CV ANALYSIS SOFTWARE

UCS503 Software Engineering Project Report End-Semester Evaluation

Submitted by:

101983058 Abhimat Gupta
101803546 Jayati Gumber
101803563 Kunal Gupta
101803549 Sher Amir Singh Dullat
101983052 Sunidhi Singla
BE Third Year, COE

Submitted to Ms. Rashmeet Toor

Name of the Faculty – Dr. Vinod Bhalla

Designation – Assistant Professor



Computer Science and Engineering Department TIET, Patiala

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1. Project Overview

Every big or small company wants to hire the best candidates for their operations. These days, companies put a lot of time, efforts and money in the process of selecting the right candidate. This system will help the human resource department to select right candidate for a particular job profile, which in turn will provide expert workforce for the organization. This software is thus proposed to enable a more effective and economic way to short list submitted candidate CVs from a large number of applicants providing a consistent and fair CV ranking policy, which can be legally justified. The purpose of the prototype is to demonstrate the concept and to deliver operational and functional services for testing purposes. As for now, short listing the right candidates out of mass applicants is the main objective.

CV Scanner is a project to develop an effective way to shortlist submitted candidates' CVs from a large number of applicants providing a consistent and fair CV ranking policy, which can be legally justified. System will rank the experience and key skills required for particular job position. Then, the system will rank the CVs based on the key skills which are required for particular job profile. This system will help the HR department to easily shortlist the candidate based on the CV ranking policy. This system will focus not only in qualification and in experience but also focuses on other important aspects, which are required for particular job position. This system will help the human resource department to select right candidate for particular job profile, which in turn provide expert workforce for the organization.

2. Software Requirement Specification (SRS)

Software Requirements Specification

for

CV Analysis Software

Version 3.0 approved

Prepared by Group 6

Abhimat Gupta 101983058 Jayati Gumber 101803546

Kunal Gupta 101803563

Sher Amir Singh Dullat 101803549

Sunidhi Singla 101983052

Thapar Institute of Engineering and Technology, Patiala

05/12/2020

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Revision History

Name	Date	Reason for Changes	Version
Abhimat, Jayati, Kunal, Sher Sunidhi	26/09/2020	Finished initial release minus glossary and diagrams.	1.0

Abhimat, Jayati, Kunal, Sher,	2/10/2020	Added Glossary and diagrams minus appendix B and C	2.0
Sunidhi			
Abhimat, Jayati, Kunal, Sunidhi	05/12/2020	Added all UML diagrams and revised documentation	3.0

2.1 Introduction

2.1.1 Purpose

The purpose of this document is to provide a detailed overview of our software product, CVAS for erecruitment. This document describes the scope of the project, its target audience, hardware and software requirements, interface, safety and security requirements, and other non-functional requirements.

2.1.2 Document Conventions

In general, the document follows the IEEE formatting requirements. The content of this document is written in Arial with font size 11. The main titles of the body are written in Times New Roman with font size 18 while the subtitles are written in Times New Roman with font size 14. The sub-subtitles are written with font size 12. The margins are set as follows: left and right is 0.9" while top and bottom is 1".

2.1.3 Intended Audience and Reading Suggestions

This project is a prototype for CVAS and it is restricted within the college premises. However, it is useful for the recruiters as well as job seeking candidates for the e-recruitment process. This document is intended to be used by members of the project team who will implement and verify the correct functioning of the system.

2.1.4 Product Scope

The rapid development of modem Information and Communication Technologies (ICTs) in the past few years and their introduction into people's daily lives has led to new circumstances at all levels of their social environment (work, interpersonal relations, entertainment, etc.) People have been steadily turning to the web for job seeking and career development using web 2.0 services like LinkedIn and job search sites. On the other hand, a lot of companies use online knowledge management systems to hire employees, exploiting the advantages of the World Wide Web, termed as e-recruitment systems. They automate the process of publishing positions and receiving CVs. The online recruitment problem is two-sided: it can be seeker-oriented or company-oriented. In the first case, the system recommends the candidate a list of job positions that better fit his profile. In the second case, recruiters publish the specifications of available job positions and the candidates who can apply by submitting their CV's links.

This system will help the HR department to easily shortlist the candidates based on the CV ranking policy. It will focus not only in qualification and in experience, but also on other important aspects which are required for a particular job profile.

