Faculty of Computers and Artificial Intelligence

Cairo University

Final Assessment Project

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Online Recruitment Project

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Chapter 1: Introduction

The project would help in effective and systematic record-keeping that is storing and retrieving data. The project will be able to give the report so that management can make decisions on the basis of those reports.

1.1 Description of the project idea

An online recruitment system is a service that automates company's recruiting needs by getting volumes of employment applications over the internet.

The beauty of online recruitment solutions lies in its accessibility and ease of use.

Anywhere on the globe designated individuals are able to receive process and keep a record of CVS within a web-based information powerhouse.

Online recruitment benefits both job seekers and employers.

Applicants have a simpler, more efficient application process, while employers are able to manage all applications in an efficient manner.

I have created 15 tables in the database which I have identified to make the application work well namely:

Admin: Admin will add all the qualifications, Career, experience, city, state, country and update and delete information about the Employer or job seeker he can also search for the job seekers and active them and he can also see the jobs add by the Employer.

	username	password
1	admin	admin

Employer: Employer register himself and his company and after login, he will post a new job and he can search for the job seekers on the various condition and he can offer the job to job seeker according to the job profile and he can also see the response from the job seekers.

	ID	company_name	is_active	establishment_date	city_id	state_id	contact_no	website_url	email	password	about_me
1	1	Facebook	1	2009-05-12	6	2	01251556569	www.facebook.com	facebook@gmail.com	ssdfadgafd484	The Facebook company builds technologies that giv...
2	2	Google	1	2002-01-15	12	3	01251614569	www.google.com	google@gmail.com	dfknav415SD	Google was founded in September 1998 by Larry Pa...
3	3	AE	1	2025-09-17	1	2	0115251169	www.AE.com	AE@gmail.com	ss5564484	NULL
4	4	Amazn	1	2020-04-10	1	2	01003777869	www.amazon.com	Amazon@gmail.com	ss5564484	Amazon is guided by four principles: customer obses...
5	5	Souq	1	2012-01-11	6	2	01188974569	www.souq.com	souq@gmail.com	122333484	NULL

Career: this table holds information of career

ID	name
1	Student
2	Entry Level
3	Experienced
4	Manager
6	Senior Management

City: this table holds information about cities

cities_id	name	state_id
1	Birmingham	1
2	Montgomery	1
3	Mobile	1
4	Huntsville	1
5	Tuscaloosa	1
6	Indianapolis	2
7	Fort Wayne	2
8	Evansville	2
9	South Bend	2
10	Hammond	2
11	Omaha	3
12	Lincoln	3
13	Bellevue	3
14	Grand Island	3
15	Kearney	3

States: this table holds information of regions

ID	name
1	Alabama
2	Indiana
3	Nebraska
6	Nevada
7	Iowa
8	Alaska
9	Arizona
10	Kansas

Education: The education table stores each job seeker's educational history, as provided by them.

certificate_degree_name – This is the certificate or degree type; e.g. high school, higher secondary, graduate, postgraduate, or professional certificate.

major – This column holds the main course of study for the certificate or degree – e.g. a bachelor's degree with a major in computer science.

institute_university_name – This is the institute, school, or university that awarded the degree or certificate.
start_date – This attribute stores the date when the user was accepted into an educational program.

completion_date – This is the date the degree or certificate was awarded. However, this attribute is nullable; people may still be completing their program while they are looking for a job, or they may have dropped out of the program altogether.

percentage and GPA – These columns store the grade percentage or CGPA (cumulative grade point average) attained by users in their degree or certificate course.

jobseeker_id	certificate_degree_name	major	institute_university_name	starting_date	completion_date	percentage	cgpa
1	FCI	it	Cairo	2018-09-20	2022-06-28	98.50	3.90
1	High School	Scientific mathematics	6 october school	2017-09-20	2018-07-15	93.50	NULL

Experience: The experience table keeps records of users' past and current professional experience. It contains the following important columns :

is_current_job – still working or not.

