

CENG 302

Introduction to Database Management Systems

Spring 2021-2022

TERM PROJECT

Due Date: 18 January 2022, Tuesday

Project Description

In the term project, you will design a database and implement a practical application of the subject. The below scenario belongs to real product description. You are free to enrich and revise the properties of the given project ideas. User interface of the projects will not be graded. The database model that you have created and the criteria you are asked to satisfy (given under the section “Deliverables and Constraints in the Projects”) matter. The aim of this project is not to create a competitor application but to teach you how to design an application which utilizes databases.

Project deliverables:

- Schema Design and Implementation
- Final Report
- Demonstration of the projects

The demo program will be announced later on ODTUClass.

You should not explain anything in the final report. This report should only include the screenshots of your results. You will do the detailed explanation in the demo phase. You can only write titles and captions of your screenshots into the final report document.

Case Study: An Online Caregivers Platform

Platforms such as **Evdekibakicim**¹ have become popular for finding trustful caregivers. Caregivers on several categories (e.g. babysitters, for elderly care) register to the platform, and families who seek a caregiver may search among the candidates and make an appointment via the platform. In this project, you are required to implement such a platform with the following features:

1. Caregivers register to the platform with the following information:
 - a. Name
 - b. Surname
 - c. Type of caregiving (one of the categories: babysitter, caregiver for elderly, playmate for children)

¹ <https://www.evdekibakicim.com/>

- d. Gender
 - e. Photo
 - f. Mail address
 - g. Phone number
 - h. City
 - i. Price requested per hour
 - j. Biography and personal information: A short description of the caregiver such as education information, working experience
 - k. Password
2. Family members who seek a caregiver also register to the system with the following information:
- a. Name
 - b. Surname
 - c. Mail address
 - d. Phone number
 - e. Password
 - f. City
 - g. Address
 - h. Information about the person in need of nursing: A short description about the family member for whom the caregiver is needed (e.g. I have a 5-year old son who likes painting...)
 - i. House rules: Description about the house rules that the caregiver should follow (e.g. the caregiver should pay attention to hygiene...)
3. Family members can search caregivers based on the caregiving type and city.
4. Family members can also post a job advertisement about the need of caregiving, hence, caregivers also search among the announcements and apply them.
- a. Since posting an advertisement is a more detailed process, family members explicitly state the criteria that should be met by the caregiver. For example, age of the person who need caregiving, time interval (between 09:00-12:00, 12:00-15:00 etc.) and frequency (weekly, daily, only weekends etc.) for the caregiving service should be stated in the announcement.
 - b. Members can see the applicants to the advertisements posted by the member, and view the profiles of the applicants.
5. Members can view profiles of the potential caregivers that satisfy their conditions. On the profile, they can send a message to the caregiver, or they can allow the caregiver to contact with them.
6. Members can make an appointment with the caregivers on their profiles.
- a. For making an appointment, members state
 - i. Date of the appointment
 - ii. Hour of the appointment
 - iii. Total number of hours for caregiving service (e.g. 3 hours, 5 hours)
 - b. If a member creates an appointment with a caregiver, caregiver should confirm or decline the request.
 - c. If the appointment is confirmed, the contact information is shown to both members and caregivers.
 - d. Members can see their appointments on their profiles.

DELIVERABLES AND CONSTRAINTS IN THE PROJECTS:

Schema Design and Functionality of the System:

You should present the functionality of your system (forms, screens and reports).

The constraints of the project are as follows:

- You must have insert, delete, and update operations satisfying integrity constraints.
- Develop complex queries, one with aggregate functions, and one that involves multiple tables to be joined, preferably nested queries.
- Include a derived attribute, date or time information in your database design and perform the query comprising these values.
- Provide printed report and/or displayable form capabilities.
- You must implement one dynamic SQL query with programming utilities (Wait for a parameter to be entered from the screen and produce information accordingly).
- You can develop the project in whichever programming language you feel more comfortable with. We recommend you to use Java or Python. Languages such as C# or C++ are also suitable for developing this project. You may also prefer to use Spring, Hibernate or similar frameworks.
- If you are going to use Java programming language, you can connect and query to MySQL Server using Java Database Connectivity (JDBC). For Python, you can achieve the same task using the suitable version of Connector/Python for your operating system.
- You can also use an object-relational mapping library such as Hibernate but you should present sufficient evidences for the constraints asked for the queries such as complex queries during the demonstration.
- Error and exception handling should be done and demonstrated at the demo phase as well.