2.1.5 References

- "An integrated e-recruitment system for CV ranking based on AHP" Available -https://www.researchgate.net/publication/220723975 An Integrated eRecruitment System for CV Ranking based on AHP
- Software Requirements Specification document with example: available https://krazytech.com/projects/sample-software-requirements-specificationsrs-report-airlinedatabase
- Software Requirements Specification report for Time-Tracker 2.0 Available https://trelloattachments.s3.amazonaws.com/58c0dc2106266ad55c4a3486/58c65f5a171e248 79e1e0d 02/d94c2d78161d54c8779a4ffdeba0cff9/srs.pdf
- Design and Realization of Distinctive Data Interface Based on SAP HR System, Available https://ieeexplore.ieee.org/document/6118590

2.2 Overall Description

2.2.1 Product Perspective

Every big or small company wants to hire the best candidates for their operations. These days, companies put a lot of time, efforts and money in the process of selecting the right candidate. This system will help the human resource department to select right candidate for a particular job profile, which in turn will provide expert workforce for the organization. This software is thus proposed to enable a more effective and economic way to shortlist submitted candidates' CVs from a large number of applicants providing a consistent and fair CV ranking policy, which can be legally justified. Also, a feature can be included through which recruiter can take online assessment of candidates, thus filtering the suitable candidates.

As for now, shortlisting the candidates out of all mass applicants is the main objective.

2.2.2 Product Features

The major feature of this CVAS is that it is fast and accurate. It saves time, increases efficiency and boosts productivity. Our fully automated workflow solution and CVAS seamlessly loads candidates' data from database and shares it to the existing recruiter.

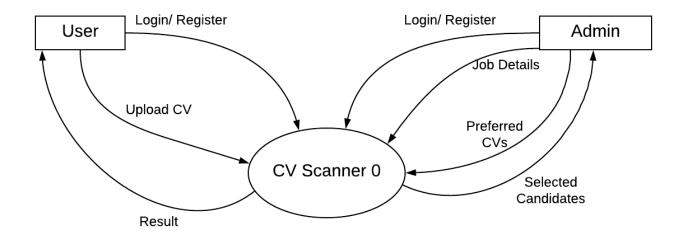


Fig 2.2.2.1 Data flow diagram level-0

2.2.3 User Classes and Characteristics

This part is to identify various user classes that we anticipate will use the web application. User classes will be differentiated based on the use, product functions and features, technical expertise, security and privilege levels. The solution is intended to be used by three main different user classes; system administrators, system operators and candidates.

2.2.3.1 System Operators:

- Maintains the functional interface of the application and troubleshooting issues.
- Suggest possible updates and identifying renewal application.
- Coordinate with service providers and infrastructure vendors.
- · Communicate with system administrators.

2.2.3.2 System Administrators:

- Develop and maintain installation and configuration procedures and operational requirements
- Perform weekly/ monthly backup operations ensuring all required files and data are successfully backed up.
- Repair and recover from hardware or software failures.
- Communicate with system operators to rectify the problems if occur.

2.2.3.3 Candidates:

 Upload their CVs with the authentic information to avoid being disqualified and improve accuracy

2.2.4 Operating Environment

Here we listed the several operating environments that are used in this application.

OE-1: System is not dependent on geographical areas.

- OE-2: System shall operate in newest versions of all web browsers.
- OE-3: There should be no constraint on users being able to access the system at a given time.
- OE-4: Data is generated by application and stored in the AWS S3 bucket an online database. OE-5: Continuous service is preferred, but as long as there is no data loss, minor service interruptions can be tolerated.

OE-6: Personal data will be stored in the database, so the AWS S3 bucket is well secured. OE-7: HTML, CSS and JavaScript is used to create user interface as these languages are supported by most browsers.

2.2.5 Design and Implementation Constraints

The following constraints will apply to for the prototype:

- *Processing speed:* This software requires high speed machine for data extraction from the CV on the administration side.
- Deployment Point: It is built to be deployed as software for the use of every big or small company and even for college to conduct their own placement test (future prospect).
- Operating Platform: It may work for several distributions of Linux and Windows PCs.
- Hardware used: This software is made using Python and the data is stored in SQLite which
 is the database of our web-based server. Flask has been used for the deployment of web
 application.

2.2.6 User Documentation

No user documentation will be required, as all candidates are well aware of how to deal with these types of applications. But we will ask candidates to write their CVs in language known as Latex and not to use fancy templates for the CVs.

2.2.7 Assumptions and Dependencies

AS-1: CV size should not be more than 1 MB.

AS-2: Usage of university account for login is must.

AS-3: User must have enabled JavaScript of the browser. DE-1:

User must have university account.

2.3 System Features

2.3.1 CV Assessment

System Feature	CV Assessment
Priority	High
Description	Assessment of CV provided by the candidate, identify, detects and extracts key skill characteristics from the

	CVs uploaded by the candidate.
Stimulus/ Response Sequences	This feature is activated after the candidate has uploaded the CV link.
Functional Requirements	A dedicated parser, pre-processing module, work dictionary job function, content screening function.

2.3.2 Feedback to Candidate

System Feature	Feedback to Candidate
Priority	High
Description	System will give feedback to user on the basis of job profile and CV provided.
Stimulus/ Response Sequences	Users will get the result in the form whether he/she is selected or not, or if he/she gave wrong resume link.
Functional Requirements	A feedback module having specific parameters to judge candidates/ user.

