

SW Engineering CSC648/848 Spring 2021

SkillSeek

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Executive Summary

Our team is building a website that addresses a major problem for students on campuses around the nation, thus we decided to create a web application called SkillSeek. Skillseek aims to resolve a significant concern for both adults/teenagers when they graduate from College, University, or highschool, which is finding a job after graduating. Our website provides a student friendly platform where users can post their resumes in hopes of finding their dream job. Currently, students graduating in a post-COVID world are facing immense difficulties finding a job coupled with immense economic pressure. With the introduction of our web application, we are hoping to help students, teachers, and organizations by giving them a means to interact with each other to ease the employment process. We aim to facilitate the process by allowing students to differentiate themselves by marketing their educational background and work experience. Furthermore, our platform streamlines the massive undertaking of sifting through potential job candidates by providing an effortless way of reviewing candidate resumes, teacher reviews, and other relevant information that are considered when employers make the determination of employing an individual. SkillSeek is also a great tool for organizations aiming to diversify their workforce by giving users the option of specifying their gender and demographic.

What distinguishes our platform from those of our competitors is that we are a non-profit organization as we don't charge premiums like LinkedIn and Indeed.com. As a team, we make every effort to simplify our user interface to make it accessible to as many individuals as possible. We encourage everyone to come and visit our website so we can provide them the best job listing in the market. To summarize, with the heavily competitive nature of the current job

market and the global depression we are currently facing, our team is doing its utmost to alleviate and ease the difficulties upcoming graduates shall face in finding job opportunities and bridge the gap between these individuals and employers.

Our group Team 1 is composed of 5 SFSU students who seek to address the struggle students face finding a job, immediately after graduating. We hope to increase students' chances of finding employment by simplifying and modernizing the process of seeking it, especially with the unique circumstances that COVID-19 has given rise to. As a group we are multicultural that came from different backgrounds and different walks of life and our diversity and our unique experience help us bind as a team very strongly. Despite the fact that most of our group members have little to no experience in working in professional environments or let alone setting up web servers / applications. So, we did our best to create a great website that individuals can use on a daily basis. By the end of the project due date, we hope to provide an application that will not only serve students around the globe who are in search of opportunity, but also an application that everyone can enjoy and use consistently.

Personas and Main Use Cases

Students:

Our main and most numerous users shall be students as they are the primary focus of our application. As upcoming and fresh graduates, students are motivated to find a job and begin their careers to be able to sustain themselves. They tend to be creative, optimistic, and very eager to prove themselves. As SkillSeek users, they would be responsible for maintaining their profile and keeping their information and resume up to date to attract employers' interest. They are also encouraged to persuade their instructors to review them in order to differentiate themselves and increase their probability of being hired. A pain point for any student user is that they will have to compete with other students when applying for jobs and that may dissuade, frustrate, or possibly deter them from using our service. Another frustration that students will likely face is the difficulty in finding employment due to the saturation of the job market or their education and experiential background. A student's ultimate goal for using SkillSeek is finding a well paying job suitable to their interests and personality.

Examples of potential student users:

- Grace, a high school graduate, is looking for a job. She is really passionate about becoming a Barista. With her friend's recommendation, she goes to Skillseek and decides to create an account. Grace eventually decides to use SkillSeek's search functionality to look for a job in her desired area. She comes up with 20 job listings matching her criteria and proceeds to apply to them directly through the platform.
- Bob, a Computer Science student at a US university, is looking for internships while completing his degree to accumulate work experience and

build a compelling resume. He creates a SkillSeek account, customizes his profile, and uploads his resume. He begins to seek out his preferred organizations to view available internships opportunities. He applies to their applicable listings and awaits a response from potential employers.

- Emelia, a recent graduate specializing in Environmental Science, found a job through SkillSeek at a waste management company but is unsatisfied with her wage and the work environment. She decides to look for different opportunities, so she routinely returns to SkillSeek to check for the latest job listings matching her criteria and applying to those that suit her. She is contacted by several employers who offer her positions at their organization and compares the offers. She settles on an environmentally focused non profit and proceeds to submit her resignation in pursuit of an exciting new opportunity.