Project presentation – Demo:

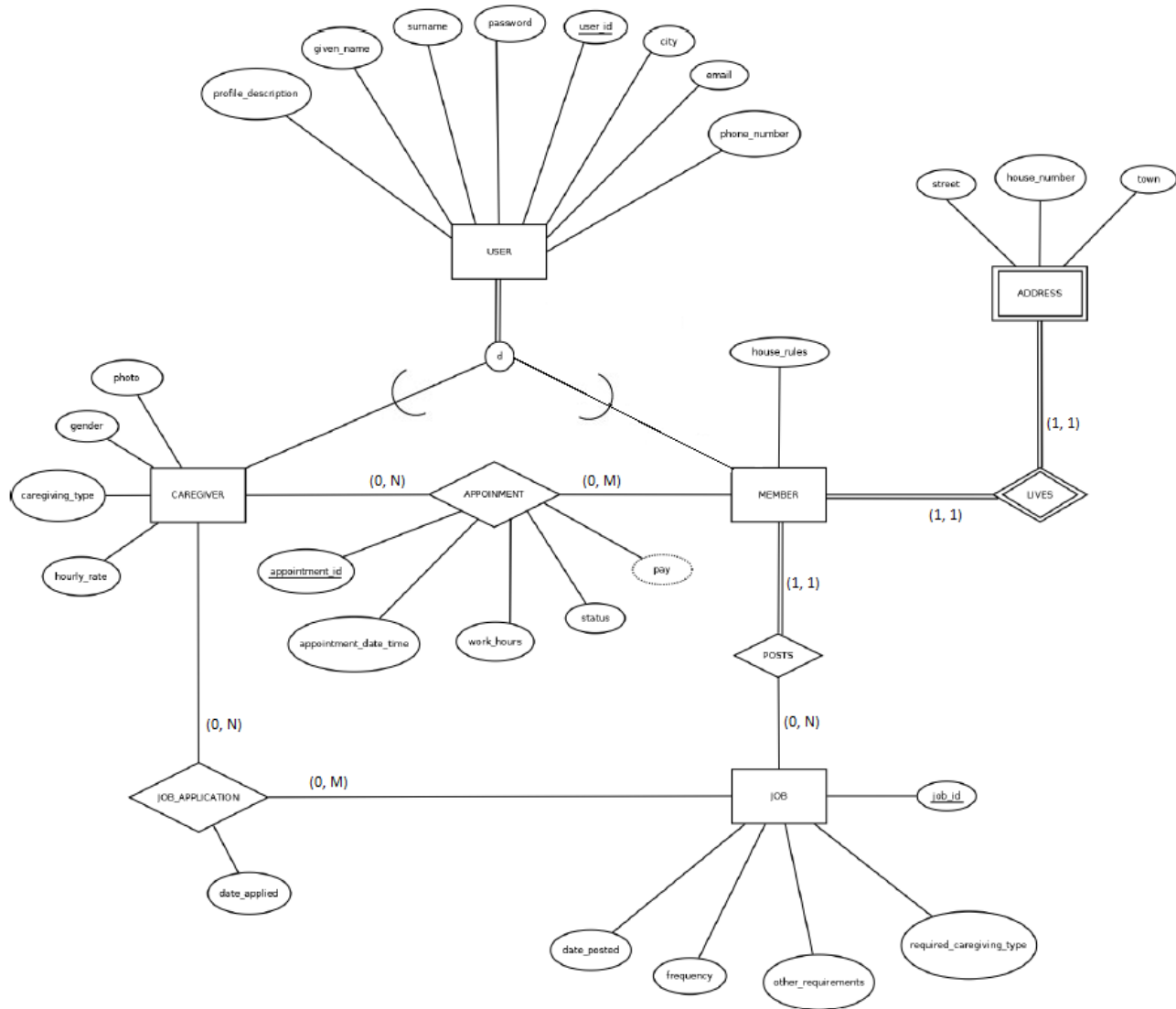
The following items will be checked:

- insert, delete, update operations for the selected tables and whether integrity is enforced
- forms/reports
- main menu, presentability and navigation options
- derived attribute
- aggregate queries
- complex join queries
- one view operation
- one module (dynamic SQL from a program)
- error checking

Report:

- You should prepare a final report that includes the screenshots of the deliverables.