2.3.3 User Authentication

System Feature	User Authentication
Priority	High
Description	Check if user exists in our database, and user name and password matches
Stimulus/ Response Sequences	User will now access our system if he/she registered
Functional Requirements	A database storing all parameters while login

2.3.4 Result Display

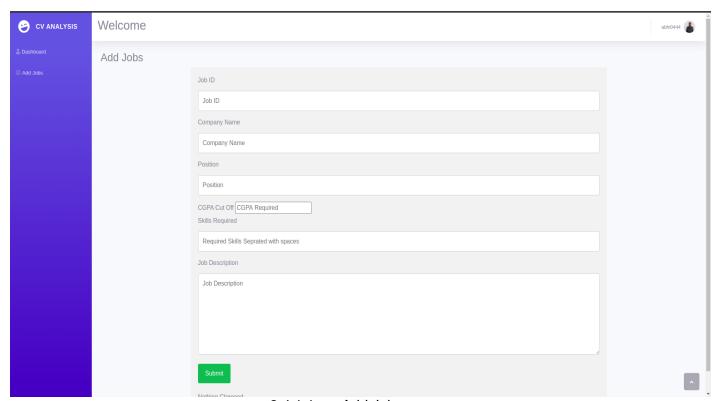
System Feature	Result Display
Priority	High
Description	Evaluate all candidates that applied for that particular job
Stimulus/ Response Sequences	Display all the score categories as cv score and total score
Functional Requirements	A database storing all parameters while login

2.4 External Interface Requirements

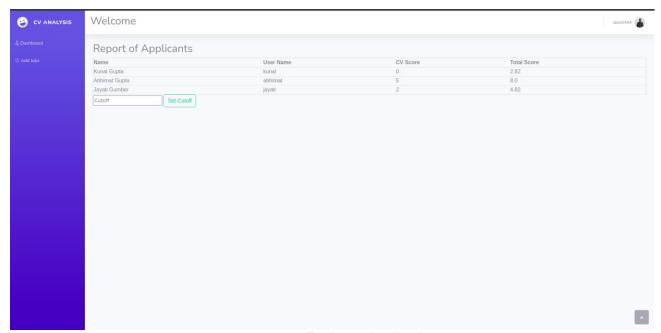
2.4.1 User Interfaces

The two main interfaces of the user interface are as follows: Admin -

- Add Job Details Admin adds the details which are necessary for the candidate, e.g. job profile, CGPA cut
- Set skills required Admin can add the technical or management skills required.
- Scan CV Our software which will scan the CVs of the candidates and select best out of them to be uploaded into the system for further process of recruitment.
- Shortlisted Candidates Candidates which are shortlisted will be informed through system genrated mail. The shortlisting of CVs is performed by the system itself.



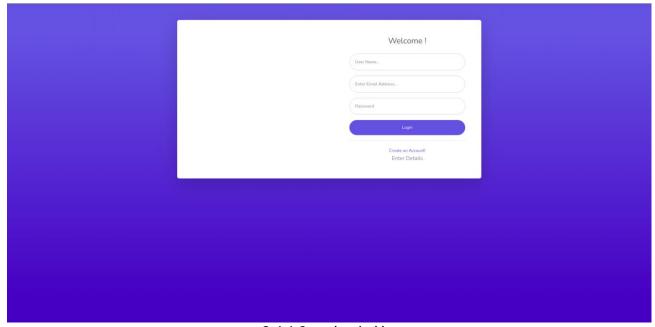
2.4.1.1 Add Jobs



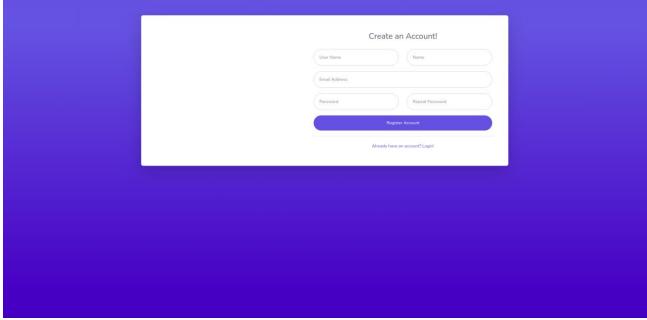
2.4.1.2 Evaluate Application

User-

- Register To access the system, candidates need to register and create valid login credentials. Also, the candidate needs to upload their CV.
- Login Candidates must have to log in with their valid credentials to access the system.
- · Results Based on the CV analysis, the results will be sent to recruiter on their mail ids.