start_date – This stores when a user starts a job.

end_date – This stores when a user ends a job.

job_title – This holds information about the user's job role.

city_id – This signifies the city where the job was located.

state_id – This signifies the state where the job was located.

jobsseker_id – this signifies the person that has this experience.

company_name – These attributes hold the relevant company name associated with a job.

description – This column stores details about job roles and responsibilities, challenges, and achievements.

is_current_job	start_date	end_date	jobtitle_id	city_id	state_id	jobseeker_id	company_name	description
0	2009-09-01	2018-01-28	3	1	1	2	Facebook	This Web Developer job description sample templa...
1	2018-01-11	NULL	5	4	3	3	Google	NULL

Industry: this table holds information about industry

id	name
1	Manufacturing
2	Engineering Services
3	Information Technology Services
4	Computer Software
5	Real Estate/Property Management
6	Marketing and Advertising
7	Internet/E-commerce
8	FMCG

Job_Category: this table holds information about Category

ID	job_category
2	Analyst/Research
3	Fashion
4	Strategy/Consulting
5	Banking
6	Creative/Design/Art
7	Human Resources
9	Medical/Healthcase
10	Sales/Retail
11	Pharmaceutical
13	R&D/Science
16	Opeation/Management
19	Tourism/Travel
21	Marketing/PR/Advertising
22	Logistics/Supply Chain
23	C-Level Executive/GM/Director
24	Customer Service/Support
26	Porject/Program Management
27	Media/Journalism/Publishing
28	Engineering-Telecon/Techn...
29	Installation/Maintenance/Re...
30	IT/Software Development

Job_Title: this table holds information about Titles

ID	job_title
2	Medical Assistant
3	Web Designer
4	Dog Trainer
5	President of Sales
6	Nursing Assistant
7	Project Manager
8	Librarian
9	Project Manager
10	Account Executive
11	Marketing Coordinator
12	Virtual Assistant
13	Well Driller

Job_type: this table holds information about types

ID	job_type
1	Full Time
2	Work From Home
3	Part Time
4	Freelance/Project
5	Shift Based
6	Internship
7	Volunteering
8	Student Activity

Job_Seeker: Job Seeker registers himself and fills the profile given by admin and after login he will search for the job on various conditions and he can change his profiles and he can apply for the jobs based on various conditions. He can see the response of the Employer.

	ID	firstname	lastname	email	password	about_me	city_id	state_id	contact_no	career_id	is_active	date_of_birth	gender	industry_id
1	1	abdo	essam	abdoessam743@gmail.com	0000000000	An "About Me," also known as a blurb, is a sh...	1	1	01220877201	1	1	2000-09-17	M	4
2	2	yara	yaser	yarayaser@gmail.com	123456789	An "About Me," also known as a blurb, is a sh...	2	2	01101524554	2	1	2000-08-14	F	1
3	3	abdo	kamal	abdokamal@gmail.com	1452375454	An "About Me," also known as a blurb, is a sh...	3	3	01154267454	3	1	2001-04-14	M	8
4	4	ahmed	mostafa	ahmed@gmail.com	123556689	NULL	3	2	01255554554	2	1	2002-03-01	M	3
5	5	sara	ahmed	s_ahmed@gmail.com	1561641531	NULL	NULL	2	01099523125	2	1	1995-02-14	F	1

Application: this table holds information of applied jobs

	apply_date	id_jobpost	jobseeker_id
1	2020-04-19 00:00:00	1	3
2	2020-04-30 00:00:00	2	1
3	2020-05-19 00:00:00	3	2
4	2020-03-19 00:00:00	1	1
5	2020-04-09 00:00:00	1	2
6	2020-05-22 00:00:00	3	1
7	2019-04-22 00:00:00	8	2

Job_Post: The job_post table is the main table in this subject area. As you might guess, it holds details about job posts. All the other tables in this section are created around it and linked with it.

id – This is the primary key of this table. Each job post is assigned a unique number, and this number is referred to in other tables.