EER Diagram



Schema

Primary key, Foreign key, *Unique

USER (user_id, *email, given_name, surname, city, phone_number, profile_description, password)

CAREGIVER (caregiver_user_id, photo, gender, caregiving_type, hourly_rate)

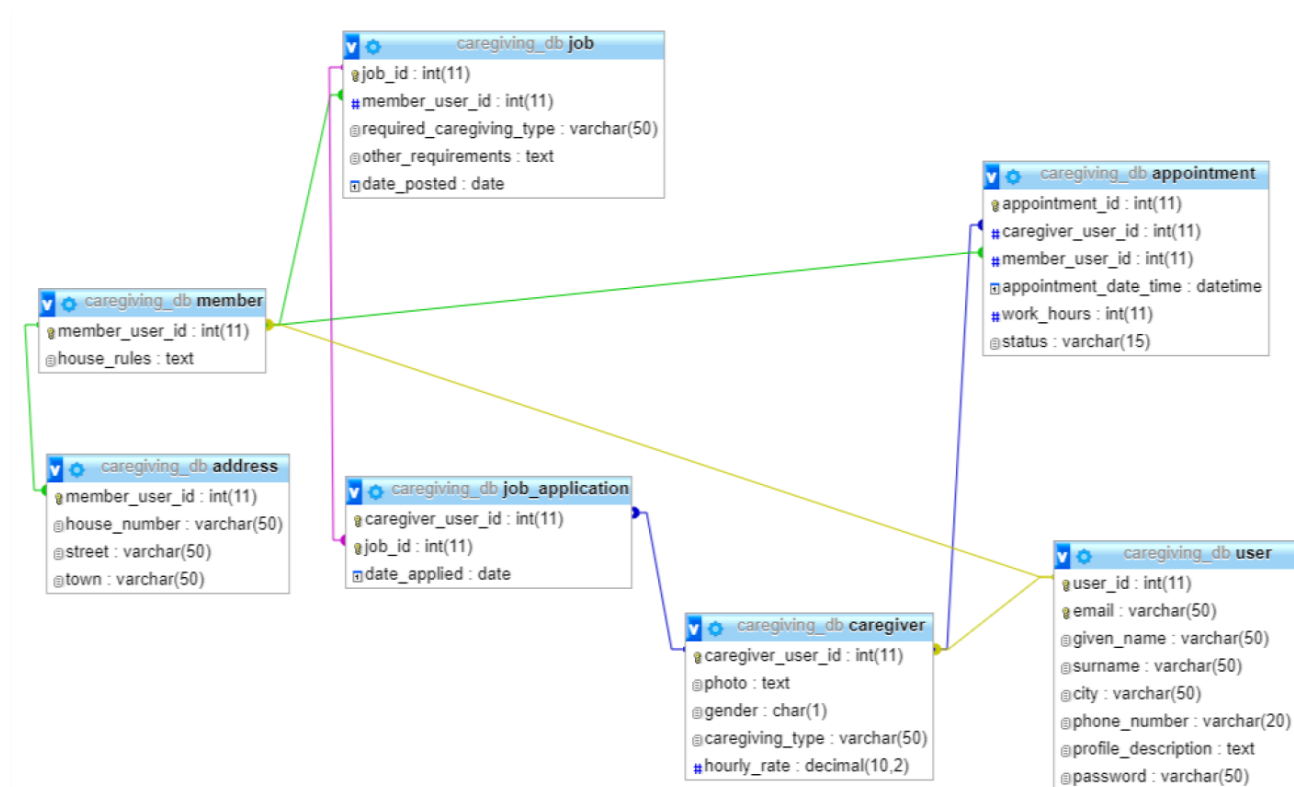
MEMBER (member_user_id, house_rules)

