



Bilkent University

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Department of Computer Engineering

# CareerBridge

*Project short-name: CB (Group Number: 11)*

## Project Proposal

Berk Çakar - 22003021

Atak Talay Yücel - 21901636

Kutay Tire - 22001787

Yiğit Yalın - 22002178

Instructor: Özgür Ulusoy

Teaching Assistant: Zülal Bingöl

Project Proposal

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# Project Proposal

*Project name: CareerBridge*

## 1 Introduction

This project aims to develop a web application enabling all kinds of users from the professional domain to connect with each other, find suitable positions for jobs and internships, and create career-related posts.

The proposal describes the system with its key attributes, explains why and how a database will be used to handle data, discusses the system's functional and non-functional requirements, mentions the system's possible limitations, and finally, illustrates the conceptual design via an elaborated E/R model.

## 2 Project Description

CareerBridge is a professional networking platform designed to connect professionals with opportunities, foster career development, and enable job seekers to access relevant career resources. The platform will allow professionals to build their network, showcase their skills and experience, and search for job opportunities in their industry. CareerBridge will be an attraction point for professionals and recruiters to connect and interact.

As can be understood from the above, CareerBridge is a professional social networking software platform. To achieve this, users should be able to interact with each other and professionally share information. Of course, such interaction requires users to have profiles with different roles. The platform will have the following types of users: professionals, recruiters, career experts, mentees, skill assessors, and administrators. Professionals are users who are looking for jobs or want to build their network. Professionals are essentially regular users, and the target audience can include employees, white or blue-collar workers, academicians, students, executives, freelancers, and much more. Professionals can create their professional profiles and showcase their skills, work experience, education, certifications, and achievements. They can also add links to their portfolio, resumes, and social media profiles. Moreover, the professionals will be able to connect with and message other professionals. Not only that, professionals can give and receive recommendations from other professionals to showcase their competence. Lastly, professionals can create timeline posts to share their thoughts, ideas, and experiences with other professionals. Likewise, professionals like, comment, and share other professionals' posts.

The platform will also provide a job search feature where professionals can search for job opportunities based on their location, industry, job title, and keywords. In that sense, professionals can apply for jobs and send their

resumes to recruiters. On the other hand, recruiters are also professionals, but they are looking for other professionals to fill their job/position vacancies. They can post detailed job/open position advertisements (with a job title, description, requirements, and location) and evaluate the incoming applications. Recruiters can be human resource managers, recruiters, and even academicians who try to find postdoc, Ph.D., master, or undergraduate students for their labs or research projects. A professional acquires the recruiter role after the platform administrators approve their profile.

CareerBridge also hosts career experts. Career experts are users who are experts in their field and can provide career advice to professionals. Still, they are professionals and can be mentees as well. Their role is to empower individuals to take control of their career development and achieve their career goals through a personalized and strategic approach. Similar to recruiters, administrators can decide who can be a career expert. Mentees can have prioritized conversations and appointments with career experts.

Additionally, as a unique and new functionality, CareerBridge will provide the skill assessing feature. Skill assessment is performed by skill assessors who are professionals approved by the administrators. Any professional who thinks they are eligible to be a “skill assessor” can fill out an application form providing the necessary documents, project details, test scores (if any), and other information, such as the particular skill(s) they want to assess. In a practical scenario, professionals will be able to see the corresponding skill assessors based on the skills they showcased in their profiles. They can then contact the skill assessors and ask for a skill assessment. After that, the skill assessor will check the professional's profile, resume, and other details to see if they are eligible for that skill. In that case, skill assessors can assign a badge to the professional's profile, indicating that they have verified that skill. The badge will be visible to other professionals.

In summary, CareerBridge is a professional networking platform designed to provide professionals with access to career resources, networking opportunities, and job opportunities. The platform will serve as a “bridge” between recruiters and job seekers and create a community of professionals for knowledge sharing and mentorship.

### **3 Necessity of the Database**

The necessity of the database system in CareerBridge can be evaluated under several aspects.

Firstly, as CareerBridge is a platform for professionals, employers, career experts, mentees, and more to interact, share information, and apply for job openings, it needs a robust and scalable data management system. A database provides a centralized repository for storing and managing user profiles, job postings, job applications, mentorship requests, and appointments, among others.

In terms of data integrity, CareerBridge requires a high degree of transactional integrity to ensure that data related to job applications, connection requests, profile information, and more are created, read, updated, and deleted without any defects or inconsistencies. A relational database management system (RDBMS) provides the necessary functionalities to ensure data integrity by enforcing data constraints, referential integrity, and transactional consistency.