employer_id – This column holds the employer_id of the recruiter who has posted the job.

jobtype_id – This column signifies whether the job duration is permanent or temporary.

is_company_name_hidden – This is a flag column that shows if the company's name should be shown to job seekers. Recruiters may prefer not to show company names on their posts.

created_at – This stores the date when the job is posted.

job_description – This holds a brief description of the job.

is_active – This signifies if a job is still open. Recruiters can mark their posts inactive as soon as the positions are filled.

id_employer	jobtitle_id	min_salary	max_salary	city_id	state_id	created_at	experience_years	description	is_active	job_category	company_name_hidden	jobtype_id	industry_id
1	3	3300.00	8500.00	10	2	2020-04-01 00:00:00	4	Web development is nothing more than an attempt ...	1	30	0	1	4
1	11	1500.00	5000.00	1	1	2020-04-15 00:00:00	1	A marketing coordinator assists the marketing depa...	1	21	0	2	5
2	12	1500.00	5000.00	13	3	2020-01-05 00:00:00	0	A virtual assistant (VA) is a person who provides sup...	1	24	0	6	3
1	8	100.00	2000.00	13	3	2020-04-30 00:00:00	0	NULL	1	19	0	7	8
1	7	1000.00	8000.00	10	3	2020-04-20 00:00:00	0	NULL	0	10	0	2	8
2	3	1000.00	25000.00	13	3	2020-04-04 00:00:00	0	NULL	0	16	0	4	5
3	12	1100.00	8000.00	13	3	2020-04-05 00:00:00	0	A virtual assistant (VA) is a person who provides sup...	1	24	0	6	3
1	8	100.00	800.00	10	3	2019-04-05 00:00:00	0	NULL	1	24	0	6	3
1	13	1500.00	5000.00	1	1	2020-04-20 00:00:00	1	A marketing coordinator assists the marketing depa...	1	21	0	2	5

Saved_Jobs: this table holds all about saved jobs for jobseekers

jobseeker_id	id_jobpost
1	2
1	3
1	9
3	5

1.2 Technology and tools used

- SQL Server Management Studio
- ErdPlus https://erdplus.com/
- Lucidchart https://www.lucidchart.com/