ADDRESS (member_user_id, house_number, street, town)

JOB (job_id, member_user_id, required_caregiving_type, other_requirements, date_posted)

JOB_APPLICATION (caregiver_user_id, job_id, date_applied)

APPOINTMENT (appointment_id, caregiver_user_id, member_user_id, appointment_date, appointment_time, work_hours, status)



1. Create SQL Statements

You will create all the tables according to the schema described above.

You can assume that tables will be created before executing any other database operation. Do not forget to define foreign keys while you are creating tables.

2. Insert SQL Statements

You will insert data into appropriate tables:

-User

user_id	email	given_name	surname	city	phone_number	profile_description	password
1	a.yilmaz@yahoo.com	Ayşe	Yılmaz	Edirne	535-323-5252	New to caregiving	ayse1234
2	acetinkaya@gmail.com	Ahmet	Cetinkaya	İstanbul	532-993-0117	Likes to give care to old people	acetinkaya
3	d.karaca@hotmail.com	Damla	Karaca	Ankara	535-123-0121	More than 5 years experience of caregiving	12345678
4	altinosman@gmail.com	Osman	Altın	İstanbul	533-993-0642	Just a guy who needs caregiving	osman0642

5	ali.yilmaz@hotmail.com	Ali	Yilmaz	İstanbul	532-572-4312	A dad with a lot on his hands and needs help taking care of kids	463mngkr3
6	pinariyilmaz@hotmail.com	Pinar	Yilmaz	Ankara	535-553-4351	In need of caregiving	pnrylmz
7	celikmustafa@gmail.com	Mustafa	Celik	İzmir	534-642-4531	New to caregiving	musfsfsa
8	eminedemir@hotmail.com	Emine	Demir	İstanbul	533-721-3704	In need of caregiving	demire43
9	elifbusra@gmail.com	Elif	Busra	İstanbul	532-248-8754	More than 5 years experience of caregiving	busra343mf
10	kayahatice55@hotmail.com	Hatice	Kaya	Ankara	535-463-6328	Likes to give care to old people	kayahat43
11	kocakzeynep@gmail.com	Zeynep	Kocak	İstanbul	533-231-9843	Likes to give care to old people	kocak3843
12	m.karaca@hotmail.com	Mehmet	Karaca	Ankara	532-462-6093	More than 5 years experience of caregiving	karacamehmet4343
13	atesmahmut@gmail.com	Mahmut	Ates	İstanbul	533-127-6842	Just a guy who needs caregiving	mahmutfire66
14	hasan.yilmaz@hotmail.com	Hasan	Yilmaz	İstanbul	535-528-1167	A dad with a lot on his hands and needs help taking care of kids	hasan1985
15	huseyin.yilmazer@gmail.com	Hüseyin	Yilmazer	Ankara	532-685-5371	In need of caregiving	hsynankara06
16	mozturk@gmail.com	Murat	Ozturk	İzmir	532-464-1752	New to caregiving	ozturk35murat
17	emrek@hotmail.com	Emre	Kubra	İstanbul	533-353-5313	In need of caregiving	kubraemre4542
18	ibrkaya@gmail.com	İbrahim	Kaya	İstanbul	533-531-5313	More than 5 years experience of caregiving	kaya.ibrahim1988
19	demiromer@hotmail.com	Ömer	Demir	Ankara	535-138-6422	Likes to give care to old people	64demioreon
20	duygusahin@gmail.com	Duygu	Şahin	Ankara	532-224-2461	Likes to give care to old people	duyguaade3