Scalability is also another concern indicating the necessity of a database system. As CareerBridge is a platform that a large number of users will use, it needs to be able to handle a large number of concurrent users. Thus, its database system can be scaled horizontally by adding more servers to the database cluster. This approach allows the database system of CareerBridge to handle many concurrent users without any performance issues.

Performance-wise, the platform must provide low-latency access to the stored data, preferably every moment the application is up and running. An RDBMS provides a highly optimized and efficient way to store and retrieve data, thus ensuring fast and reliable performance.

Lastly, since CareerBridge is a dynamic platform that will constantly evolve and grow, it needs to adapt to changes in user needs, business requirements, and technological advancements. A database management system allows developers to easily modify the schema, add new tables, relations, and properties, and refactor the codebase without affecting the frontend user experience.

Overall, not using an RDBMS to store data (i.e., a file system storage) would have significant downfalls for the CareerBridge project, including limited scalability, poor data integrity, limited querying & data management capabilities. An RDBMS is the best solution for managing large volumes of data with transactional integrity, efficient querying, and robust security mechanisms.

## **4 Utilization of the Database**

The CareerBridge project will utilize a database system to store and manage all the data related to the various entities involved in the system. The entities can include but are not limited to professionals, recruiters, career experts, mentees, and administrators. Each entity will have its own set of attributes, such as name, email, password, and phone number, which will be stored in the database. Additionally, professionals can upload their resumes, which will also be stored in the database.

The database will be used to support various functionalities of CareerBridge. For example, it will allow professionals to search and apply for job advertisements, and enable recruiters to view and manage job applications. Career experts will be able to approve or deny mentee requests and set

appointments with their mentees, all of which will be managed through the database.

The database will also support the sharing of timeline posts by professionals. These posts will be stored in the database, along with information such as the author, date, and content of the post. Other professionals will be able to share, like, and comment on these posts, and all of these interactions will be recorded in the database.

In addition to these functionalities, the database will also be utilized to store the information related to the notifications that will be sent to users. For example, the database will store the information about the notifications that will be sent to professionals when they receive a new connection request, a new job application, or a new message (e.g., the notification type, the sender, the recipient, the date, and the content).

In short, the database will be an integral part of the CareerBridge platform, providing a uniform location for storing and managing all the data related to the system's entities and their interactions.

## **5 Requirements**

### **5.1 Functional Requirements**

CareerBridge's functional requirements are shaped around the different roles that users can have on the platform. Instead of creating a hierarchy between the different types of users, we selected to create a flat structure where each user can have multiple roles. This approach allows us to have a more flexible and dynamic platform. In other words, all users can be considered professionals after the sign-up process. Then, they can be granted different roles (such as recruiter, career expert, and mentee) while keeping the professional role based on their profile and the platform administrators' decision. Note that each professional can have multiple roles at the same time. For example, a professional can simultaneously be a recruiter and a career expert. In that sense, the platform will have the following functional requirements for each type of role:

#### **5.1.1 Functional Requirements for Professionals**

- Professionals can log in and out of their accounts.
- They can create/edit their profiles and add their skills, work experience, education, certifications, achievements, portfolio links, resumes, and more.
- They can connect with other professionals and send them messages.
- They can observe the profiles of other professionals.

- They can give and receive recommendations from other professionals.
- They can publish timeline posts. Also, they can like, comment, and share other professionals' posts.
- They can view, search, and filter for job opportunities based on their location, industry, job title, and keywords.
- They can apply for job opportunities and send their resumes to recruiters.
- They can send a request to the platform administrators to be granted either the recruiter, career expert or skill assessor role.
- They can ask career experts to become their mentees and get prioritized appointments and conversations related to their career development.
- They receive notifications about new job openings that match their profile.
- They can receive notifications about new messages, comments, and likes on their posts. Additionally, they can receive notifications about new connections, job openings matching their profiles, and job applications.
- They can view analytics about their profile views, connections, and job applications.

#### **5.1.2 Functional Requirements for Recruiters**

- Recruiters can do everything that a professional can do, plus:
- They can publish detailed job postings (advertisements).
- They can view job applicants for their job postings.
- They can approve or deny job applications.
- They can set up interviews with job applicants.
- They receive notifications when they receive job applications for their job postings.