Use Cases:

Finding a Job:

A student is looking for a job so they decide to join SkillSeek to seek out opportunities.

- The student registers for an account with SkillSeek.
- The student checks his email to complete verification email to verify his account and complete registration.
- The student logs in to their account and edits their profile by including some brief information and uploading a profile picture and resume.
- The student utilizes search to look for jobs that they are interested in and then hits the apply button.

Finding Friends/Networking:

Students are looking to find friends / new networks on SkillSeek.com.

- The student first accesses their account.
- The student then hits friends request button and types in the friends name
- The student waits for the friend to accept or reject the friend request.
- Once mutuals, both parties will be able to private message each other and network.
- The student will receive a notification (if enabled) and an email if and when they are on the receiving end of a friend request where they will be able to accept or deny.

Finding a company

Students are looking for whether a certain company has any job listings on SkillSeek.com.

- The student first accesses their account.
- The student utilises the search functionality to input their company of interest.
- The student will be able to see any job listings the company of interest has available and displayed on their page.
- If the student is interested in any listing, they are able to click the apply button.

Teachers:

Our least common users will most likely be teachers; however, they are vital members of the community as they are responsible for recommending students to employers on our platform. The teacher's motivation is to help their student find jobs and they can do so by simply giving them review. Since we are aware that teachers across the world are extremely preoccupied with their families and work we know that this results in teachers having a limited time for writing recommendations, thus our platform's review system would be a much faster alternative option to give a review to students than the typical recommendation letter you would receive from your professor. Also, at any given moment of their career, a teacher could use our platform to apply for a job similar to a regular student if they wish to do so .

Example of potential teacher users:

- Mr. Johnson, a political science teacher at San Francisco State University, wants to review one of his students. Unfortunately, he doesn't really know a platform on the internet that has this certain feature. So Mr. Johnson was recommended to go on SkillSeek by one of his colleagues who uses SkillSeek routinely to give ratings to his students. Consequently, Mr. Johnson then decided to go to Skillseek and make a teacher account . Once, Mr. Johnson completed verifying his account and editing his profile, he proceeded to visit a student's profile to rate them and he does this simply by looking up the student name or unique username in the search bar. Once Mr. Johnson verifies that it's the right student, he then proceeds to write a review on his student's account.

Use Cases:

Teachers applying for job:

Teachers looking for new job opportunities.

- The teacher needs to register / sign in to their accounts .
- The teacher needs to have their resume uploaded on their accounts for employers to access and receive .
- The teacher needs to search for an appropriate job listing .
- The teacher , as an applicant , needs to navigate through available options and hit the "apply" button in order to apply for a job .

Finding/Reviewing the student:

Teachers are looking for a platform to review their students. They came across Skillseek.com where they can easily connect with students and grade them.

- A teacher registers for a new teacher account.
- The teacher proceeds to verify their account.
- The teacher may look up their student's name in the search bar.
- The teacher can then review their student's profile.

Employers:

The last target audience for SkillSeek are employers; they play an imperative role at SkillSeek which is providing students and teachers with jobs. Employers have a clear and direct incentive to use our platform as it provides them with an effective and efficient way of sourcing up and coming talent. Employers can also benefit from the exposure our platform can provide as it can serve as a form of

marketing. One of the main frustrations employers have to cope with, in terms of recruitment, is the sheer volume of applications they receive and the difficulty of finding suitable applicants effectively. To cope with these difficulties, organizations have resorted to outsourcing the process to a third party and even hiring large human resources departments. By using the straightforward user interface our platform offers, employers can inspect applicant profiles with the click of a button and view all the information that they require to make their decision.

Examples of potential Employer users:

- A tech-company looking for graduate students to fill vacant job positions. The company decides to use SkillSeek and proceeds to create an account and post a job listing for students to apply for. They come up with more than 50 applicants for their organization and are able to review their profiles directly to ensure they meet the desired criteria. They proceed to schedule interviews with eligible candidates until they are able to find the right matches for the open positions.

Use Cases:

Looking for Employees:

An organization is looking for talent for their company, they came across Skillseek.com where they can find new people for their company.

