INSY-437-001 Managing Data &. Databases

Database Design and Implementation for LockedIn; a Business Competitor of LinkedIn

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I. Introduction

In today's dynamic business landscape, the demand for professional networking platforms remains fervent, with LinkedIn reigning as a dominant force. As our team seeks to develop a platform akin to LinkedIn, they are stepping into a realm where connectivity and professional engagement are paramount. In the digital age, where remote work and virtual collaborations have become commonplace, a robust platform facilitating connections, job opportunities, and industry insights is not just desirable but essential. The appeal of digital networking is an essential career steppingstone: according to a LinkedIn survey in 2022, close to 85% of all jobs are obtained via networking as opposed to traditional recruitment applications from company posts (Lou Adler (LinkedIn), 2022). With the global workforce increasingly relying on digital channels for career advancement and networking, the potential market for such a platform is vast. Consequently, to launch their competitive venture, our company, LockedIn, is seeking a technical solution to a usable database in this business context.

II. LockedIn’s Functionalities

The project assigned to our team revolves around developing a professional networking platform similar to that of LinkedIn. Our focus is on understanding the intricacies of LinkedIn's business model, and its social networking functionalities which have spearheaded the platform forefront in the professional online spaces. Understanding its capabilities will allow us to architect a similar app design, propitious to professional connections.

a. Business Processes

LinkedIn's business process encompasses several key components that facilitate professional networking, career development, and business growth. LockedIn’s concept will be similar, but devoid of other irrelevant content which can clutter users’ digital networking

experience (a frustration commonly observed by LinkedIn users). Below, we detail the functionalities that grant LockedIn a more dedicated networking experience, and importantly, ones that will not be included to minimize user distraction.

1. User Registration and Profile Creation:

The process begins with individuals signing up for a LockedIn account by providing their personal, academic, and professional information. Users create detailed profiles highlighting their education, work experience, skills, and accomplishments; critical in showcasing to companies their worth and allowing their network to observe their expertise.

2. Networking and Connection Building:

LockedIn enables users to connect with colleagues, peers, industry professionals, and potential employers. Users can search for connections based on various criteria such as industry, location, job title, and mutual connections. Building a robust network is crucial for leveraging opportunities, sharing knowledge, and accessing career resources.

3. Content Creation and Sharing:

LockedIn allows users to publish and share content relevant to their professional interests and expertise or branding. Users can post articles, updates, and links to external content (text only). Engaging trends helps users showcase their expertise, stay informed about industry trends, and establish thought leadership to attract a greater professional halo or recruiters. In response, other users can freely react to content with a diversity of reactions (from “like”, “love”, “support” to “insightful” for instance), or converse under posts (which in turn can equally receive reactions).

4. Job Search and Recruitment:

LockedIn serves as a valuable platform for job seekers and recruiters alike. Users can search for job opportunities based on location, industry, job function, and company size. Recruitment profiles and LockedIn’s advanced search filters to identify potential candidates,

view their profiles and connect with them directly through job postings.

III. Statement and Objectives

a. Mission Statement

The purpose of the envisioned database system for LockedIn is to maintain the data that is used to facilitate connections, foster professional growth, and provide valuable insights into various industries and job markets. LockedIn is geared toward professionals seeking networking made simple and vouches to provide a unified and undistracted user experience to its clients.

b. Mission Objectives

To maintain (enter, update, and delete) data on users, user backgrounds, user skills, and user activities and interactions.

To maintain (enter, update, and delete) data on companies and company backgrounds.

To maintain (enter, update, and delete) data on job postings and applications.

To perform searches on user profiles, backgrounds, and activity.

To perform searches on companies and schools.

To perform searches on job postings and applicants.

To track the status of job openings and applicants.

To track the status of company and school involvement.

To track LockedIn’s competitive business performance and ability to create professional connections (i.e. analyzing job postings, platform offerings of opportunities, and user popularity).

To report on users' experiences, skills, backgrounds, interactions, and activities.