#### **5.1.3 Functional Requirements for Career Experts**

- Career experts can do everything that a professional can do, plus:
- They can accept a certain amount of mentees depending on their choice.
- They can approve and deny mentee requests.
- They can set up appointments with their mentees.
- They can remove mentees from their mentorship program.
- They receive notifications when they receive mentee requests or appointment requests.
- They can publish articles or videos on career-related topics to share their expertise. Each of these posts will be featured on the platform's homepage and will be visible to all professionals.

#### **5.1.4 Functional Requirements for Mentees**

- Mentees can do everything that a professional can do, plus:
- They can still request to be mentees of another particular expert. A mentee can have multiple mentors at the same time.
- They can cancel their mentorship program(s).
- They can set up appointments with their mentors (Career experts).
- They can have prioritized conversations and appointments with career experts.
- They receive notifications about upcoming appointments with their mentors.
- They can provide feedback on their mentorship experience.

#### **5.1.5 Functional Requirements for Skill Assessors**

- Skill assessors can do everything that a professional can do, plus:
- They can request to add new master skills.
- They can drop their master skills.
- They can give badges to professionals for the skills which they master.

#### **5.1.6 Functional Requirements for Administrators**

- Administrators can still have access to all the features available to professionals. However, they can reach the administrator dashboard, where they can perform the following actions:
- They can create system reports about the platform's usage. These can include analytical queries related to users, job postings, job applications, and more.
- They can ban or unban users.
- They receive notifications when they receive a new user request to become a recruiter or a career expert. They also receive notifications when a user reports another professional, a timeline post, or a job posting.
- They can approve or deny a professional's request to become a recruiter or a career expert.

### **5.2 Non-functional Requirements**

**Scalability:** One of the application's key features is the ability to support many users worldwide. As a result, the system should not limit the



number of users and should be able to handle the requests of many users without performance loss. Hence, the database should be designed in a way that it can support a significant number of users.

**Performance:** The application should not have any delays in query executions and should be able to respond to user actions immediately without any freezes or latencies. For example:

- For any single database query request, the response time should be in the order of milliseconds. Otherwise, the application's server infrastructure and hardware must be scaled up.
- The login and logout processes should take less than 2 seconds.
- Navigation among different pages in the app should take less than 2 seconds.
- Connection requests to potential recruiters and employees should be sent in at most one second.
- The users should be able to see the filtered results of their searches in less than 4 seconds.

**Reliability:** The application should be able to perform any database action without losing any data unintentionally. Furthermore, database backups should be performed to ensure the system's reliability and preserve data in case of a crash.

- The application's database will be backed up every 6 hours to minimize the effects of any possible data loss.

**Usability:** The system has to provide a clear and understandable interface for every type of user. For UI to be brief and concise:

- Responsive design approaches should be used so that the application can fit on the screen of different devices (i.e., 1920x1080, 1366x768, 360x640, and more).
- Soft colors should be used in the background for a more understandable interface. For example, white (HEX: #ffffff), gray (HEX: #808080), and cream (HEX: #fffdd0) colors will be used in the background for a cleaner and more usable interface

### 5.3 Pseudo Requirements

- MySQL will serve as the relational database management system since it supports all modern DBMS features, such as views, triggers, and constraints.
- The application's backend will be implemented in Python using the Django framework.
- The database interaction in the application's backend will be performed using raw SQL queries (i.e., any database query automation tools, including object-relational mapping (ORM) libraries, will not be used).

- The frontend of the application will be implemented in TypeScript using the Angular framework.

## 6 Limitations

- Each professional has zero or more posts.
- Each professional has zero or more connections.
- Each professional has one profile.
- Each post has zero or more likes.
- Each post has zero or more comments.
- Each post has at most 2048 characters.
- Each post has zero or one attachment; the maximum attachment size is 25 MB.
- Each profile has zero or more endorsements.
- Each profile has zero or more languages.
- Each profile has zero or more awards.
- Each profile has zero or more projects.
- Each profile has zero or more experience.
- Each profile has zero or more certifications.
- Each profile has zero or more skills.
- Each profile has a zero or more test score.
- Each profile has zero or one resume, a PDF with a limited size of 25 MB.
- Each career expert has a mentee limit. The career expert determines this limit, which is two by default.
- Each recruiter has at least one company.
- Each skill assessor has at least one master skill.
- Each skill has zero or one assessment.
- Each assessment has one rating.
- Each experience has an organization.
- Each company is showcased on at least one profile.
- Each school belongs to at least one educational experience.
- Each non-profit organization is named in at least one voluntary experience.
- Each thread has two participants.
- Each thread has zero or more messages.
- Each message has one thread.
- Each appointment has one thread.
- Each notification has at most 256 characters.
- Each response to a job application has zero or one attachment, a PDF with a limited size of 25 MB.
- Each job advertisement has zero or more interviews.
- Each interview has one job application.