- An employer signs up for a new account.
- The employer then proceeds to create their first job listing by providing information about the position they are trying to fill.
- The employer waits for candidates to apply for the job listing.
- Once candidates have applied, the employer will begin to receive emails to notify them.

- The employer logs into SkillSeek and navigates to their profile to view posted job listings.
- The employer selects the job listing that they were notified about to view the applicants.
- The employer may then select each applicant to navigate to their profile and view their experiences and resume.
- The employer then emails the applied candidate to schedule a meeting for an interview.
- If the employer is satisfied and the job vacancy has been filled the employer may choose to hide or delete the job listing.
- If the vacancy has not been filled, the employer may continue seeking viable candidates.
- If the job listing expires, the employer can continue to examine applicant profiles for a period of two months before the job listing and its applicants are cleared.

List of Main Data Items and Entities

Our database must be designed to track several entities and their relationship with one another. The most basic entity will be users and their associated

information. Users will differ based on account type, of which there will be three, students, teachers, and employers.

User Entity Attributes - users:

- User ID (Primary Key) - uid
- Username (Unique) - username
- Password - password
- First Name - firstName (will be treated as organization name for employers)
- Last Name - lastName (NULL for employers)
- Email (Unique) - email
- Date Of Birth - dateOfBirth (will be treated as date of establishment for employers)
- Account Type - accType
- Verified - verified

Every user must have a profile page to host personal information about themselves or their organization. Here we must distinguish between account types in order to host the appropriate information for user profiles. As attributes will vary, we shall create two separate entities to host profile data; one entity to store information belonging to students and teachers and another to store that of the employer. Each user shall have exactly one profile.

A blueprint for the entities and their attributes shall look like the following:

Individual Profiles - profileIndividual: (Student & Teacher)

- User ID (Primary Key & Foreign Key) - fk_uid
- Profile Picture - profile picture
- Resume - resume
- Current Profession - currentProfession
- Description - description
- Gender - gender
- Location - location
- Demographic - demographic

Organizational Profiles - profileOrg: (Employer)

- User ID (Primary Key & Foreign Key) - fk_uid
- Logo - logo
- Headquarters Location - location
- Description - description

To provide users with the ability to display their education and work-related experiences we need two separate entities to house the associated data. Both students and teachers may find uses for these features, so they shall have the ability to include this information on their profile whereas, employers shall not. The distinction made here is simply a design choice as the employer account type represents organizations such as business, corporation, institutions, etc. Each eligible user shall have as many educational and work-related experiences associated with their account. For future reference, we will distinguish between these two entities using the following terms: education for educational experience and experience for work related experience.

Education Entity - education:

- Education ID (Primary Key) - education_id
- User ID (Foreign Key) - fk_uid
- Degree Type - degree_type
- Degree Name - degree_name
- University - university
- Start Date - beginDate
- End Date (can be NULL) - endDate
- Ongoing - ongoing (to distinguish between past and present educational experiences)

Experience Entity - experience:

- Experience ID (Primary Key) - experience_id
- User ID (Foreign Key) - fk_uid
- Employer - employer
- Job Title - experience
- Description - description
- Start Date - beginDate
- End Date (can be NULL) - endDate

- Ongoing - ongoing (to distinguish between past and present experiences)

To provide teachers with the capability of adding reviews to student profiles, we need to account for another entity which shall be referred to as ratings. Reviews shall only appear on student profiles as they are the only account type eligible for reviews. Teachers shall be able to post any number of reviews for any individual student account and shall be able to review as many students as they desire.

Review Entity - rating:

- Review ID (Primary Key) - rating_id
- Review Title - review
- Rating - rating
- Reviewee User ID (Foreign Key) - rater
- Reviewer User ID (Foreign Key) - rated
- Date Reviewed - dateRated

As for organizational profiles, they are distinct since they shall act as a portal of sorts to the employer's available job listings. To allow employers to create job listings for students and teachers to apply to, a new entity is required. The job listing entity will have several vital attributes associated with it to allow for this functionality.