To report on companies.

To report on schools and new graduates entering the job market.

To report on job openings, applicants, and skills.

c. Scope

For simplicity, we chose not to include direct messaging within LockedIn's platform; weeding out unsolicited sales soliciting or advertisements by simply prioritizing communication between users via mainstream posts on the platform (visible to all). Further, we assume that LockedIn Business profiles will be static: these will not create posts nor interact with other users. LockedIn is for the independent professional user first and only. In the same thought, we will not seek to emulate the LinkedIn Sales Navigator feature which allows company sales representatives to prospect potential leads on the platform (the B to B side of the LinkedIn platform). We will restrict ourselves to the personal networking (peer-to-peer) and business recruitment activities of the platform (limited to job postings).

IV. Conceptual Model

Based on the mission objectives and mission statement, we established the conceptual model as displayed in the ERD below. The data dictionary that contains the various attributes each entity holds is also available in the appendix.

V. Relational Table

Based on the conceptual model defined, we built the corresponding relational model that documents the various attributes held within each entity along with the various relationships (i.e. one to one, one to many, many to many) between them.

VI. Physical Implementation and SQL Query Illustration

The relational tables above were then implemented physically by the MySQL database supported by DB Fiddle (https://www.db-fiddle.com/f/gp3nd3ctRAVvGu5Yqts1r4/21). To

demonstrate the effectiveness and ability of our designed database, we imagined several scenarios in which the various users may seek to extract information stored in our database. Considering all the stakeholders involved, including regular users, companies, and LockedIn's management team, we categorize the queries into:

A. Candidate focussed
B. Company focussed
C. LockedIn focussed

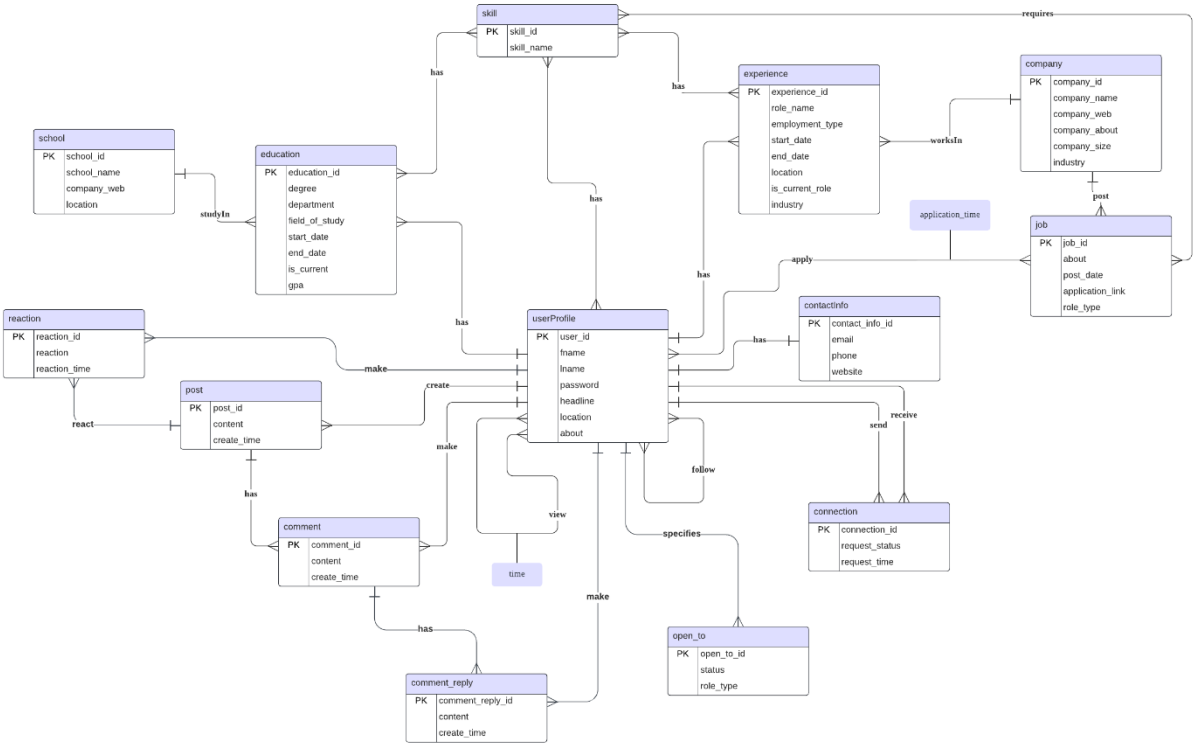
The queries are available in txt. format attached in the zip file.