Chapter 2: Analysis

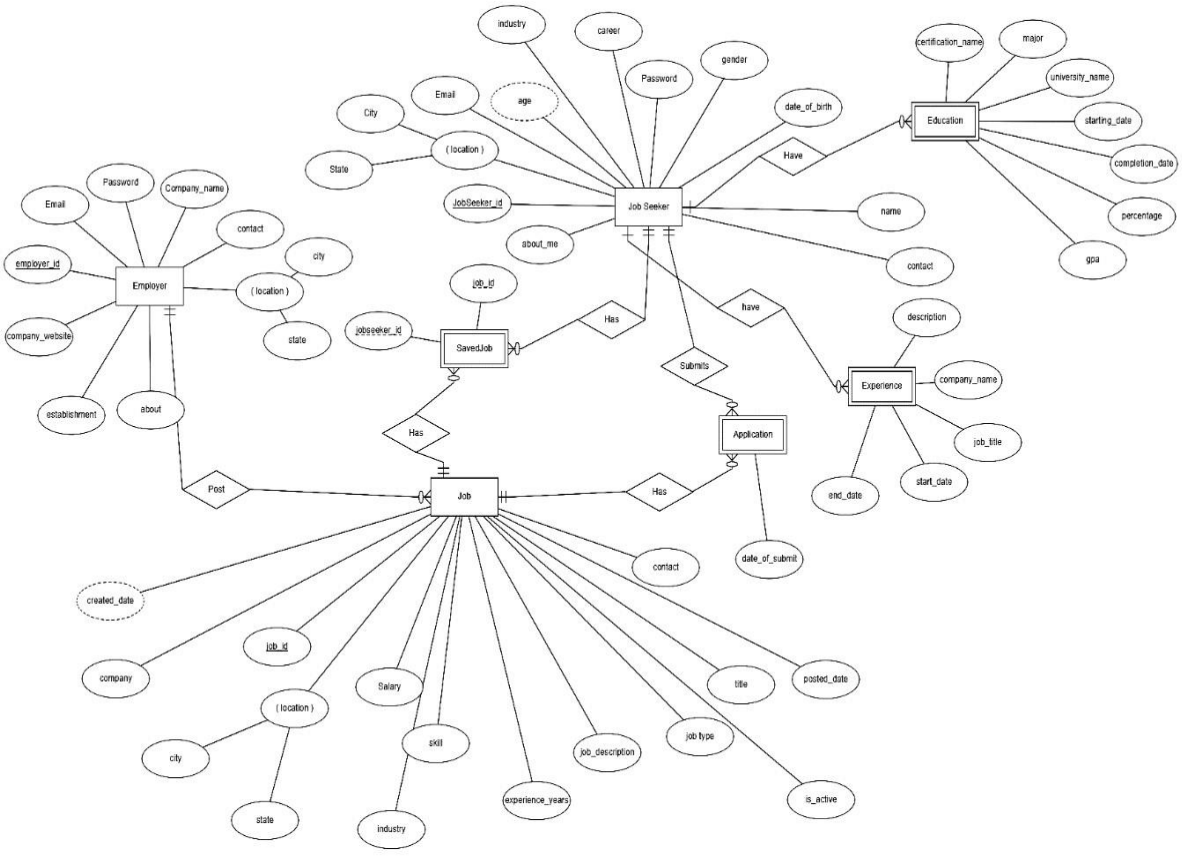
The entity-relationship diagram gives a pictorial representation of all the database tables and the relation between the entities.

It also shows the cardinality i.e. the many to one or one to one or one to many relationships amongst the tables.

This is the first step in designing a database. All the idea of requirements and specification details about the different entities in the database are conceived in the beginning and then transformed into a diagram. This step takes time but once finalized, a good, strong, and robust database is a cakewalk.

