Cairo University,
Faculty of Computers and Artificial Intelligence
Dr. Iman Hassan & Dr. Amani Hassan

Database systems
IS211
Research Project

Introduction to Database systems

(PM-2183)

Team Members

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Final Assessment Project

Online Recruitment Project

FCAI-CU

2020 Full Semester

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Chapter 1: Introduction:

1.1: Description of the project idea:

Online employment projects allow a greater number of people, especially young people, to apply for the largest number of jobs suitable for them and their skills, and also facilitate the matter for job providers to reach the largest number of people suitable for the job offered, thus these sites have facilitated the matter instead of going to the company's headquarters with its waste For time and effort.

On these sites companies and their representatives offer jobs with all their details as the name of the job, the required skills, the expiry date of the application and the level of the person required in terms of experience in the field of the job offered, then the sites allow young people to apply for those jobs and send their required data to the job holder and send their CV, then after that the process is completed Filter and choose the most suitable person for this job.

Employment platforms work remotely by creating an account for each person with the addition of all the required data that companies need from their job applicants. Then, after the availability of these sites, the ability to search for new jobs and filter them according to field, time and other types, and result in communication with job providers, among the most famous of these sites are LinkedIn, Wuzzuf and many other sites.
It is good for anyone to have an account on one of these sites, which gives them more and better opportunities.

1.2: Technology and tools used:

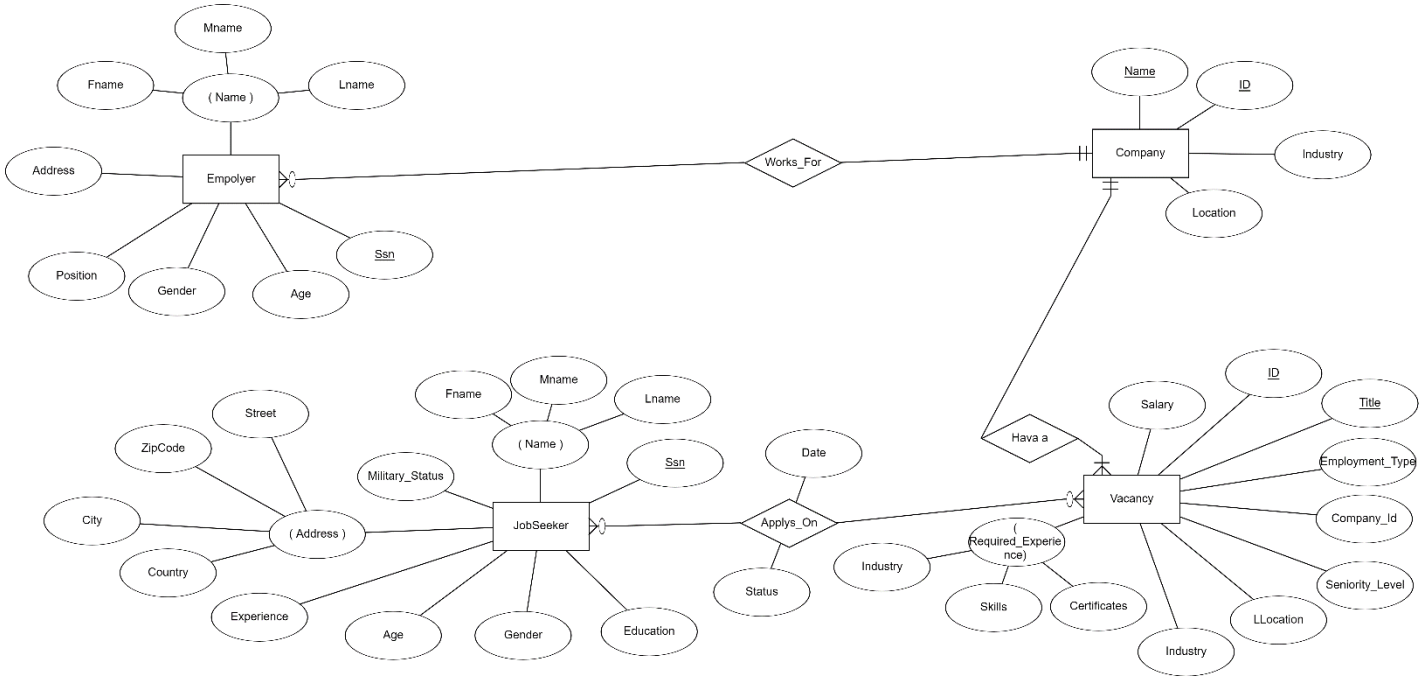
To launch this project, we used:

1. Microsoft SQL Server Management Studio. (For SQL)
2. ERD Plus. (For ERD Model & Physical Model)

- We used The Entity Relationship Model to design the ERD Model.
- We used an algorithm to map the ERD Model to Relational Schema.
- We used the SQL to make the project a real.

Chapter 2: Analysis:

2.1: DB Conceptual ERD:



To draw this ERD Model we used ERD Plus Website.

In this ERD Model there are several things to explain, First, we have JobSeeker Relation, that contains the following attributes: Name (as a composite attribute), Ssn as primary key, Education, Gender, Age, Military_Status, and Address also as composite attribute.

Second, we have Employer Relation, that contains the following attributes: Name (as composite attribute), Address also as composite attribute, Age, Gender, Position, Ssn as primary key.

Third, Company Relation that contains the following attributes: Name, Id, Industry, and Location, and the Id is the primary Key.

Forth, Vacancy Relation that contains the following attributes: Id as primary key, Salary, Title, Employment type, company id, seniority level, location, industry, and required experience.

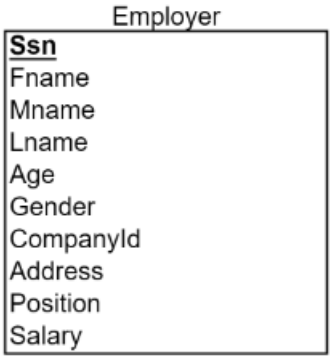
2.2: DB Physical ERD:

1. Job Seeker Relation (Table):

```
CREATE TABLE JobSeeker(
Fname VARCHAR(15),
Mname VARCHAR(15),
Lname VARCHAR(15),
Ssn INT NOT NULL PRIMARY KEY,
Gender CHAR,
AGE INT,
Military_Status VARCHAR(15),
Education VARCHAR(15),
Experience INT,
Adddress int)
```

2. Employer Relation:

```
CREATE TABLE Employer(
Fname VARCHAR(15),
Mname VARCHAR(15),
Lname VARCHAR(15),
Ssn INT NOT NULL PRIMARY KEY,
Gender CHAR,
Salary INT,
Company_Id INT,
AGE INT,
Position VARCHAR(15),
       Adddress int)
```

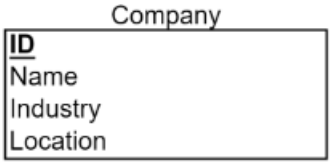


3. Vacancy Relation:

```
CREATE TABLE Vacancy(
Id INT NOT NULL PRIMARY KEY,
Salary INT,
Seniority_Level VARCHAR(15),
Industry VARCHAR(15),
Employment_Type VARCHAR(15),
LLocation VARCHAR(15),
Title VARCHAR(15),
Req_Experience_Id INT,
Company_Id INT)
```

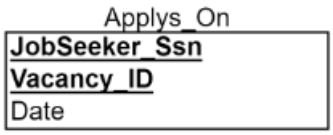
4. Company Relation:

```
CREATE TABLE Company(
Id INT NOT NULL PRIMARY KEY,
Nname VARCHAR(15),
Industry VARCHAR(15),
   LLocation VARCHAR(15))
```



5. Applys_on Relation:

```
CREATE TABLE Applys_On(
JS_Id INT,
V_Id INT,
Ddate VARCHAR(15),
PRIMARY KEY (JS_Id,V_Id));
```



Chapter 3: SQL Queries + screenshots of the results:

SQL Statements:

```
CREATE DATABASE Recruitment;
--Table JobSeeker ---------------------------------------------------------------------
------------------
CREATE TABLE JobSeeker(
Fname VARCHAR(15),
Mname VARCHAR(15),
Lname VARCHAR(15),
Ssn INT NOT NULL PRIMARY KEY,
Gender CHAR,
AGE INT,
Military_Status VARCHAR(15),
Education VARCHAR(15),
Experience INT,
Adddress int)

-- 1) Signing up a new user (Job Seeker): Add new job seeker.
insert into JobSeeker values('Kareem','hasan','mohamed',542,'M',25,'Done','CS',3,12);
insert into JobSeeker values('ahmed','yousef','mohamed',156,'M',20,'Done','CS',2,5);
insert into JobSeeker values('ahmed','hessuien','mazen',123,'M',15,'Done','IT',5,10);
insert into JobSeeker values('yousef','essam','kareem',897,'M',15,'Done','IS',3,7);
insert into JobSeeker values('hazem','tareq','mohamed',515,'M',35,'Done','DS',4,3);
insert into JobSeeker values('nader','ahmed','ramadan',564,'M',24,'Done','AI',3,1);
insert into JobSeeker values('essam','walled','mohey',111,'M',22,'Done','CS',8,2);
insert into JobSeeker values('dina','ahmed','khaled',496,'F',21,'Done','IT',2,5);

-- 2) Update user details
update JobSeeker
set Fname='Jhon'
where Ssn=515;
select * from JobSeeker

-- 3) Showing a list of job seekers that satisfy certain criteria (e.g. industry,
location, experience…)
-- 1]
select *
from JobSeeker
where JobSeeker.Education='CS';
-- 2]
select *
from JobSeeker
```

```sql
where JobSeeker.Adddress=1;
-- 3]
select *
from JobSeeker
where JobSeeker.Experience=3;

--
**********************************************************************************


----------------------------------------------------------------------------------------


-- Table Employer ----------------------------------------------------------------------
-----------------
CREATE TABLE Employer(
Fname VARCHAR(15),
Mname VARCHAR(15),
Lname VARCHAR(15),
Ssn INT NOT NULL PRIMARY KEY,
Gender CHAR,
Salary INT,
Company_Id INT,
AGE INT,
Position VARCHAR(15),
Adddress int)

-- 2) Signing up a new user (Employer): Add new employer.
insert into Employer Values('Ahmed','mohamed','hasan',123,'M',1200,1,20,'HR',12);
insert into Employer Values('mohamed','yasser','hasan',456,'M',1566,1,25,'HR',3);
insert into Employer Values('mazen','kareem','yosef',213,'M',2500,3,28,'IT',10);
insert into Employer Values('mona','mohamed','eslam',494,'F',3000,4,22,'DEV',7);
insert into Employer Values('fares','ahmed','ahmed',159,'M',2500,2,25,'AD',5);
insert into Employer Values('abdelrhman','khaled','ahmed',157,'M',1200,1,29,'Full
s',2);
insert into Employer
Values('mohamed','khaled','yousef',255,'M',2500,2,30,'Manager',1);
insert into Employer Values('amir','mohamed','nader',128,'M',1600,4,19,'HR',7);

-- 2) Update user details
update Employer
set Fname='salma'
where Ssn=494;
select * from Employer
--
**********************************************************************************
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-- Table Vacancy ----------------------------------------------------------------------
--------------
CREATE TABLE Vacancy(
Id INT NOT NULL PRIMARY KEY,
Salary INT,
Seniority_Level VARCHAR(15),
Industry VARCHAR(15),
Employment_Type VARCHAR(15),
LLocation VARCHAR(15),
```

```
Title VARCHAR(15),
Req_Experience_Id INT,
Company_Id INT)

ALTER TABLE Vacancy
ADD E_Id INT;

-- 1) Add a new vacancy:
insert into Vacancy Values(1,1000,'Senior','Technology','Full-Time','Giza','Senior
AD',1,1);
insert into Vacancy Values(2,1400,'Junior','Hr','Full-Time','cairo','junior hr',2,2);
insert into Vacancy Values(3,2500,'Senior','Security','part-Time','Giza','seniro
it',3,1);
insert into Vacancy Values(4,3000,'Mid-Junior','Database','remote','alex','database
des',3,4);
insert into Vacancy Values(5,1500,'Mid-Senior','Home data','part-Time','cairo','mid
hd',4,3);
insert into Vacancy Values(6,2560,'Junior','clouding','Full-Time','cairo','junior
DB',2,2);
insert into Vacancy Values(7,3900,'Mid-Senior','mobile','Internship','mina','mid
AD',3,1);
select * from Vacancy

update Vacancy set E_Id = 123 where Vacancy.Id = 1
update Vacancy set E_Id = 123 where Vacancy.Id = 2
update Vacancy set E_Id = 213 where Vacancy.Id = 7
update Vacancy set E_Id = 456 where Vacancy.Id = 3
update Vacancy set E_Id = 159 where Vacancy.Id = 5
update Vacancy set E_Id = 128 where Vacancy.Id = 4
update Vacancy set E_Id = 128 where Vacancy.Id = 6

-- 2) Update vacancy:
update Vacancy
set Title='Admin'
where Id=4;
select * from Vacancy
-- 3) Showing a list of vacancies that satisfy certain criteria (e.g. industry,
location, required experience…)
-- 1]
select *
from Vacancy
where Vacancy.Industry='Security';
-- 2]
select *
from Vacancy
where Vacancy.LLocation='Cairo';
-- 3]
select *
from Vacancy
where Vacancy.Req_Experience_Id=1;

-- 4) Hide a vacancy (Employer)
Delete From Vacancy Where Vacancy.Title = 'database des';
select * from Vacancy
--
**********************************************************************************
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```

```
-- Table Company ----------------------------------------------------------------
-------------
CREATE TABLE Company(
Id INT NOT NULL PRIMARY KEY,
Nname VARCHAR(15),
Industry VARCHAR(15),
LLocation VARCHAR(15))
insert into Company Values(1,'Google','Programming','Selicon Valley');
insert into Company Values(2,'Microsoft','Windows','Cairo');
insert into Company Values(3,'Amazon','WebSerivces','New York');
insert into Company Values(4,'Apple','Mobile','China');
--
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-------------------------------------------------------------------------------------------
-- Table Adddress ---------------------------------------------------------------
-------------
CREATE TABLE Adddress(
Country VARCHAR(15) not null,
City VARCHAR(15) not null,
ZipCode INT not null,
Address_Id int not null primary key)
insert into Adddress Values('Egypt','Cairo',12518,12);
insert into Adddress Values('Egypt','Giza',12354,5);
insert into Adddress Values('Egypt','Alex',48995,1);
insert into Adddress Values('Egypt','Minofia',46513,3);
insert into Adddress Values('Egypt','Sina',12418,7);
insert into Adddress Values('Egypt','Embaba',18518,10);
insert into Adddress Values('Egypt','Aswan',12345,2);
--
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-------------------------------------------------------------------------------------------
-- Table Required_Experience ----------------------------------------------------
--------------
CREATE TABLE Required_Experience(
Id INT NOT NULL PRIMARY KEY,
Ex1 VARCHAR(15) ,
Ex2 VARCHAR(15) ,
Ex3 VARCHAR(15) ,
Ex4 VARCHAR(15) )
insert into Required_Experience values(1,'C++','java','sql','c#')
insert into Required_Experience values(2,'C#','php','math','network')
insert into Required_Experience values(3,'api','css','logic','php')
insert into Required_Experience values(4,'mysql','js','technical','stat')

--
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-------------------------------------------------------------------------------------------
```

```
-- Table Applys_On ------------------------------------------------------------
-------------
CREATE TABLE Applys_On(
JS_Id INT,
V_Id INT,
Ddate VARCHAR(15),
PRIMARY KEY (JS_Id,V_Id));