## 7 Conceptual Database Design Using the Entity-Relationship Model

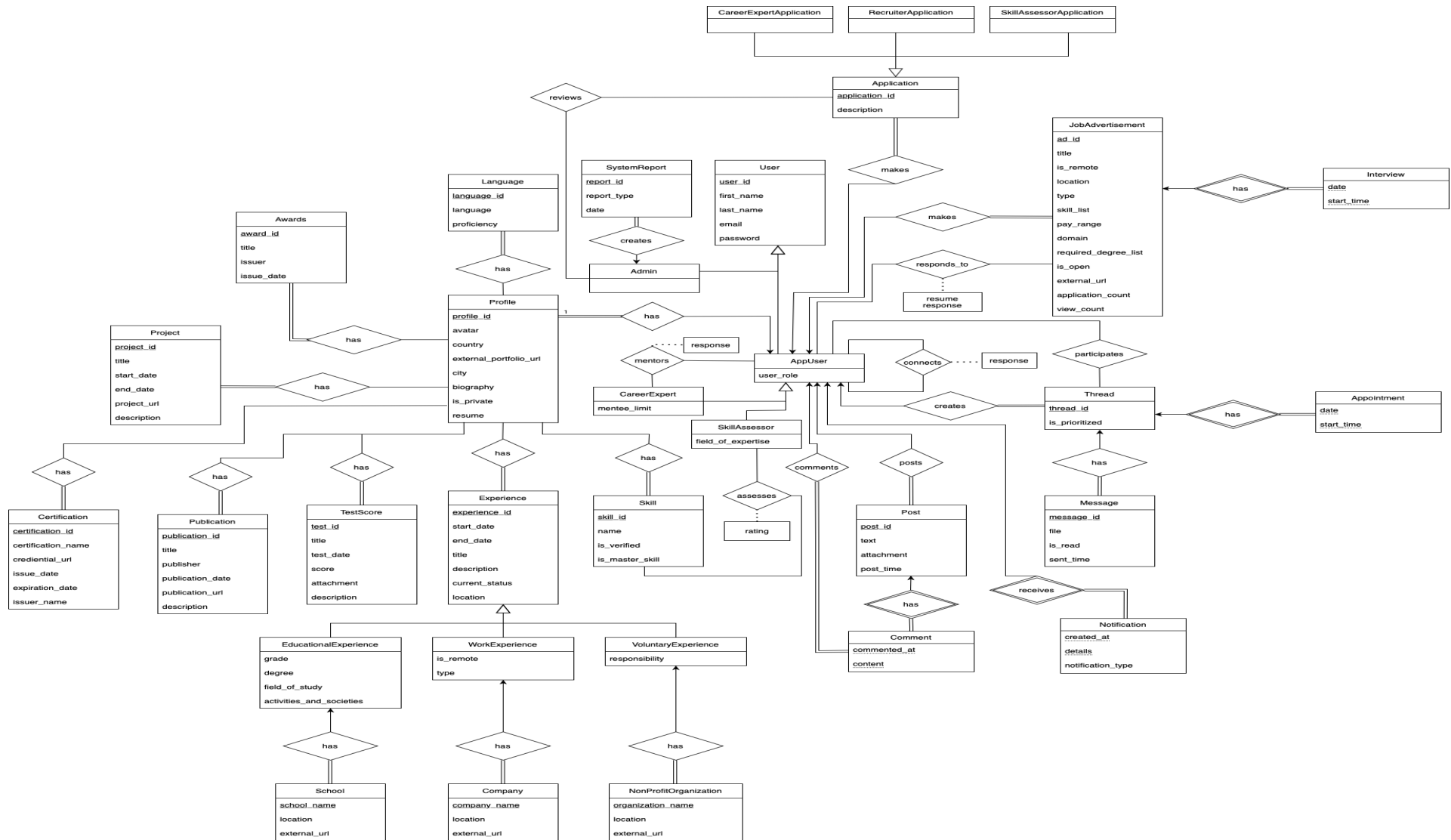


Figure 1: Proposed Entity-Relationship Model of the CareerBridge Application