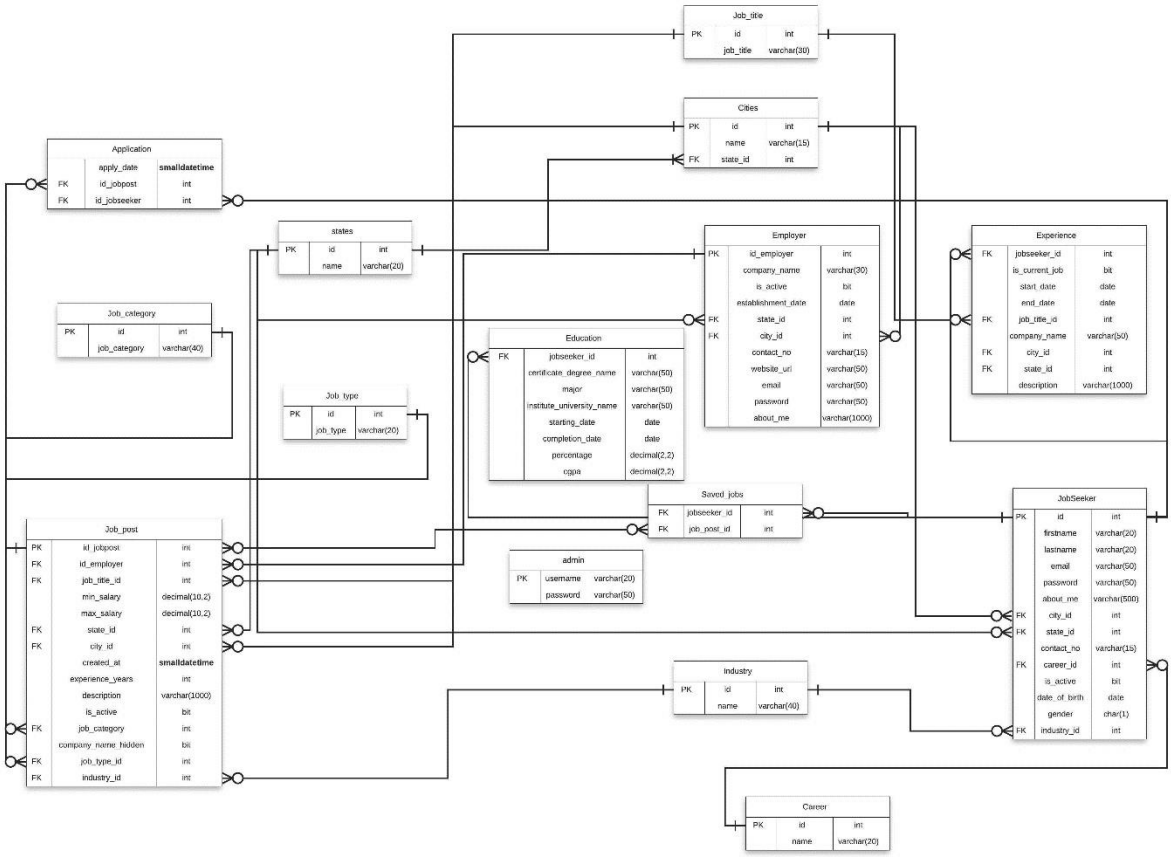
2.1 DB Conceptual ERD

At this level of database abstraction all the attributed and what data are actually stored is described and entries and relationship among them.



2.2 DB Physical ERD

This is the lowest level of abstraction at which one describes how the data are actually stored.



SQL Implementation:

Admin:

```
CREATE TABLE [admin] (
 [username] varchar(20) PRIMARY KEY NOT NULL,
 [password] varchar(50) NOT NULL,
);
```

Industry:

```
CREATE TABLE [Industry] (
 [id] int IDENTITY(1,1) PRIMARY KEY ,
 [name] varchar(20) NOT NULL,
```

```
);
```

City:

```
CREATE TABLE [Industry] (
 [id] int IDENTITY(1,1) PRIMARY KEY ,
 [name] varchar(20) NOT NULL,
);
```

Job Title:

```
CREATE TABLE [Job_title] (
 ID int IDENTITY(1,1) PRIMARY KEY,
 [job_title] varchar(30) NOT NULL
);
```

State:

```
CREATE TABLE [states] (
 ID int IDENTITY(1,1) PRIMARY KEY,
 [name] varchar(20) NOT NULL ,
);
```

Career:

```
CREATE TABLE [Career] (
 ID int IDENTITY(1,1) PRIMARY KEY,
 [name] varchar(20) NOT NULL
);
```

Job Type:

```
CREATE TABLE [Job_type] (
 ID int IDENTITY(1,1) PRIMARY KEY,
 [job_type] varchar(20) NOT NULL
);
```

Job Category:

```
CREATE TABLE [Job category] (
 ID int IDENTITY(1,1) PRIMARY KEY,
 [job category] varchar(40) NOT NULL
```

```
);
```

Experience:

```
CREATE TABLE [Experience] (
 [is_current_job] bit Default 0,
 [start_date] date,
 [end_date] date,
 [jobtitle_id] int FOREIGN KEY REFERENCES Job_title(ID),  city_id int FOREIGN KEY
REFERENCES Cities(cities_id),  state_id int FOREIGN KEY REFERENCES states(ID),
jobseeker_id int FOREIGN KEY REFERENCES JobSeeker(ID) NOT NULL PRIMARY KEY,
 [company_name] varchar(50),
 [description] varchar(1000)
);
```