-- 1) Apply and Save vacancy (Job Seeker)
insert into Applys_On Values(542,1,'12/5/2015')
insert into Applys_On values(156,5,'2/4/2020');
insert into Applys_On Values(123,5,'12/5/2015')
insert into Applys_On Values(515,1,'12/5/2015')
insert into Applys_On Values(496,1,'12/5/2015')
insert into Applys_On Values(111,6,'12/5/2015')
insert into Applys_On Values(897,5,'12/5/2015')
insert into Applys_On Values(111,2,'10/7/2015')
insert into Applys_On Values(897,3,'10/2/2019')
insert into Applys_On Values(111,4,'10/2/2019')
select * from Applys_On
--
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-- Adding Foreign key for the tables ------------------------------------------
-------------------

ALTER TABLE Employer ADD FOREIGN KEY (Company_Id) REFERENCES Company (Id);
ALTER TABLE JobSeeker ADD FOREIGN KEY (Adddress) REFERENCES Adddress (Address_Id);
ALTER TABLE Employer ADD FOREIGN KEY (Adddress) REFERENCES Adddress (Address_Id);
ALTER TABLE Vacancy ADD FOREIGN KEY (Req_Experience_Id) REFERENCES Required_Experience
(Id);
ALTER TABLE Vacancy ADD FOREIGN KEY (Company_Id) REFERENCES Company (Id);
ALTER TABLE Vacancy ADD FOREIGN KEY (E_Id) REFERENCES Employer (Ssn);
alter table Applys_On ADD FOREIGN KEY(JS_Id) References JobSeeker(Ssn);
alter table Applys_On ADD FOREIGN KEY(V_Id) References Vacancy(Id);
--
*****************************************************************************************
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-----------------------------------------------------------------------------------------------
```

SQL Queries:

```
-- Query No. (1) ---------------------------------------------------------------------
--------------
--What was the most interesting job “title” that had maximum number of applicants?

select top 1 Applys_On.V_Id,Count(*) as maxApplicants
from Applys_On
Group By Applys_On.V_Id
order by maxApplicants desc;
-- Testing of the query:
select * from Db
select Vacancy.Title
from Db , Vacancy
where Db.V_Id=Vacancy.Id
--
*****************************************************************************************
**************
```

```
-- Query No. (2) ---------------------------------------------------------------------
---------------
-- What was the announced job “title” that hadn’t any applicants last month?
select Vacancy.Id from Vacancy
except(select DBTabl.V_Id from DBTabl)
-- this is the ids of the job title that hadn’t any applicants last month
--
*****************************************************************************************
**************
```

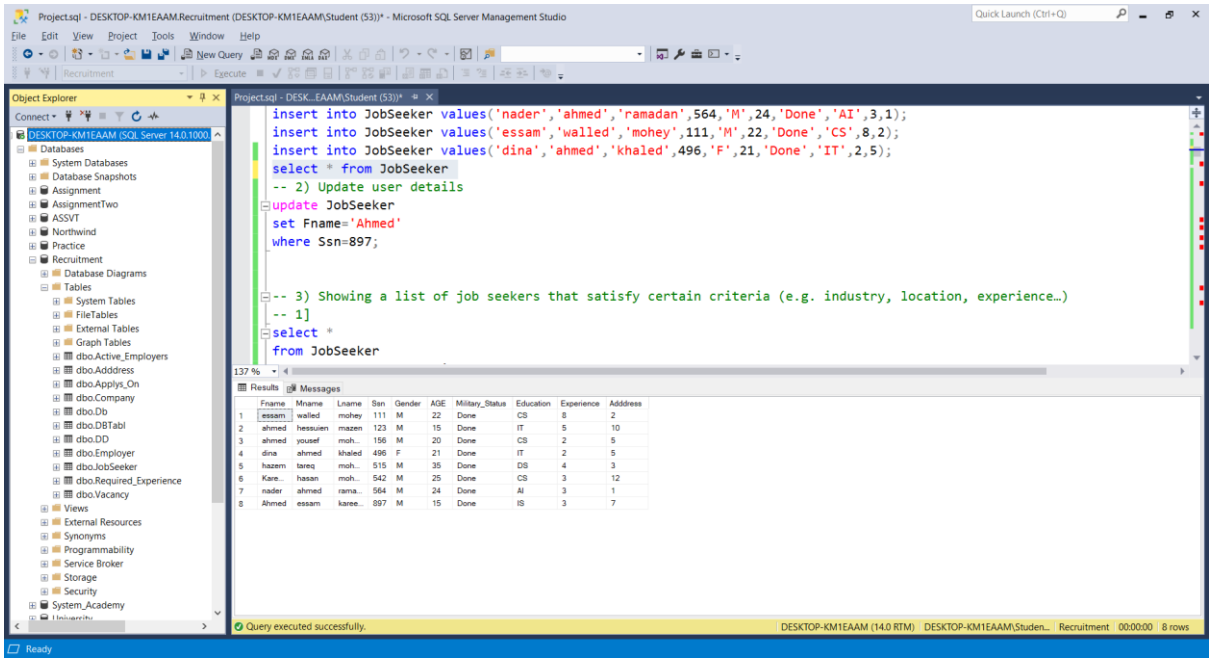
```
-- Query No. (3) ---------------------------------------------------------------------
---------------
-- Who was the employer with the maximum announcements last month?
select  Top 1 Vacancy.E_Id  ,count(*) as number
from Vacancy
Group by Vacancy.E_Id
order by number desc
--
*****************************************************************************************
**************
```

```
-- Query No. (4) ---------------------------------------------------------------------
---------------
-- Who were the employers didn’t announce any job last month?
select  Vacancy.E_Id  ,count(*) as number into Active_Employers
from Vacancy
Group by Vacancy.E_Id
order by number desc
-- Testing of the query:
select Employer.Ssn from Employer
except(select Active_Employers.E_Id from Active_Employers)
--
*****************************************************************************************
**************
```

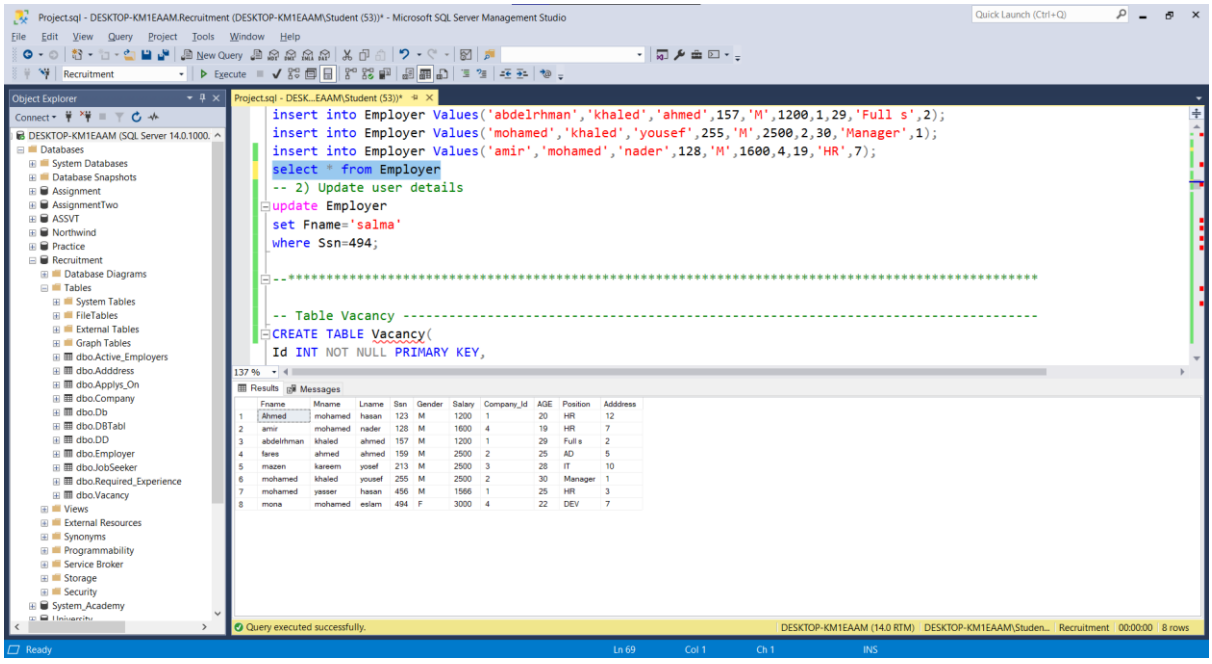
```
-------------------------------------------------------------------------------------------
-- Query No. (5) ------------------------------------------------------------------------
---------------
-- What were the available positions at each employer last month?
select Vacancy.Id from Vacancy
except(select DBTabl.V_Id from DBTabl)