Job Listing Entity - jobListing:

- Listing ID (Primary Key) - listing_id
- Poster User ID (Foreign Key) - poster_id
- Job Title - jobTitle
- Description - description
- Location - location
- Expiry Date - expiryDate
- Expired - expired
- Hidden - hidden

A user defined expiry date attribute shall allow the job listing to expire and be hidden from all other users. When the expiry date is reached, expired shall be set to true. The hidden attribute shall allow employers to voluntarily hide a job

listing from view without permanently deleting it. Expired job listings shall be preserved for a period of 60 days, so employers have the opportunity to observe the profiles of applicants and select candidates. After the job listing is deleted, all child entities shall be deleted such as job applicants.

Job Applicant Entity - jobApplicant:

- Application ID (Primary Key) - application_id
- Listing ID (Foreign Key) - listing_id
- Applicant User ID (Foreign Key)- applicant_uid

Another feature we shall implement is the ability to follow organizations and befriend other users. This feature requires more discussion to decide on how users shall be able to interact with one another. Regardless of the design choices made, the underlying entity that allows for such an interaction should remain largely unchanged. The connections entity is responsible for this interaction.

Connections Entity - connections:

- Connections ID (Primary Key) - connections_id
- Connector ID (Foreign Key) - connector_uid
- Connected ID (Foreign Key) - connected_uid
- Pending - pending

To enforce email verification, we require an entity associated with each created account following the completion of the registration process. After the verification is completed the entity associated with the user shall be deleted and the verification status of said user shall be updated. Accounts that are not verified within 2 days shall be deleted.

Email Verification Entity - email_verification_hashes:

- Hash ID (Primary Key) - hash_id
- Hash - hash
- Associated User ID (Foreign Key) - associated_uid

- Expiry Date - expiryDate

Finally, an entity named sessions shall be automatically generated by, express-sessions, a module we are using to handle user sessions.

Initial List of Functional Requirements

User Independent Functionality:

- Users shall be able to register for accounts.
- Users shall receive a verification email after account creation.
- Users shall be able to login and out safely.
- Users shall be able to edit their profile and password.
- Users shall be able to search for other users and job listings on the platform.
- Users shall be able to view other users' profiles and connect with them.

Student Functionality:

- Students shall be able to include their name, a short biography, their location, demographic, gender, current profession, and date of birth on their profiles.
- Students shall be able to upload a profile picture and resume on their profiles.
- Students shall be able to list education and work experiences on their profile.
- Students shall be able to receive reviews from teachers.
- Students shall be able to apply to view and apply for job listings.

Teacher Functionality:

- Teachers shall be able to include their name, a short biography, their location, demographic, gender, current profession, and date of birth on their profiles.
- Teachers shall be able to upload a profile picture and resume on their profiles.

- Teachers shall be able to list education and work experiences on their profile.
- Teachers shall be able to review students for potential employers to view.
- Teachers shall be able to apply to view and apply for job listings

Employer Functionality:

- Employers shall be able to include their organization's name, a short description about their corporation, a logo, and the location of their headquarters.
- Employers shall be able to post multiple job listings for potential candidates to apply for.
- Employers shall be able to include a job title, description, job location, and an expiry date for the job listing
- Employers shall be able to contact applicants via email.
- Employers shall be able to delete and hide posted job listings.
- Employers shall be able to view candidates who applied for a job listing while the listing is not expired and for a period of 2 months after it has expired.

Initial List of Non-functional Requirements

- The application shall be developed, tested and deployed using tools and servers approved by the class CTO and as agreed in M0.
- The application shall be optimized for standard desktop/laptop browsers
- Selected application functions shall render well on mobile devices
- Data shall be stored in a mySQL database on the AWS deployment server.

- Each table in the database shall support up to $2^{64} - 1$ rows to support as much data as possible without a robust database design.
- The application shall support up to a 100 users accessing it at once.
- The deployment server shall be able to store up to 1GB of data.
- The website shall allow for data to be cached to minimize loading times.
- The response time for all pages shall be limited to a maximum of 4 seconds, assuming that the webpage's data is not cached, website traffic is low, and the user and deployment servers internet speeds are relatively fast.
- User data shall be protected, and all privacy policies will be appropriately communicated to the users.
- Basic and best security practices shall be applied to protect user information stored in the database and information being sent via HTTPS requests as they are using the website.
- Google analytics shall be utilized to display track and report on website traffic.
- Webmail shall be used to deliver notifications to users and to allow users to communicate with one another.
- The application shall be running and accessible 24/7 except for brief outages to deploy new features and bug fixes.
- The application shall be able to operate normally after encountering faults.
- When fault is encountered, users shall be alerted with either a flash message or an error page.
- The language used shall be English.
- Application shall be easy to use and intuitive.
- Pay functionality shall not be implemented nor simulated in UI.