JobSeeker:

```
CREATE TABLE [JobSeeker] (
 ID int IDENTITY(1,1) PRIMARY KEY ,
 [firstname] varchar(20) NOT NULL,
 [lastname] varchar(20) NOT NULL,
 [email] varchar(50) NOT NULL,
 [password] varchar(50) NOT NULL,  [about_me]
varchar(500),  city_id int FOREIGN KEY REFERENCES
Cities(cities_id),  state_id int FOREIGN KEY
REFERENCES states(ID),
 [contact_no] varchar(15),
 [career_id] int FOREIGN KEY REFERENCES Career(ID),
 [is_active] bit DEFAULT 1,
 [date_of_birth] date,  [gender] char(1),  industry_id int
FOREIGN KEY REFERENCES Industry(ID)
);
```

Education:

```
CREATE TABLE [Education] (  jobseeker_id int FOREIGN KEY
REFERENCES JobSeeker(ID) NOT NULL,
```

```
 [certificate_degree_name] varchar(50),
 [major] varchar(50),
 [institute_university_name] varchar(50),
 [starting_date] date,
 [completion_date] date,
 [percentage] decimal(4,2),
 [cgpa] decimal(4,2)
);
```

Employer:

```
CREATE TABLE [Employer] (
 ID int IDENTITY(1,1) PRIMARY KEY,
 [company_name] varchar(30),
 [is_active] bit Default 1,   [establishment_date] date,
city_id int FOREIGN KEY REFERENCES Cities(cities_id),
state_id int FOREIGN KEY REFERENCES states(ID),
 [contact_no] char(11),
 [website_url] varchar(50),
 [email] varchar(50) NOT NULL,
 [password] varchar(50) NOT NULL,
 [about_me] varchar(1000)
);
```

Application:

```
CREATE TABLE [Application] (
 [apply_date] smalldatetime DEFAULT GETDATE(),
 [id_jobpost] int FOREIGN KEY REFERENCES Job_post(ID)  NOT NULL,
jobseeker_id int FOREIGN KEY REFERENCES JobSeeker(ID) NOT NULL
);
```

Saved jobs:

```
CREATE TABLE [Saved_jobs] (   jobseeker_id int FOREIGN KEY
REFERENCES JobSeeker(ID) NOT NULL,
 [id_jobpost] int FOREIGN KEY REFERENCES Job_post(ID) NOT NULL
);
```

Job Post:

```
CREATE TABLE [Job_post] (
 ID int IDENTITY(1,1) PRIMARY KEY,
 [id_employer] int FOREIGN KEY REFERENCES Employer(ID),
 [jobtitle_id] int FOREIGN KEY REFERENCES Job_title(ID),
 [min_salary] decimal(10,2),  [max_salary]
decimal(10,2),  city_id int FOREIGN KEY REFERENCES
Cities(cities_id),  state_id int FOREIGN KEY
REFERENCES states(ID),
 [created_at] smalldatetime DEFAULT GETDATE(),
 [experience_years] int default 0,
 [description] varchar(1000),
 [is_active] bit default 1,
 [job_category] int FOREIGN KEY REFERENCES Job_category(ID),
 [company_name_hidden] bit Default 0,
 [jobtype_id] int FOREIGN KEY REFERENCES Job_type(ID),
industry_id int FOREIGN KEY REFERENCES Industry(ID)
);
```

Chapter 3: SQL Queries + screenshots of the results

a. What was the most interesting job “title” that had maximum number of applicants?

Solution:

```
SELECT top(1) M.job_title as [Job Title] ,
M.NumOfApplies as [Number Of Applies]
From
(
SELECT Job_title.job_title, COUNT(*) AS NumOfApplies
FROM Application join Job_post Join Job_title  on
job_title.ID = Job_post.jobtitle_id  on Job_post.ID
= Application.id_jobpost
GROUP BY job_title
) as M  order by
M.NumOfApplies DESC
```

Job Title	Number Of Applies
Web Designer	3

b. What was the announced job “title” that hadn’t any applicants last month?