2.4.1.3 Login User



2.4.1.4 Register User

2.4.2 Hardware Interfaces

The software makes extensive use of several hardware devices. These devices include:

Processor – i5 or higher

Hard Disk – 5 GB (or more)

Memory – 4 GB RAM (or more)

2.4.3 Software Interfaces

The basic and must require software interfaces for this project are listed below:

Linux/ Windows 7 or higher

SQL database server

Flask/ Django server with high performance

2.4.4 Communications Interfaces

- This project supports all types of web browsers.
- The final result will be sent on the mails of candidates after their CV scan.
- The candidate will get all type of information on the system.

2.5 Other Non-functional Requirements

2.5.1 Performance Requirements

PE-1: Uploaded CV documents (including CV and other details) should not take more than 20 seconds to load on to the database.

PE-2: Any web page of the system should not have total files of more than 10 MB and should load within 12 seconds on a 900KB/sec internet connection.

PE-3: The CV scan by the software should execute within 15 seconds on a 4.1 GHz intel i5 processor, 5 GB storage at 8GB/sec rated speed and 4GB DDR4 memory.

2.5.2 Safety Requirements

SR-1: If the applicant is not satisfied with their CV evaluation or they think that something had gone wrong with the scan, they can fill the recheck form after which their CV will be checked manually by a person.

SR-2: In case of major damage to database, it shall backup from the most recent backup file stored in the archive and prompt applicants to submit files again

SR-3: If any of the applicant files are lost in transaction, that specific applicant should be prompted to submit the file again by front end of website.

SR-4: If admin is not satisfied with outcomes of CV scan, they should be able to pause the ongoing scans and check the source of software. After inspection, the scans should begin from the beginning to check all the files again.

SR-5: If any of the admins is not satisfied with a particular scan, they shall follow the procedure described in SR-4, but they should not be allowed to interfere personally and assign a CV score to a particular file.

2.5.3 Security Requirements

SE1: The database should be Linux based for enhanced security.

SE-2: Only the admins should be able to view details of applicants and edit the required information for iob.

SE-3: Log in should be necessary for applicants to apply and provide documents.

SE-4: The site shall be encrypted by end-to-end encryption.

SE-5: No user files with extension of executable files shall be accepted.

2.5.4 Software Quality Attributes

SQ-1: The CV analysis should work on plaintext, rich text as well as Unicode text files.

SQ-2: CV analysis should undergo rigorous testing before it is deployed on the website to ensure its correctness.

SQ-3: The database should be modular to ensure easy manageability.

SQ-4: The UI should be intuitive and should make the site easy to use for both admin and applicants.

SQ-5: Admins should be given privilege to pause the ongoing scans and test the analysis software against any set of sample data to ensure its correctness.

2.6 Other Requirements

None at this time.

Appendix A: Glossary

CV Curriculum Vitae

CGPA Cumulative Grade Point Average

CVAS CV Analysis System

HTML HyperText Markup Language – it is the most basic building block of the

Web. It defines the meaning and structure of web content.

CSS Cascading Style Sheets is a style sheet language used for describing the

presentation of a document written in a markup language such as HTML

DFD Data Flow Diagram

It shows the flow of data through the system and is also used for modelling

the requirements.

UML Unified Modeling Language
SE Software Requirements

SQ Software Quality

Use Case Diagram Use Case Diagrams are considered for high level requirement analysis of

a system. When requirement of a system is analyzed, the functionalities

are captured in use cases.

Activity Diagram A flowchart to represent the flow from one activity to another activity.

AWS Amazon Web Services
S3 Simple Storage Service
AHP Analytic Hierarchy Process
Windows, Linux Various Operating Systems

Python Python is an interpreted, high-level and general-purpose programming

language.

Flask is a lightweight WSGI web application framework. It is designed to

make getting started quick and easy, with the ability to scale up to complex

applications.

Appendix B: Analysis Models

None at this time.

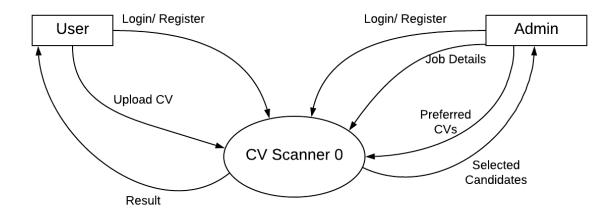
Appendix C: To Be Determined List

None at this time.