- Modern SE processes and practices shall be used as specified in the class, including collaborative and continuous SW development
- The website shall prominently display the following exact text on all pages "SFSU Software Engineering Project CSC 648-848, Spring 2021. For Demonstration Only" at the top of every website page.

Competitive analysis

Features	SkillSeek	LinkedIn	Glassdoor	Indeed	ZipRecruiter
Allowing users to list their gender and demographics	++	+	-	+	-
Job Listing Functionality	++	++	++	++	++
User Profiles	++	++	++	++	++
Teacher Recommendations	++	++	++	-	++
Educational Experience on Profiles	++	++	++	++	++
Work Experience on Profiles	++	++	++	++	++
Search Functionality	++	++	++	++	++
Boolean Search	+	++	++	++	++
Posting Functionality	-	++	-	-	-
Integrated Resume Hosting	++	++	++	++	++
Job Specific Wage Statistics	-	++	++	++	++

On a competitive level, SkillSeek does offer any advantages over our well-established and corporate competitors at the moment. Our initial desired

outcome for the application, falls short in nearly every single field and does not offer sufficient functionality to be more advantageous for our users. The redeeming trait of our application is that it is a platform primarily geared towards employing recent graduates rather than well experienced individuals. While that may be interpreted as a limitation, it provides students with a significantly greater probability of being hired for several reasons. Firstly, the competition on our platform will be much lower than that of our competitors as it only caters to students rather than experienced individuals. Secondly, employers who seek applicants on SkillSeek will primarily be looking for students as that is the desired scope of the website, although teachers shall also have the ability submit their candidacy for a job listing. Hopefully, we can expand on the site's functionality and features if we have ample time to do so.

High-level System Architecture and Technologies Utilized

Listed below are software technologies that our team has agreed upon. These may be subject to slight changes in the future, but will stay mostly consistent to provide a solid experience for the end-user.

Deployment Model: Software as a Service (SaaS)

Server-side Technologies:

- Host - AWS EC2 t2.micro (1x vCPU, 1gb RAM)
- OS - Ubuntu Linux 20.04 (LTS)
- Web Server - NodeJS 14.15.5 (LTS)
- Reverse Proxy and Static File Server - NGINX/1.18.0 (Ubuntu)
- Database - MySQL 8.0.21
- Storage Engine - InnoDB
- Web Analytics Service - Google Analytics
- Deployment Platform - AWS CodeDeploy (may switch to AWS CodePipeline)

Front End Frameworks / Additional Technologies:

- Framework: ExpressJS 4.17.1
- Template Engine: HandleBars 4.7.7
- Markup Language: HTML5
- Styling Language: CSS3

Tools:

- Virtualization Software - VirtualBox & VMware
- Database Design Tool - MySQL Workbench
- Versioning System - Git
- Repository Host - GitHub

Targeted Browsers:

- Google Chrome
- Mozilla Firefox

Team and roles

- GitHub Master / Team Leader: Emin Musayev
- Documentation Master / Front-End: Begum Sakin
- Front-End: Ali Bin Sabir
- Documentation Master / Front-End: Melissa Gonzalez
- Back-End and Database Development: Ramzi Abou Chahine

Checklist

1. Team found a time slot to meet outside of the class . **(Done)**
2. Github master chosen. **(Done)**
3. Team decided and agreed together on using the listed SW tools and deployment server. **(Done)**
4. Team ready and able to use the chosen back and front end frameworks and those who need to learn are working on learning and practicing .**(Done)**
5. Team lead ensured that all team members read the final M1 and agree/understand it before submission **(Done)**
6. Github organized as discussed in class (e.g. master branch, development branch, folder for milestone documents etc.) **(Done)**