VII. Challenges and Future Implementations

Several challenges were faced when developing the LockedIn database. The first challenge encountered was defining the scope of the project by determining which features provide value and need to be included on the platform. This phase required a few iterations to finalize the ERD which considers all core features of the platform. Additionally, populating each table with realistic dummy data was a second challenge due to the numerous interrelationships among values from different tables. Since it was important to ensure that the data remained coherent when executing SQL queries, another iterative process was necessary to refine and finalize the dummy data set. Going forward, more sample data can be added to the database to have more realistic outputs when testing new queries. Moreover, a future objective is to integrate a new set of SQL queries to allow LockedIn to have its own API, which it can share with third-party developers and get integrated on other platforms. A second beta version of the database could be crafted to integrate additional prominent features, such as private messaging, which plays a pivotal role in fostering user interactions and enhancing their connectivity experience within our platform.

APPENDIX

Conceptual Model ERD



Data Dictionary

Description of Entities

Entity Name	Description	Aliases	Occurrence
userProfile	Contains the profile information to uniquely identify a user.	User, User Profile	A user can take many actions and follow and/or view many other users.
education	Contains the education background that a user possesses.	Educational Background, Educational Degree	A user can complete many educations, but a given educational background is specific to each user.
school	The information stored to uniquely identify an educational institution.	University	A school can produce many educational degrees, but each unique education can only belong to one school.

skill	Contains information on of the list of unique skills a user has and/or an education, experience, job develops.	Skill, Skills	Users can have many skills and educational backgrounds, experiences, and jobs can produce many skills. Skills are not unique to education, users, experiences, or jobs.
experience	Contains experience information to uniquely identify a user.	Experience, Experiences	Users can have many experiences, but each experience can be traced to one user and company. Experiences can produce many skills.
company	Contains the information to uniquely identify a company page.	Company, Company Profile, Company Page	A company can produce many experiences and post multiple job postings.
job	The information stored to uniquely identify an available job.	Job, Jobs	A unique job can belong to one company, but can require many skills. Users can apply to many jobs and each job can receive many applicants.
contactInfo	Contains a user's contact information.	Contact Information	Every user can have a piece of unique contact information, and contact information belongs to a single user.
connection_request	The information stored when a user requests to join another user’s network.	Connection Request, Request to Connect	A user can send and receive many connection requests.
open_to	The information stored if a user specifies what jobs	Open To	A user can identify multiple roles that they are open to

	they’re open to.		work in, but each unique instance of an open_to can only be traced to a single user.
reaction	Contains the information of a user’s reaction to a post.	Reactions, Reaction	A user can make many reactions, but each unique reaction instance of a user on a post can only be made by a single user.
post	The information stored to uniquely identify a post.	Post, Posts	A user can create many posts, but each post can be traced to a unique user. A post can receive many reactions and/or comments.
comment	Contains the information of a user's comment on a post.	Comments, Comment	A user can make many comments, but each comment can be tied to one post and user. A comment can have many replies.
comment_reply	Contains the information of a user’s reply to a comment on a given post.	Comment Reply, Reply	A user can make many comment replies, but each unique reply instance can be traced to one user and original comment.