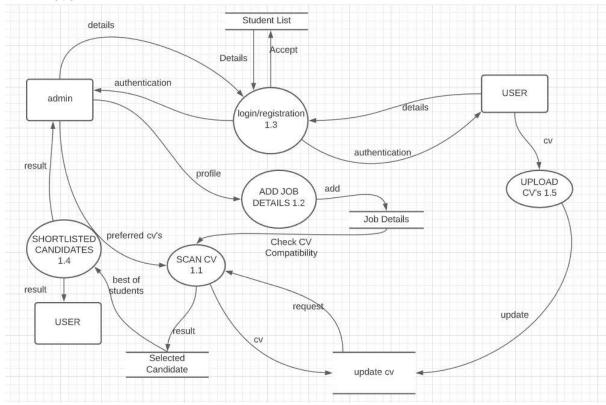
3. Structured Analysis

3.1 Data Flow Diagrams

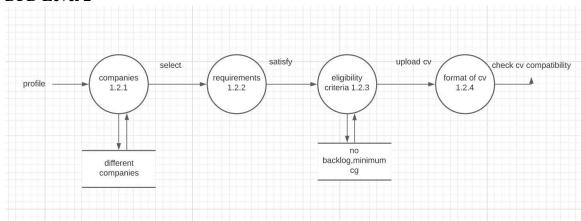
3.1.1 DFD Level 0



3.1.2 **DFD** Level 1



3.1.3 **DFD** Level 2

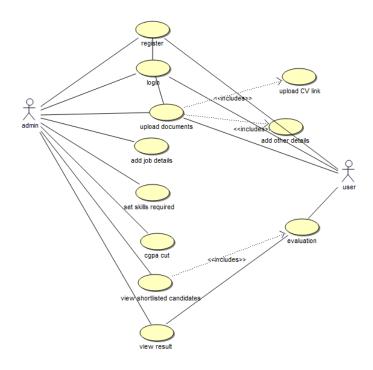


3.1.4 Data Dictionary

5.1.4 Data Dictionary		
Item	Defination	
Information Type	Resume (pdf type), User Information, Job Details	
Information Loaction	Loaction of resume (resume/user_name) and database.db user_db (user registeration) user_details (user details) job (job details) job_applied (jobs applied by candidates)	
Data Request	Data of each type reqested (Table form)	

4. Object Oriented Analysis

4.1 Use Case Diagram



4.2 Use Case Tables

Use Case for Register

ID:	Register
Title:	Register User
Description:	User can register to our system by entring requiredfeilds
Primary Actor:	User
Preconditions:	Users must be connected to the server and student of Thapar University
Postconditions:	User can now login
Author:	Kunal Gupta

Use Case for Login

ID:	Login
Title:	User Login
Description:	User can login to our system by entring requiredfeilds
Primary Actor:	User

Preconditions:	Users must be connected to the server and student of Thapar	
	University and registed.	
Postconditions:	User can nowapply for jobs	
Main	In the particular function:	
Success Scenario:	Details such as user name, mail id, and password is required	
Author:	Jayati Gumber	

Use Case Upload Document

ID:	Upload
Title:	Upload documents and add other details
Description:	User can upload documnts to our system
Primary Actor:	User
Preconditions:	User must be logged in
Postconditions:	User can now apply for jobs
Main	In the particular function:
Success Scenario:	User have to add all feilds mentioned on that page.
Author:	Abhimat Gupta

Use Case add Job

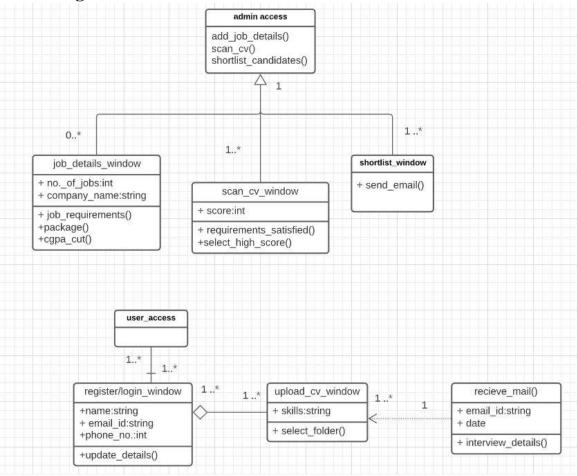
ID:	Add Job
Title:	Add Job
Description:	User can register to our system by entring requiredfeilds
Primary Actor:	Admin
Preconditions:	User must be Administrator
Postconditions:	Admin can now add jobs
Main	In the particular function:
Success Scenario:	Admin can add jobs by add all the feilds such as skills required,
	cgpa cut etc.
Author:	Sunidhi Singla

Use Case for Shortlisting

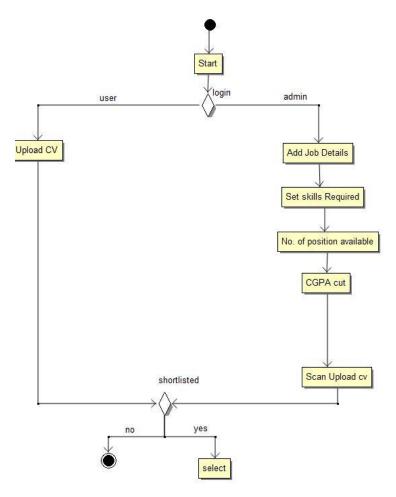
ID:	Shortlisting
Title:	Shortlisting Candidates
Description:	Through this admin can shortlist candidates that applied for that job.
Primary Actor:	Administrator
Preconditions:	User must be Administrator
Postconditions:	Shortlisted candidates are informed through system genrated mail about their results