-Caregiver

caregiver_user_id	photo	gender	caregiving_type	hourly_rate
1	photos/a.yilmaz.png	F	Baby Sitter	7.50
2	photos/a.cetinkaya.png	M	Elderly Care	9.50
3	photos/d.karaca.png	F	Baby Sitter	10
7	photos/m.celik.png	M	Baby Sitter	9.50
9	photos/e.busra.png	F	Baby Sitter	10
10	photos/h.kaya.png	F	Elderly Care	7.50
11	photos/z.kocak.png	F	Elderly Care	9.50
12	photos/m.karaca.png	M	Baby Sitter	7.0
16	photos/m.ozturk.png	M	Baby Sitter	11.2
18	photos/i.kaya.png	M	Baby Sitter	9.3
19	photos/o.demir.png	F	Elderly Care	6.4
20	photos/d.sahin.png	F	Elderly Care	5.3

-Member

member_user_id	house_rules
4	No pets.
5	Not allowed to touch the fridge.
6	No pets.
8	Not allowed to touch the fridge.
13	No pets.
14	No pets.
15	Not allowed to touch the fridge.
17	Not allowed to touch the fridge.

-Address

member_user_id	house_number	street	town
4	4570	Bayrampasa Street	İstanbul
5	241	Fahrettin Kerim Gokay Street	İstanbul
6	4214	Arjantin Street	Ankara
8	5313	Kadrgalar Street	İstanbul
13	513	Cumhuriyet Street	İstanbul
14	517	Kalamis Street	İstanbul
15	442	Tunali Hilmi Street	Ankara
17	724	Kalamis Street	İstanbul

-Job

job_id	member_user_id	required_caregiving_type	other_requirements	date_posted
1	4	Elderly Care	Someone who is energetic that can assist me in doing activity work around the house. Must be available during weekdays	2021-01-01
2	5	Baby Sitter	Gentle and capable of handling very active kids on weekends	2021-01-02
3	6	Elderly Care	I need someone to look after my grandmother during weekends	2021-01-03
4	13	Elderly Care	I need someone to look after my dad during weekends	2021-01-04
5	17	Baby Sitter	I need someone to look after my kids during weekends	2021-01-05

-Job application

caregiver_user_id	job_id	date_applied
2	1	2021-01-03
10	1	2021-01-04
12	2	2021-01-05
16	2	2021-01-06
20	3	2021-01-07
7	4	2021-01-08
19	5	2021-02-11

-Appointment

appointment_id	caregiver_user_id	member_user_id	appointment_date_time	work_hours	status
1	2	4	2021-01-07 08:30:00	5	ACCEPTED
2	10	6	2021-01-15 09:00:00	3	ACCEPTED
3	9	5	2021-01-12 10:30:00	6	ACCEPTED
4	10	4	2021-01-10 11:00:00	8	DECLINED
5	20	6	2021-01-11 11:30:00	4	ACCEPTED
6	9	17	2021-01-12 12:00:00	8	DECLINED

3. Update SQL Statement

3.1 Update phone number of Pinar Yilmaz as 535-553-4199

3.2 Add \$0.5 commission fee to the Caregivers' hourly rate if it's less than \$9, or 10% if it's not

4. Delete SQL Statement

4.1 Delete the jobs posted by Pinar Yilmaz

4.2 Delete the members who live in Kadirgalar Street

5. Simple Queries

5.1 Select caregiver and member names for the accepted appointments

5.2 List caregiver user ids that contain 'gentle' in their other requirements

5.3 List the work hours of Baby Sitter positions.

5.4 List the members who are looking for Elderly Care in İstanbul and have "No pets." rule.

6. Complex Queries

6.1 Count the number of applicants for each job posted by a member (multiple joins with aggregation)

Select a Report			
Count the number of applicants for each job posted by a member			Query
job_id	Posted By	required_caregiving_type	Number of Applicants
1	Osman Altın	Elderly Care	2
2	Ali Yılmaz	Baby Sitter	2
4	Mahmut Ates	Elderly Care	1
5	Emre Kubra	Baby Sitter	1

6.2 Total hours spent by care givers for all accepted appointments (multiple joins with aggregation)

Select a Report			
Total hours spent by care givers for all accepted appointments			Query
caregiver_user_id	given_name	surname	Total Work Hours
2	Ahmet	Cetinkaya	5
9	Elif	Busra	6
10	Hatice	Kaya	3
20	Duygu	?ahin	4