Description of Attributes

Entity Name	Attributes	Description	Data Type	Nulls	Multi-valued	Derived	Default
userProfile	user_id	Unique ID for each user.	12 variable chars.	No	No	No	None

	fname	User first name.	50 variable chars.	No	No	No	None
	lname	User last name.	50 variable chars.	No	No	No	None
	password	User password.	50 variable chars.	No	No	No	None
	headline	User’s profile headline.	255 variable chars.	Yes	No	No	None
	location	User’s specified location.	100 variable chars.	No	No	No	None
	about	User’s bio.	Text.	Yes	No	No	None
school	school_id	Unique ID for each school.	Integer.	No	No	No	None
	school_name	The name of the school.	100 variable chars.	No	No	No	None
	school_web	The website of the school.	255 variable chars.	Yes	No	No	None
	location	The location of the school.	100 variable chars.	No	No	No	None
education	education_id	The unique ID for a user’s educational background.	Integer.	No	No	No	None
	degree	Degree earned through education.	100 variable chars.	No	No	No	None
	department	Department of study.	100 variable chars.	Yes	No	No	None
	field_of_study	The field of study.	100 variable chars.	Yes	No	No	None

	start_date	User’s educational start date.	Date.	No	No	No	None
	end_date	User’s educational end date.	Date.	Yes	No	No	None
	is_current	Whether a user is currently attending an education.	Boolean.	No	No	No	None
	gpa	User’s cumulative GPA (in the form 1.23).	3-Digit Decimal.	Yes	No	No	None
skill	skill_id	The unique ID for each skill instance.	Integer.	No	No	No	None
	skill_name	The name of the skill.	100 variable chars.	No	No	No	None
experience	experience_id	Unique ID of an experience a user undergoes.	Integer.	No	No	No	None
	role_name	The title of the experience/role.	100 variable chars.	No	No	No	None
	employment_type	The type of role.	Enumeration ('full-time', 'part-time', 'contract')	No	No	No	None
	start_date	Experience start date.	Date.	No	No	No	None
	end_date	Experience end date.	Date.	Yes	No	No	None
	location	Location of the experience.	100 variable chars.	No	No	No	None
	is_current_role	Whether the role is currently occupied by the user.	Boolean.	No	No	No	None
	industry	Industry of the experience/role.	Enumeration	No	No	No	None

			('Information Technology', 'Healthcare','Finance','Manufacturing', 'Retail', 'Education','Hospitality','Transportation','Energy','Government')				
company	company_id	Unique ID of a company profile.	12 variable chars.	No	No	No	None
	company_name	The name of the company.	100 variable chars.	No	No	No	None
	company_web	The company website.	255 variable chars.	Yes	No	No	None
	company_about	The background of the company.	Text.	Yes	No	No	None
	company_size	The range of the number of people currently employed by the company.	50 variable chars.	Yes	No	No	None
	industry	The industry the company is in.	Enumeration (‘'Information Technology', 'Healthcare','Finance','Manufacturing',	No	No	No	None

			'Retail', 'Education','Hospitality','Transportation','Energy','Government')				
job	job_id	Unique ID of a job posting.	Integer.	No	No	No	None
	about	Details of the job.	Text.	No	No	No	None
	post_date	Post date of the job.	Date.	No	No	No	None
	application_link	Application link to the job.	255 variable chars.	No	No	No	None
	role_type	Type of role.	50 variable chars.	No	No	No	None
contactInfo	contact_info_id	Unique ID of a user's contact information.	Integer.	No	No	No	None
	email	User's email.	100 variable chars.	No	No	No	None
	phone	User's phone.	20 variable chars.	No	No	No	None
	website	User's website.	255 variable chars.	Yes	No	No	None
connection_request	connection_id	Unique ID of a user's connection request.	Integer.	No	No	No	None
	request_status	Status of a user's sent request.	Enumeration ('pending', 'accepted',	No	No	No	None

