purpose is to allow applicants to apply to an active job opportunity. This function takes the *request* object and *pk* as arguments. First, the function ensures that the user is an employee and has been authenticated (logged in). Next, it retrieves the job object with the associated pk (primary key) value which uniquely identifies a user. It then checks whether the user has applied to this job, hence preventing the same user from applying twice. If this is valid, it creates an applyjob object and redirects the user to the webpage with a url path *dashboard*.



```python
# Create Job
def create_job(request):
    if request.user.is_recruiter and request.user.has_company: #check whether user is a recruiter and has a company
        if request.method == 'POST': #check whether form is submitted
            form = CreateJobForm(request.POST) #retrieve information inputted by the user
            if form.is_valid():
                job = form.save(commit = False) #save if form is valid, commit=False allows modifications before saving
                job.user = request.user
                job.company = request.user.company
                job.save() #updating job object
                messages.info(request, 'New job has been created.')
                return redirect('dashboard') #redirect user to the url path named "dashboard"
            else:
                messages.warning(request, 'An error occured. Please try again later.')
                return redirect('create-job')
        else:
            form = CreateJobForm()
            context = {'form': form}
            return render(request, 'job/create-job.html', context) #display the webpage when user first enter the page
    else:
        messages.warning(request, 'Request denined to due permission error.')
        return redirect('dashboard') #redirect user to url path named "dashboard" if user is not a recruiter
```

Figure 24. create_job function.

Figure 24 shows a function named *create_job*, whose main purpose is to allow recruiters to create a job opportunity. This function takes the *request* object as an argument. First, the function ensures that the user is a recruiter and has a company. Next, it displays the webpage to the user when the user first enters the url. When the method is *POST*, meaning that the form is submitted, the function retrieves the data inputted from the user and saves this to the database. It finally returns a redirect, which redirects the user to another web page with a url path *dashboard.*



```
<div class="wrapper">
    {% if messages %}
    {% for message in messages %}
    <div class="alert-container">
        <div class="alert alert-{{message.tags}}" role="alert">
            <b>{{message}}</b>
        </div>
    </div>
    {% endfor %}
    {% endif %}

    {% block content %}
    {% endblock content %}
</div>
```

Figure 25. Template tags.

Django also allows an easier workload when it comes to displaying data from the database through HTML with the use of template tags. For instance, as shown in Figure 25, Django allows the use of python-like syntax *if* and *for*. In this case, *if* is used to only show *.alert-container* when there is a message returned to the user. *for* is used to iterate through the message, hence allowing a dynamic display that changes according to various scenarios. In addition, it is also possible to create template inheritance by using template tags, particularly using *{% block content %}*. This allows a more efficient coding environment that minimizes redundancy.

Resources

- [Link to GitHub Repository]