-- Testing of the query:
select Vacancy.Title,Vacancy.E_Id from Vacancy
where Vacancy.Id Not in(select DBTabl.V_Id from DBTabl)
--
**************************************************************************************
****
-------------------------------------------------------------------------------------------

-- Query No. (6) ------------------------------------------------------------------------
------
-- For each seeker, retrieve all his/her information and the number of jobs he applied
for
select Applys_On.JS_Id,Count(*) as no_of_jobs_applied into DD
from Applys_On
Group By Applys_On.JS_Id
-- Testing of the query:
select *  from DD
select *
from (JobSeeker full outer join DD on JobSeeker.Ssn=DD.JS_Id)

--
**************************************************************************************
*****
-------------------------------------------------------------------------------------------


-- Queries to test SQL Statements
select * from JobSeeker;
select * from Employer;
select * from Company;
select * from Vacancy;
select * from Adddress;
select * from Required_Experience;
--********************************
select * into DBTable
from JobSeeker
where JobSeeker.Gender = 'F';
--********************************
select *
from DBTabl;
select *
from Applys_On
where Applys_On.V_Id=1;
select Vacancy.Title
from Vacancy,Applys_On;
--********************************
select *
from JobSeeker,Applys_On
where JobSeeker.Ssn in  (select Applys_On.JS_Id from Applys_On)
--********************************
select Applys_On.JS_Id,Count(*) as no_of_jobs_applied
from Applys_On
Group By Applys_On.JS_Id
```

Screenshots:

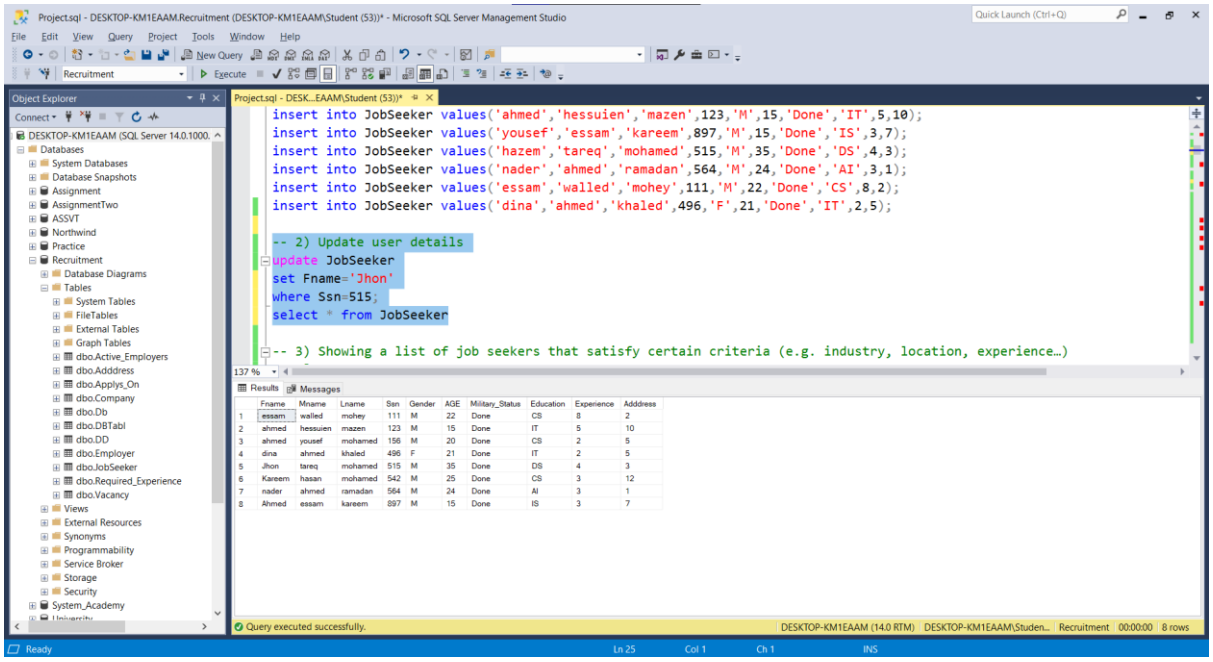
1. Signing up new user (job seeker)