			‘rejected’)				
	request_time	The time a user sent the request.	Time stamp.	No	No	No	None
open_to	open_to_id	Unique ID of a role a user is open to.	Integer.	No	No	No	None
	status	Status of user’s job search.	Enumeration (‘Actively Searching’, ‘Open to Offers’)	No	No	No	None
	role_type	Type of role a user is open to.	100 variable chars.	No	No	No	None
reaction	reaction_id	Unique ID of a user’s reaction to a post.	Integer.	No	No	No	None
	reaction_type	Nature of the reaction.	Enumeration ('like', 'love', 'celebrate', 'insightful', 'curious').	No	No	No	None
	reaction_time	Time of the reaction.	Time stamp.	No	No	No	None
post	post_id	Unique ID of a user’s post.	Integer.	No	No	No	None
	content	Content of the post.	Text.	No	No	No	None
	create_time	What time the post was created.	Time stamp.	No	No	No	None
comment	comment_id	Unique ID of a user’s comment on a post.	Integer.	No	No	No	None
	content	Content of a user’s	Text.	No	No	No	None

		comment on a post.					
	create_time	Time the comment was created.	Time stamp.	No	No	No	None
comment_ reply	comment_reply_id	Unique ID of a user's reply to a comment.	Integer.	No	No	No	None
	content	Content of the comment reply.	Text.	No	No	No	None
	create_time	Time the comment reply was created.	Time stamp.	No	No	No	None

Relational Schema

userProfile: user_id, fname, lname, password, headline, location, about, contact_info_id

PK: user_id

FK: contact_info_id REF contactInfo(contact_info_id)

contactInfo: contact_info_id, email, phone, website

PK: contact_info_id

follow: following, followers

PK: following, followers

FK: following REF userProfile(user_id), followers REF userProfile(user_id)

view: viewer, viewed, time

PK: viewer, viewed

FK: viewer REF userProfile(user_id), viewed REF userProfile(user_id)

connection: connection_id, request_status, request_time, sender, receiver

PK: connection_id, sender, receiver

FK: sender REF userProfile(user_id), receiver REF userProfile(user_id)

post: post_id, content, create_time, user_id

PK: post_id

FK: user_id REF userProfile(user_id)

reaction: reaction_id, reaction_type, reaction_time, user_id, post_id

PK: reaction_id

FK: user_id REF userProfile(user_id), post_id REF post(post_id)

comment: comment_id, content, create_time, post_id, user_id

PK: comment_id,

FK: post_id REF post(post_id), user_id REF userProfile(user_id)

comment_reply: comment_reply_id, content, create_time, comment_id, user_id

PK: comment_reply_id

FK: comment_id REF comment(comment_id), user_id REF userProfile(user_id)

skill: skill_id, skill_name

PK: skill_id

company: company_id, company_name, company_web, company_about, company_size, industry

PK: company_id

user_skill: user_id, skill_id

PK: user_id, skill_id

FK: user_id REF userProfile(use_id), skill_id REF skill(skill_id)

experience: experience_id, role_name, employment_type, start_date, end_date, location, is_current_role, industry, user_id, company_id

PK: experience_id

FK: user_id REF userProfile(user_id), company_id REF company(company_id)

experience_skill: experience_id, skill_id

PK: experience_id, skill_id

FK: experience_id REF experience(experience_id), skill_id REF skill(skill_id)

job: job_id, about, post_date, application_link, company_id, role_type

PK: job_id

FK: company_id REF company(company_id)

user_apply: user_id, job_id, application_time

PK: user_id, job_id

FK: user_id REF userProfile(user_id), job_id REF job(job_id)

job_skill: job_id, skill_id

PK: job_id, skill_id

FK: job_id REF job(job_id), skill_id REF skill(skill_id)

school: school_id, school_name, company_web, location

PK: school_id

education: education_id, degree, department, field_of_study, start_date, end_date, is_current, gpa, user_id, school_id

PK: education_id

FK: user_id REF userProfile(user_id), school_id REF school(school_id)

open_to: open_to_id, status, role_type, user_id

PK: open_to_id

FK: user_id REF userProfile(user_id)

REFERENCES

Webography & Sources Cited:

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