Main	In the particular function:
Success Scenario:	Admin has to add cutoff value to shortlist
Author:	Abhimat Gupta

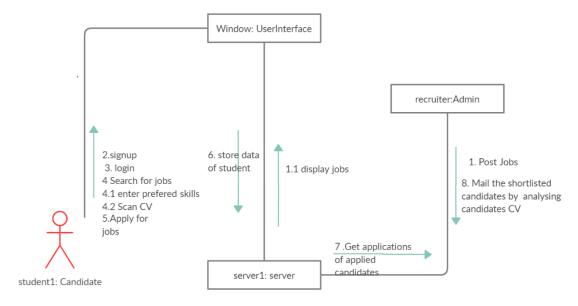
4.3 Class Diagram



4.4 Activity Diagram

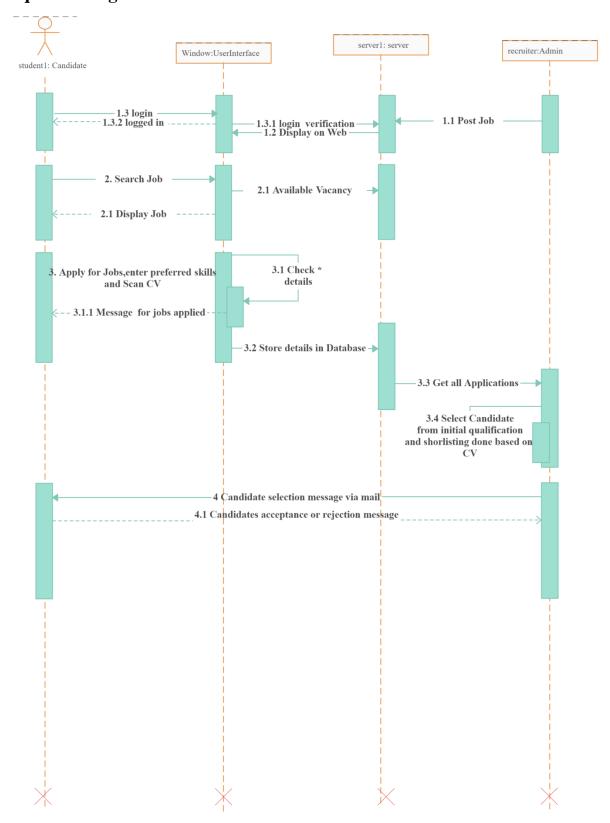


4.5 Collaboration Diagram

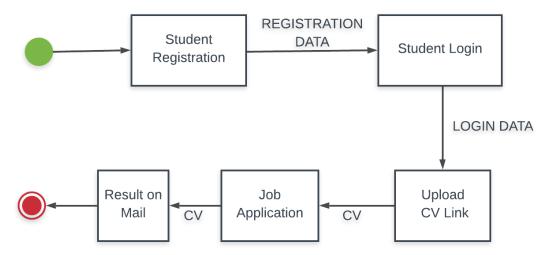


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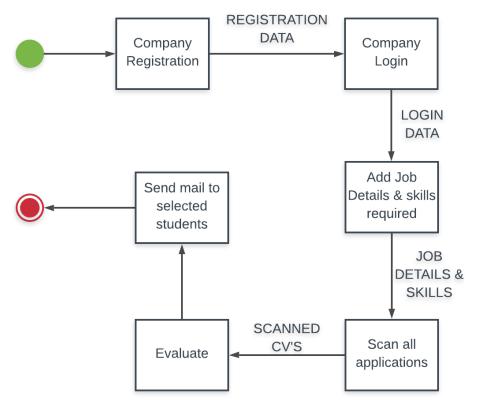
4.6 Sequence Diagram