Solution:

```
SELECT DISTINCT Job_title.job_title
FROM Job_title Join Job_post  on
Job_title.ID <> ALL
(
SELECT job_title.ID
FROM Application join Job_post Join Job_title
on job_title.ID = Job_post.jobtitle_id  on
Job_post.ID = Application.id_jobpost
AND created_at Between
DATEADD(day,1-DAY(EOMONTH(CURRENT_TIMESTAMP,-1)),
EOMONTH(CURRENT_TIMESTAMP,-1)) AND
EOMONTH(CURRENT_TIMESTAMP,-1)
)
```

	job_title
1	Account Executive
2	Dog Trainer
3	Librarian
4	Medical Assistant
5	Nursing Assistant
6	President of Sales
7	Project Manager
8	Virtual Assistant
9	Well Driller

c. Who was the employer with the maximum announcements last month?

Solution:

```
SELECT TOP(1) Employer.ID,Employer.company_name,
Employer.contact_no,Employer.email,
Employer.[password],Employer.establishment_date,
Employer.website_url,City.[name] AS City, states.[name] AS [State],
m.posts AS [Number of announcements]
FROM
(
SELECT Employer.ID AS Employer_id,
COUNT(*) AS [posts]
FROM Employer JOIN Job_post
ON Job_post.id_employer = Employer.ID
 AND created_at BETWEEN
 DATEADD(day,1-DAY(EOMONTH(CURRENT_TIMESTAMP,-1)),
 EOMONTH(CURRENT_TIMESTAMP,-1))
 AND EOMONTH(CURRENT_TIMESTAMP,-1 )
GROUP BY Employer.ID, Job_post.id_employer
) AS m  JOIN Employer JOIN City JOIN states
ON states.ID = City.state_id
ON City.cities_id = Employer.city_id
ON Employer.ID = m.Employer_id

ORDER BY [Number of announcements] DESC
```

ID	company_name	contact_no	email	password	establishment_date	website_url	City	State	Number of announcements
1	Facebook	01251556569	facebook@gmail.com	ssdfadgafd484	2009-05-12	www.facebook.com	Indianapolis	Indiana	5

d. Who were the employers didn't announce any job last month?

Solution:

```
SELECT Employer.ID,Employer.company_name,
Employer.contact_no,
Employer.email,Employer.[password],
Employer.about_me,Employer.website_url AS [Website],
City.[name] AS [City],states.[name] AS [State]
FROM Employer JOIN City
ON City.cities_id = Employer.city_id
JOIN states
ON states.ID = City.state_id
WHERE Employer.ID <> ALL
(
SELECT Employer.ID
FROM Employer JOIN Job_post
ON Employer.ID = Job_post.id_employer
AND created_at BETWEEN
DATEADD(day,1-DAY(EOMONTH(CURRENT_TIMESTAMP,-1)),
EOMONTH(CURRENT_TIMESTAMP,-1)) AND
EOMONTH(CURRENT_TIMESTAMP,-1))
```

ID	company_name	contact_no	email	password	about_me	Website	City	State
4	Amazn	01003777869	Amazon@gmail.com	ss5564484	Amazon is guided by four principles: customer ob...	www.amazon.com	Birmingham	Alabama
5	Souq	01188974569	souq@gmail.com	122333484	NULL	www.souq.com	Indianapolis	Indiana

e. What were the available positions at each employer last month?

Solution:

```
SELECT  Job_post.id_employer AS [Employer ID], Job_post.ID AS [Post ID],
job_title.job_title, Job_post.[description],
Job_category.job_category, job_type.job_type, Industry.[name]
AS [Industry], min_salary,
max_salary, City.[name] AS [City], states.[name] AS [State]
,Job_post.experience_years FROM Job_post
JOIN Job_title ON job_title.ID = Job_post.jobtitle_id
JOIN City ON City.cities_id = Job_post.city_id
JOIN states ON states.ID = Job_post.state_id
JOIN Job_category ON Job_category.ID = Job_post.job_category
JOIN Job_type ON job_type.ID = Job_post.jobtype_id
JOIN Industry ON Industry.id = Job_post.industry_id
JOIN Employer ON Employer.ID = Job_post.id_employer
WHERE Job_post.is_active = 1
AND created_at BETWEEN
DATEADD(day,1-DAY(EOMONTH(CURRENT_TIMESTAMP,-1)),
EOMONTH(CURRENT_TIMESTAMP,-1))
AND EOMONTH(CURRENT_TIMESTAMP,-1)
ORDER BY Job_post.id_employer
```