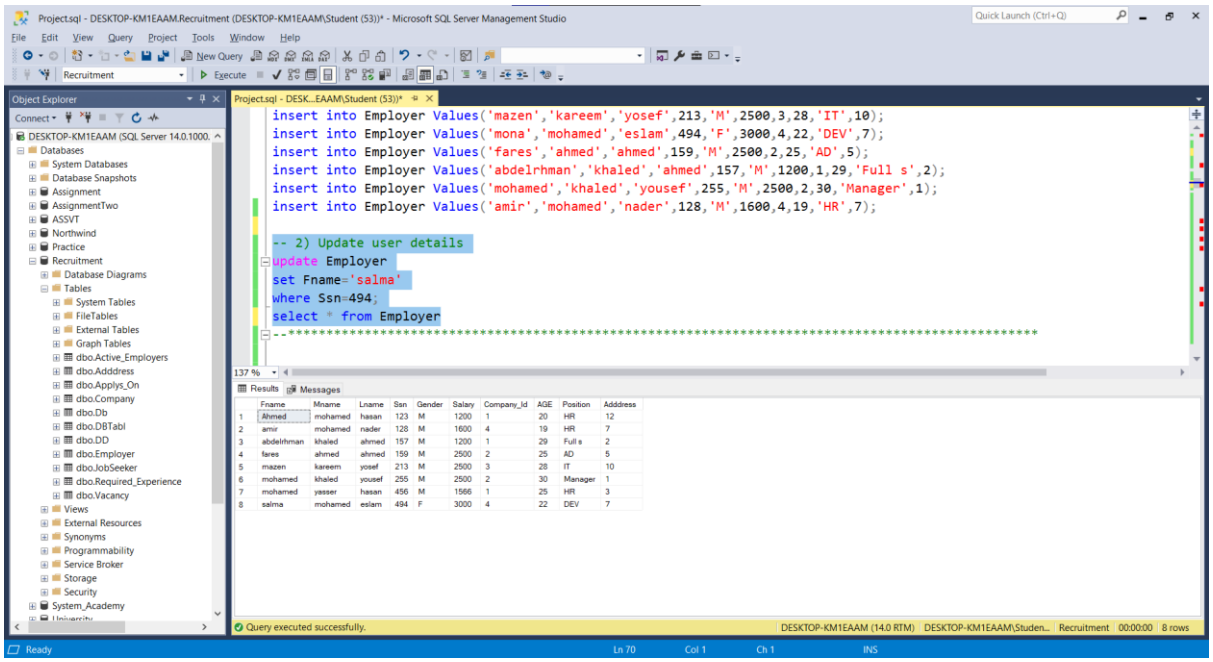
2. Signing up new user (employer)



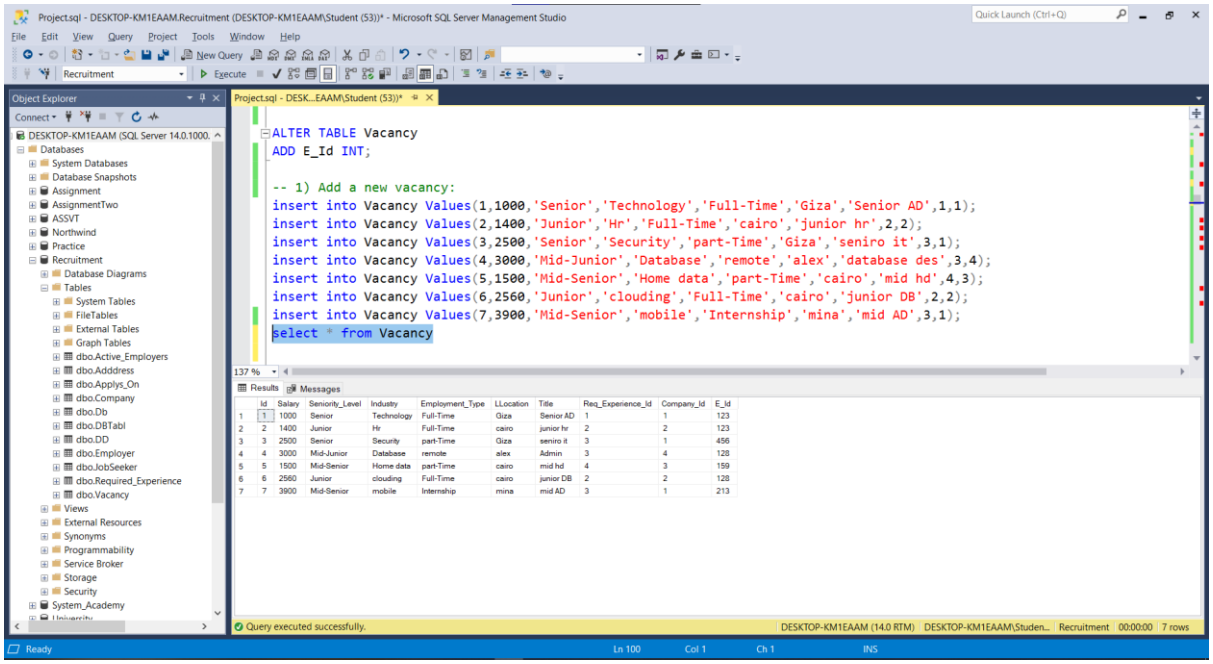
3. Update user details (job seeker)



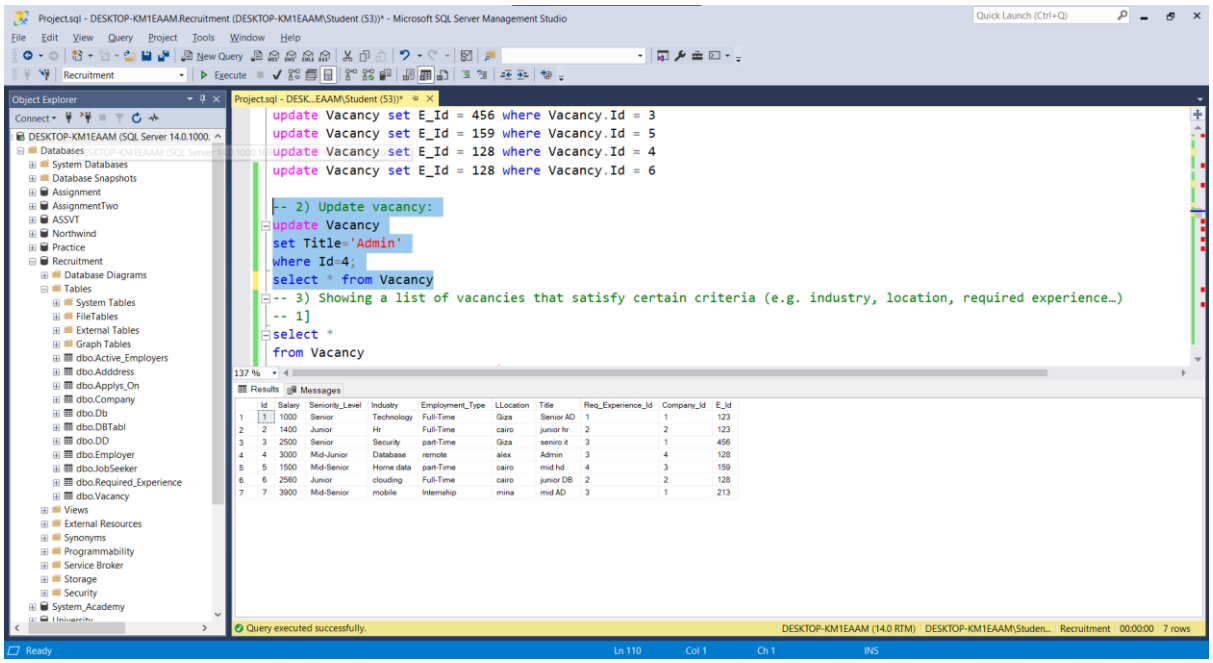
4. Update user details (employer)



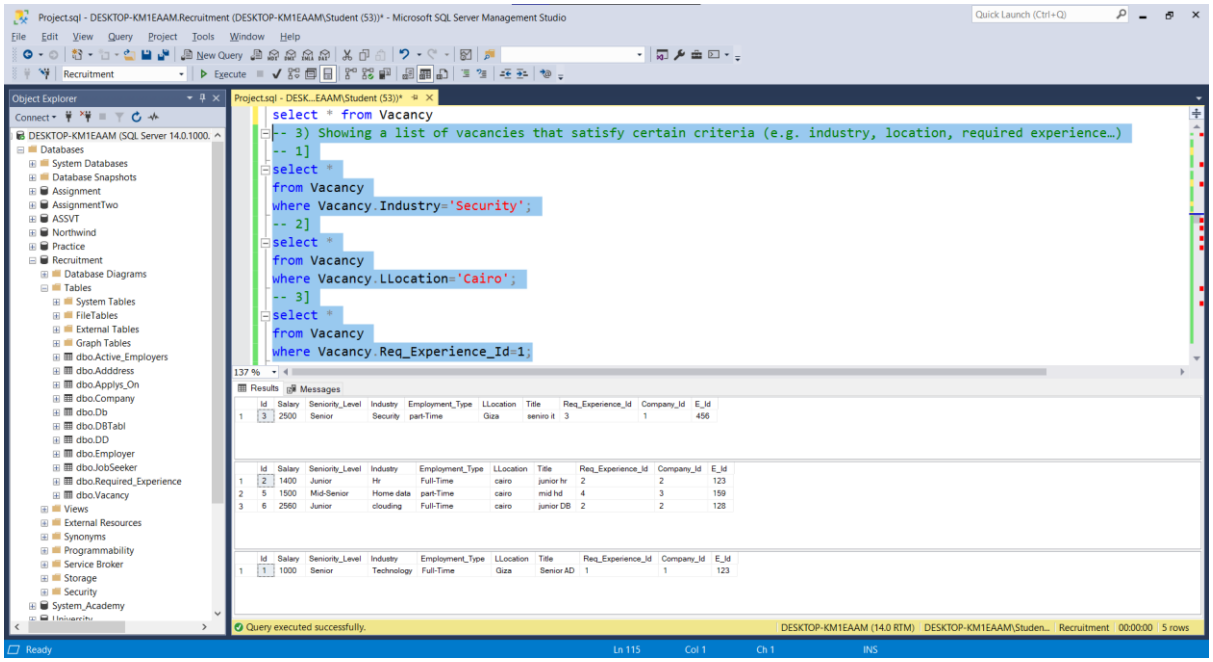
5. Add a new vacancy:



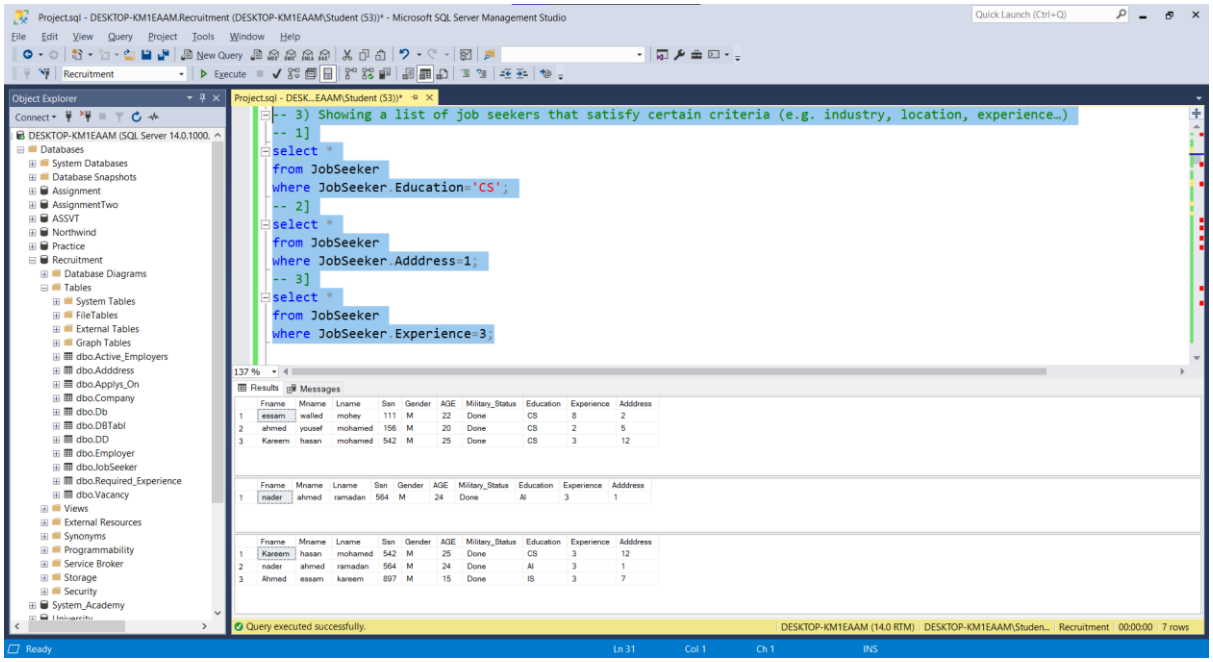
6. Update vacancy:



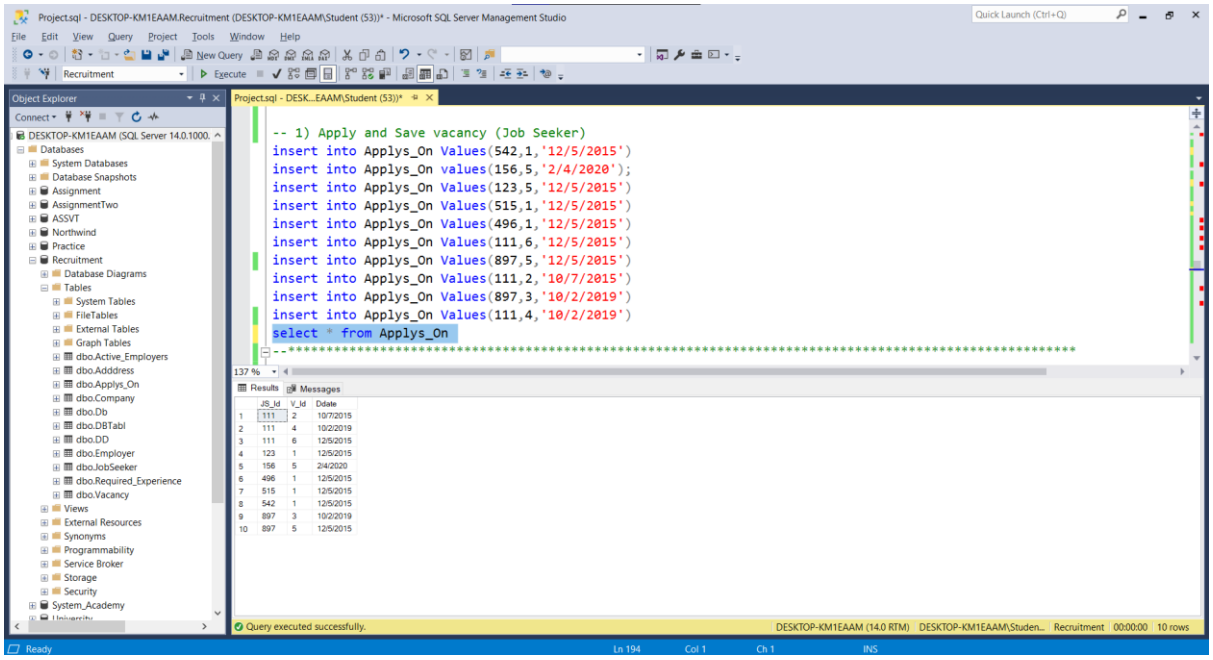
7. Showing a list of vacancies that satisfy certain criteria:



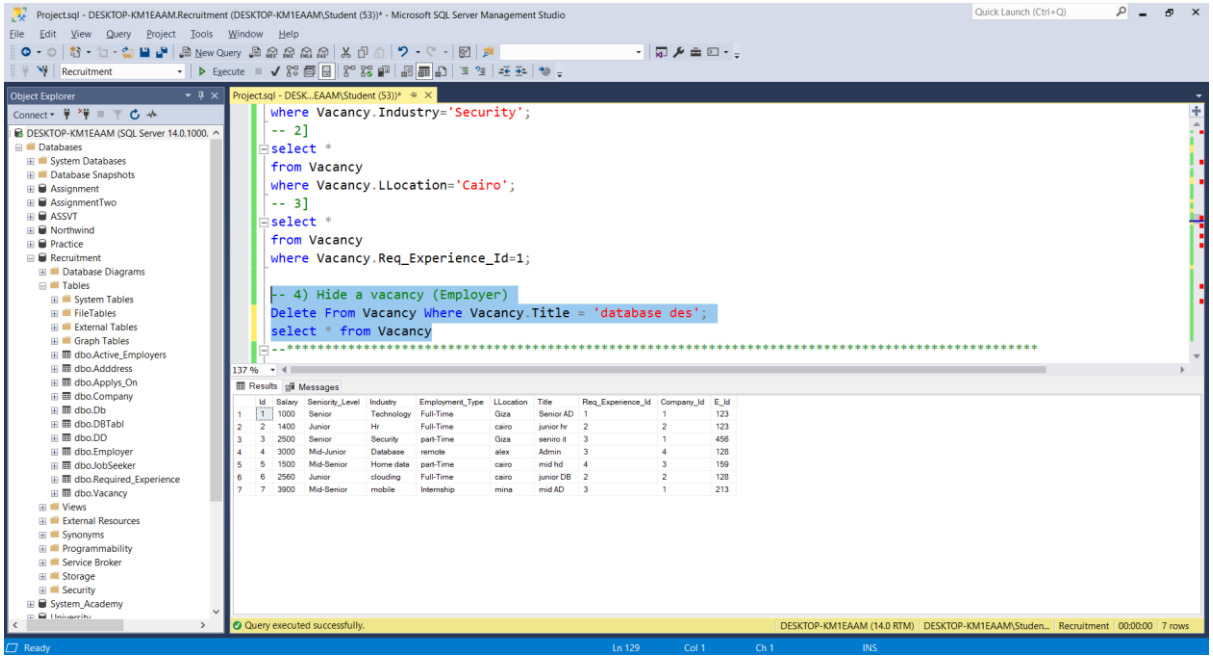
8. Showing a list of job seekers that satisfy certain criteria:



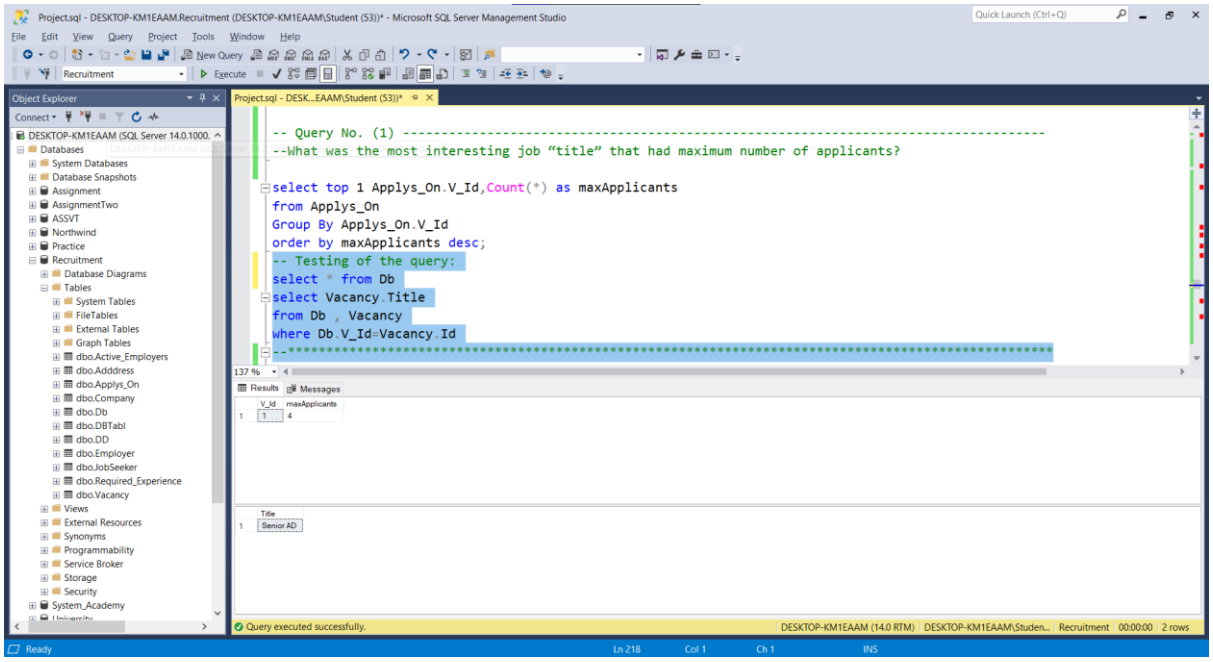
9. Apply and save vacancy (job seeker):



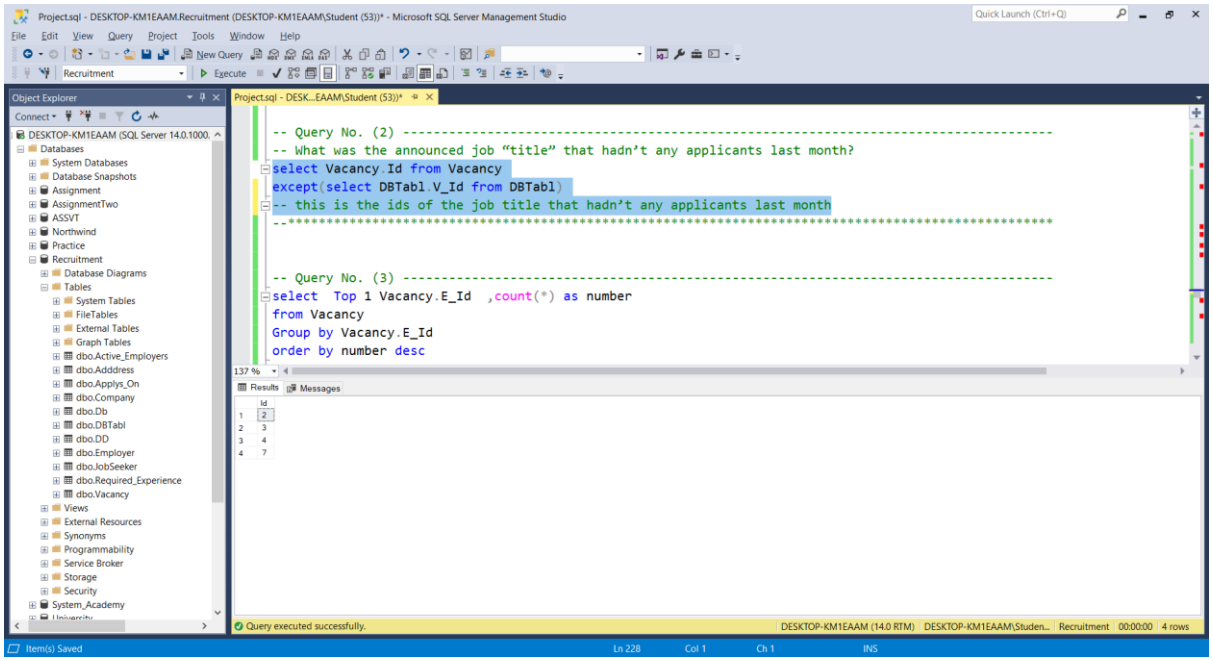
10. hide vacancy (employer):



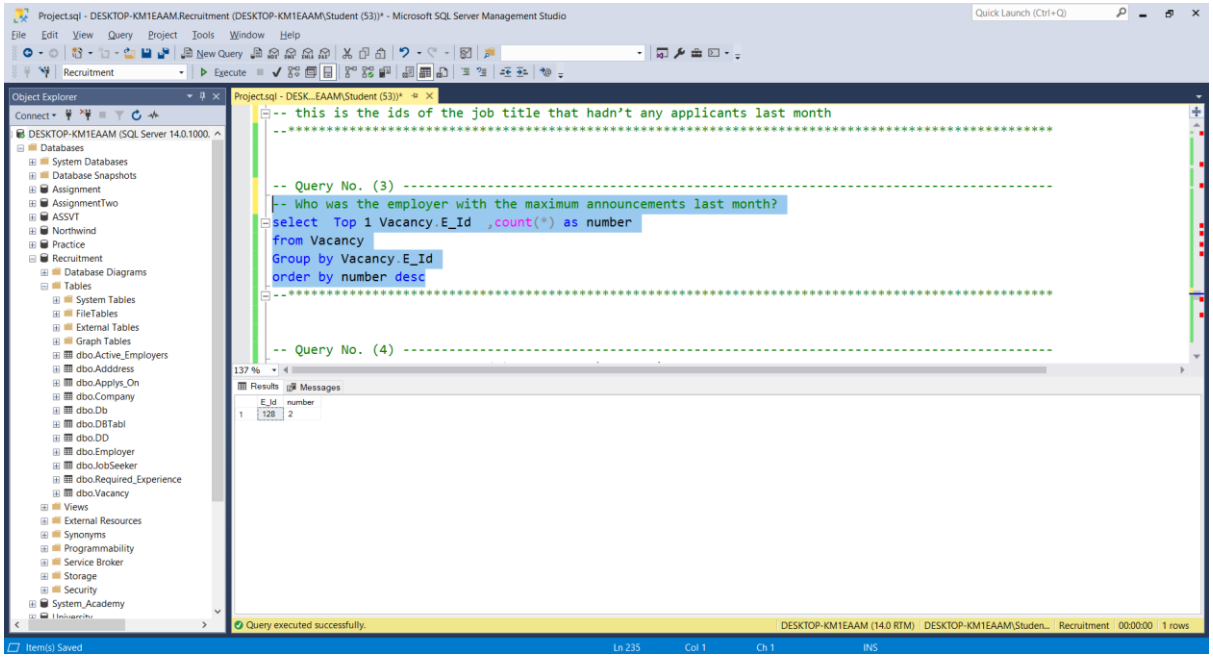
10. **Query No. 1:**



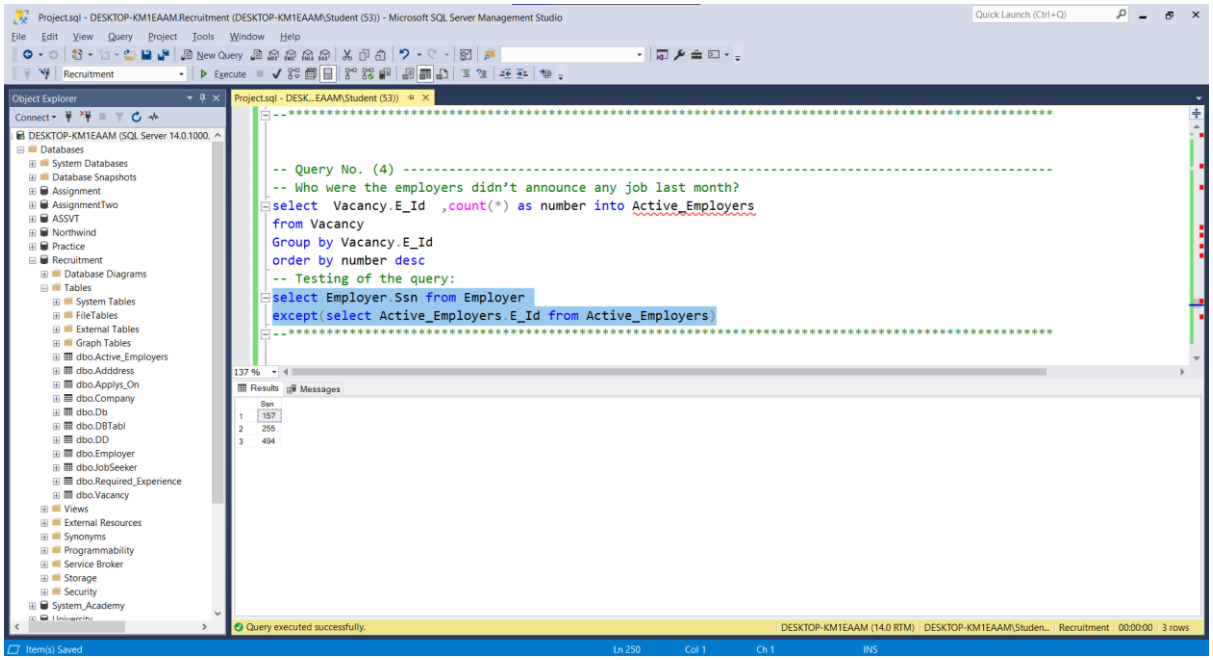
11. **Query No. 2:**



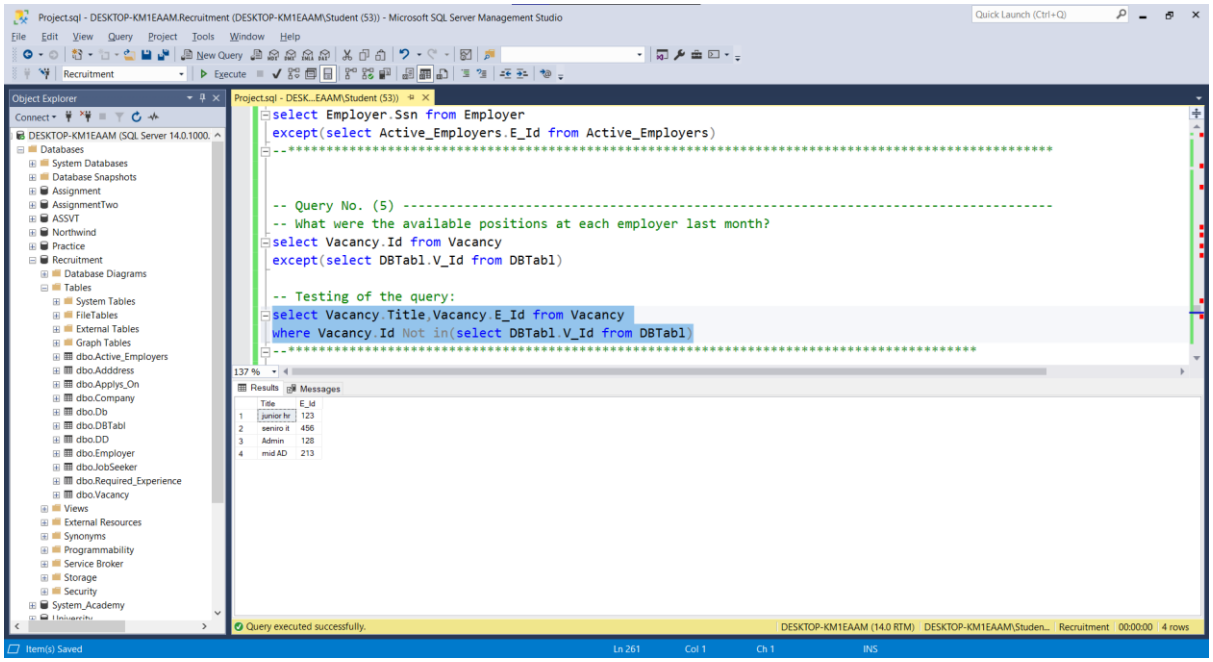
12. **Query No. 3:**



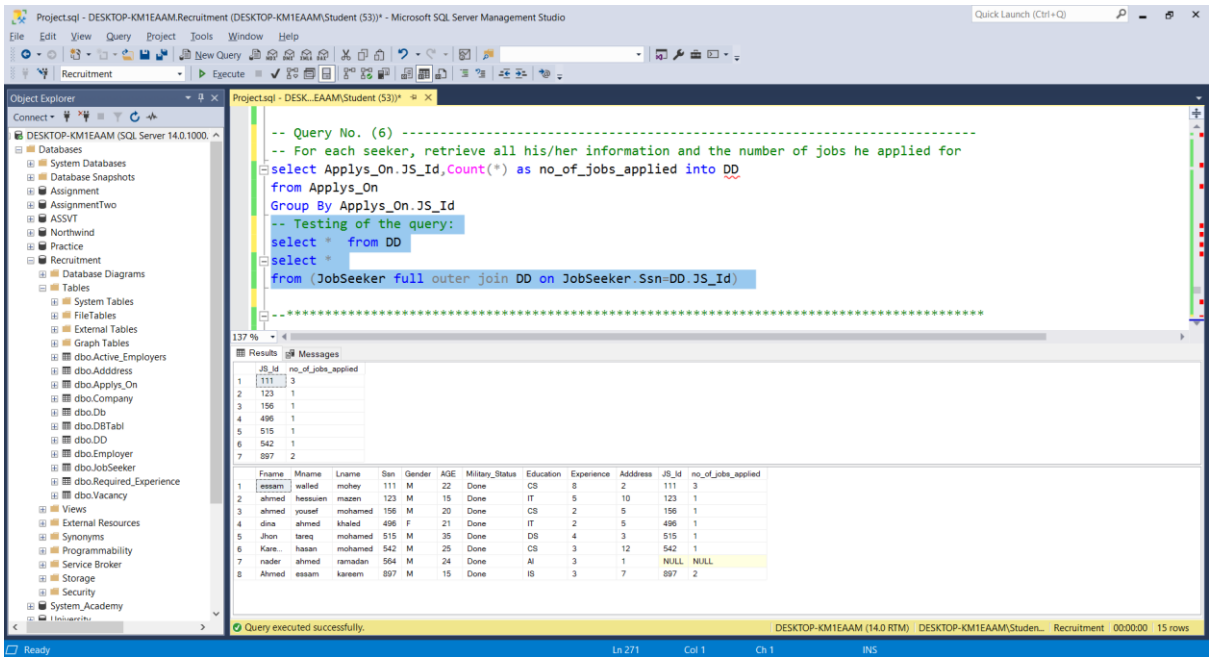
13. **Query No. 4:**



14. **Query No. 5:**



15. **Query No. 6:**



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2. The Lectures PDFs.