4.7 State Chart Diagram

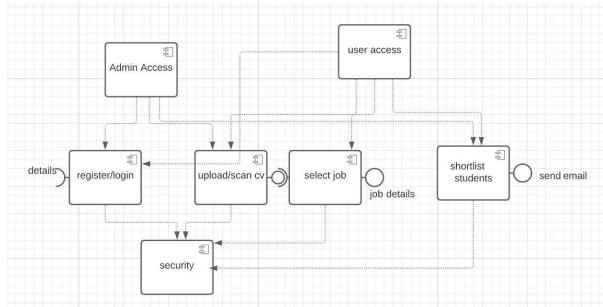


4.5.1 User State Chart Diagram

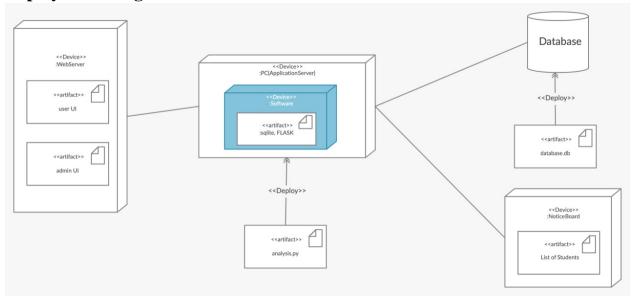


4.5.2 Company State Chart Diagram

4.8 Component Diagram



4.9 Deployment Diagram



5. Testing

5.1 Test Plan

To deliver bug free software, a tester should cover maximum possible combinations of conditions. But it is not possible to completely exhaust all possible conditions. It is not only time consuming but also, it is a waste of time and resources. To test system functionality to apply a discount depending on the purchase amount. It is not possible to test each and every value. The applicable values are too many to test. We can only pick some of the conditions and assume the system works the same for the rest of the conditions. In this project, black box testing is used to test and validate various scenarios.

5.2 Test Case Report

5.2.1 Equivalence Class Partitioning

Equivalence partitioning is a Test Case Design Technique to divide the input data of software into different equivalence data classes. Test cases are designed for equivalence data class. The equivalence partitions are frequently derived from the requirements specification for input data that influence the processing of the test object. A use of this method reduces the time necessary for testing software using less and effective test cases.

5.2.2 Basic Testing Results

Test Case#: 1 Test Case Name: User Authentication

System: CVA Subsystem: Login Page

Designed and Executed by: Abhimat, Sunidhi **Design Date:** 22/11/2020

Short Description: Check if user exits in our databse or not.

Conditions: User must be registered

Step	Action	Expected System Response	Pass/Fail	Comment
1.	Enter the required feils	If user exist in Database it will redirected to profile page	Pass	User must enter all details correct

Post Conditions: User can now use our system

Test Case#: 2 Test Case Name:CV Assessment

System: CVA Subsystem: Evaluation Page

Designed and Executed by: Abhimat **Design Date:** 24/11/2020

Short Description: Evaluate all candidate's CV's that applied for that particular job.

Conditions: Must logedin as administrator

Step	Action	Expected System Response	Pass/Fail	Comment
1.	Admin Click on Evaluate Button in that Particular Job Page	Generate the cv score for all applicatnts that have applied	Pass	Only can be done by administrator

Post Conditions: We get cv score of applicant.

Test Case#: 3 Test Case Name: Feedback to

Candidate

System: CVA Subsystem: Evaluation Page

Designed and Executed by: Kunal, Abhimat **Design Date:** 24/11/2020

Short Description: Administrator can send feedback to candidate weather he/she was selected or not on

mail

Conditions: Must logedin as administrator

Step	Action	Expected System Response	Pass/Fail	Comment
1.	Admin Click on Accept or Not Accept Button in that Particular Job	Display messages below that "mail send"	Pass	Only can be done by administrator

Post Conditions: We float mail to applicant's about if they are applicable or not

Test Case#: 4 Test Case Name: Result Display

System: CVA Subsystem: Evaluation Page

Designed and Executed by: Sunidhi, Abhimat **Design Date:** 01/12/2020

Short Description : Evaluate all candidates that applied for that particular job.

Conditions: Must logedin as administrator

Step	Action	Expected System Response	Pass/Fail	Comment
1.	Admin Click on Evaluate Button in that Particular Job Page	Generate the full score for all applicatnts that have applied	Pass	Only can be done by administrator

Post Conditions: We get total score of applicants.

Test Case#: 5 Test Case Name: Add Jobs

System: CVA Subsystem: Add Jobs

Designed and Executed by: Jayati, Sher **Design Date:** 02/12/2020

Short Description: Add new jobs through admin page

Conditions : Must logedin as administrator

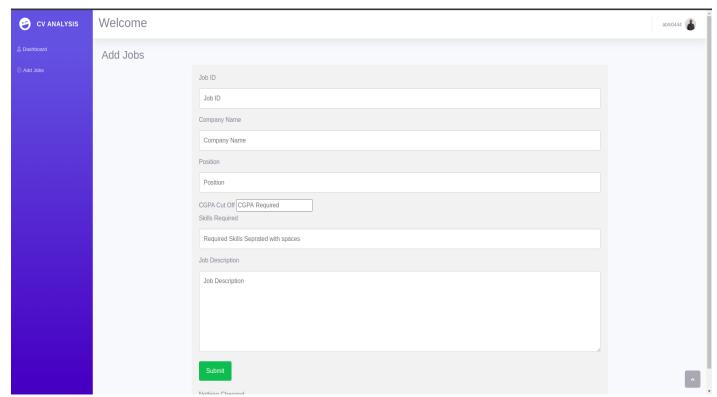
Step	Action	Expected System Response	Pass/Fail	Comment
1.	Fill all details in add job page	If job added to database dipalys message job added	Pass	Only can be done by administrator