Employer ID	Post ID	job_title	description	job_category	job_type	Industry	min_salary	max_salary	City	State	experience_years
1	1	Web Designer	Web development is nothing more than an attempt ...	IT/Software Development	Full Time	Computer Software	3300.00	8500.00	Hammond	Indiana	4
1	2	Marketing Coordinator	A marketing coordinator assists the marketing depa...	Marketing/PR/Advertising	Work From Home	Real Estate/Property Management	1500.00	5000.00	Birmingham	Alabama	1
1	4	Librarian	NULL	Tourism/Travel	Volunteering	FMCG	100.00	2000.00	Bellevue	Nebraska	0
1	9	Well Driller	A marketing coordinator assists the marketing depa...	Marketing/PR/Advertising	Work From Home	Real Estate/Property Management	1500.00	5000.00	Birmingham	Alabama	1
3	7	Virtual Assistant	A virtual assistant (VA) is a person who provides sup...	Customer Service/Support	Internship	Information Technology Services	1100.00	8000.00	Bellevue	Nebraska	0

f. For each seeker, retrieve all his/her information and the number of jobs he applied for

Solution:

```
SELECT JobSeeker.ID ,JobSeeker.firstname,JobSeeker.lastname,
JobSeeker.email,JobSeeker.[password],
JobSeeker.about_me,JobSeeker.contact_no, JobSeeker.date_of_birth,JobSeeker.gender,
states.[name] AS [State],City.[name] AS City,Career.[name] AS Career,
Industry.[name] AS Industry, COUNT([Application].jobseeker_id) AS NumberOfApplies
FROM [Application] Right JOIN JobSeeker ON [Application].jobseeker_id = JobSeeker.ID
left Join City ON  JobSeeker.city_id = City.cities_id  left Join states ON
JobSeeker.state_id = states.ID left Join Career ON  JobSeeker.career_id = Career.ID
left Join Industry ON  JobSeeker.industry_id = Industry.id GROUP BY
JobSeeker.ID,JobSeeker.firstname,JobSeeker.lastname,JobSeeker.email,JobSeeker.[password],J
obSeeker.about_me,JobSeeker.contact_no,JobSeeker.date_of_birth,
JobSeeker.gender, City.[name], states.[name], Career.[name], Industry.[name] ORDER
BY NumberOfApplies DESC;
```

ID	firstname	lastname	email	password	about_me	contact_no	date_of_birth	gender	State	City	Career	Industry	NumberOfApplies
1	abdo	essam	abdoessam743@gmail.com	0000000000	An "About Me," also known as a blurb, is a sh...	01220877201	2000-09-17	M	Alabama	Birmingham	Student	Computer Software	3
2	yara	yaser	yarayaser@gmail.com	123456789	An "About Me," also known as a blurb, is a sh...	01101524554	2000-08-14	F	Indiana	Montgomery	Entry Level	Manufacturing	3
3	abdo	kamal	abdokamal@gmail.com	1452375454	An "About Me," also known as a blurb, is a sh...	01154267454	2001-04-14	M	Nebraska	Mobile	Experienced	FMCG	1
4	ahmed	mostafa	ahmed@gmail.com	123556689	NULL	01255554554	2002-03-01	M	Indiana	Mobile	Entry Level	Information Technology Services	0
5	sara	ahmed	s_ahmed@gmail.com	1561641531	NULL	01099523125	1995-02-14	F	Indiana	NULL	Entry Level	Manufacturing	0

References

- https://www.tutorialspoint.com/dbms/index.htm
- https://www.w3schools.com/sql/default.asp
- Fundamentals of Database System Book