5.2.3 Advanced Test Case Results

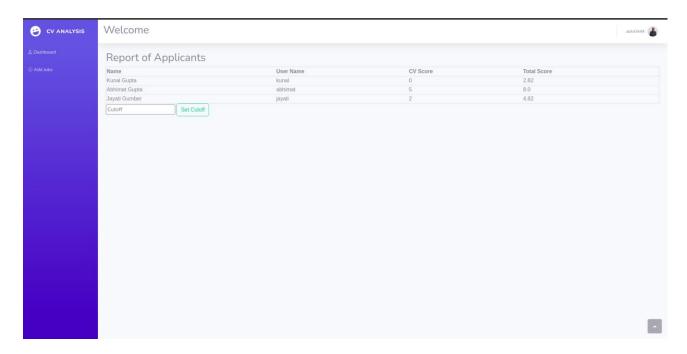
S.No	Test Case	Pass/Fail	Comment
1.	If CV is not in pdf or have some error, it will mail to applicant to update CV	Pass	CV which is not in pdf form shows cv score zero and it will notify the applicant by the admin
2.	Is this software viable enough to work with	Pass	It uses robust parsing algorithm to solve this situation. Different profiles are handled in the same way.

	different job profiles and large set of students?		
3.	Can the software detect the different text styles, tables, diagrams on the CV.	Fail	The parsing library used is not advanced to detect the different text styles.

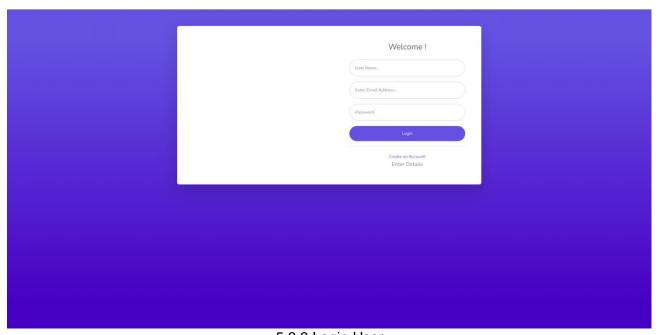
5.3 Screenshots



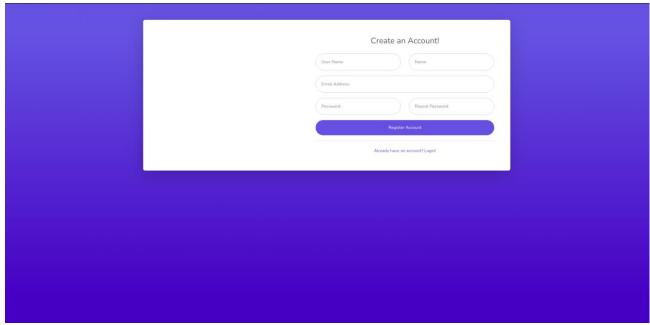
5.3.1 Add Job



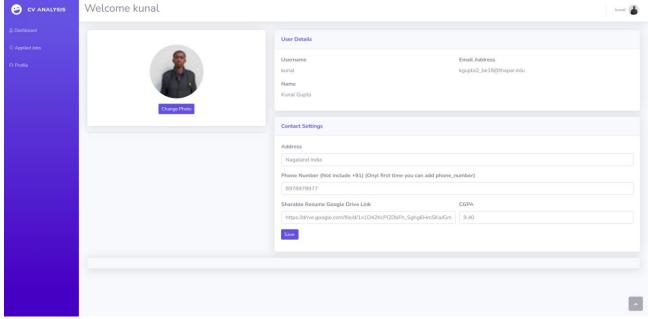
5.3.2 Evaluate application



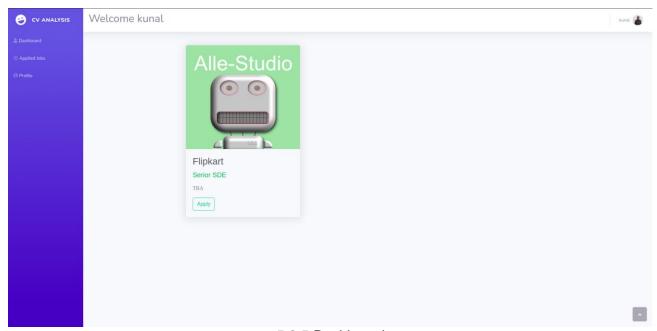
5.3.3 Login User



5.3.4 Register User



5.3.4 User Profile



5.3.5 Dashboard