6.3 Average pay of caregivers based on accepted appointments (join with aggregation)

Select a Report	
Average income of caregivers based on accepted appointments	
Query	
Average Pay	
37.800000	

6.4 Caregivers who earn above average based on accepted appointments (multiple join with aggregation and nested query)

Select a Report		
Caregivers who earn above average based on accepted appointments		Query
caregiver_user_id	Caregiver Name	Total Earnings
2	Ahmet Cetinkaya	47.50
9	Elif Busra	60.00

7. Query with a Derived Attribute

Calculate the total cost to pay for a caregiver for all accepted appointments

Select a Report							
Calculate total cost to pay for caregivers for all accepted appointments					Query		
Caregiver Name	hourly_rate	Member	appointment_id	appointment_dat...	work_hours	status	Pay
Ahmet Cetinkaya	9.50	Osman Alt?n	1	2021-01-07 08:30...	5	ACCEPTED	47.50
Hatice Kaya	7.50	Pinar Yilmaz	2	2021-01-15 09:00...	3	ACCEPTED	22.50
Elif Busra	10.00	Ali Yilmaz	3	2021-01-12 10:30...	6	ACCEPTED	60.00
Duygu ?ahin	5.30	Pinar Yilmaz	5	2021-01-11 11:30...	4	ACCEPTED	21.20

8. Dynamic Query

Search all posted jobs based on a keyword

Select a Report							
Search all jobs based on a keyword					Query		
Job ID	Required Caregivi...	Date Posted	Posted By	Applied By	Date Applied	Caregiver Hourly ...	Caregiver Type
1	Elderly Care	2021-01-01	Osman Alt?n	Ahmet Cetinkaya	2021-01-03	9.50	Elderly Care
1	Elderly Care	2021-01-01	Osman Alt?n	Hatice Kaya	2021-01-04	7.50	Elderly Care
2	Baby Sitter	2021-01-02	Ali Yilmaz	Mehmet Karaca	2021-01-05	7.00	Baby Sitter
2	Baby Sitter	2021-01-02	Ali Yilmaz	Murat Ozturk	2021-01-06	11.20	Baby Sitter
4	Elderly Care	2021-01-04	Mahmut Ates	Mustafa Celik	2021-01-08	9.50	Baby Sitter
5	Baby Sitter	2021-01-05	Emre Kubra	Omer Demir	2021-02-11	6.40	Elderly Care

Input

?

Enter a keyword:

Baby

OK

Cancel

9. View Operation

View all job applications and the applicants

Select a Report							
View the Jobs and Applicants				Query			
Job ID	Required Caregivi...	Date Posted	Posted By	Applied By	Date Applied	Caregiver Hourly ...	Caregiver Type
1	Elderly Care	2021-01-01	Osman Alt?n	Ahmet Cetinkaya	2021-01-03	9.50	Elderly Care
1	Elderly Care	2021-01-01	Osman Alt?n	Halice Kaya	2021-01-04	7.50	Elderly Care
2	Baby Sitter	2021-01-02	Ali Yilmaz	Mehmet Karaca	2021-01-05	7.00	Baby Sitter
2	Baby Sitter	2021-01-02	Ali Yilmaz	Murat Ozturk	2021-01-06	11.20	Baby Sitter
4	Elderly Care	2021-01-04	Mahmut Ates	Mustafa Celik	2021-01-08	9.50	Baby Sitter
5	Baby Sitter	2021-01-05	Emre Kubra	Ömer Demir	2021-02-11	6.40	Elderly Care

10. Error Handling

An error message is printed with using Try-Catch blocks when a different database name is entered. Moreover, an error message is also printed when the report cannot be created.

```

Output - QueryProgram (run) x
run:
com.mysql.jdbc.exceptions.jdbc4.MySQLSyntaxErrorException: Unknown database 'caregivin_db'
    at sun.reflect.NativeConstructorAccessorImpl.newInstance0(Native Method)
    at sun.reflect.NativeConstructorAccessorImpl.newInstance(NativeConstructorAccessorImpl.java:62)
    at sun.reflect.DelegatingConstructorAccessorImpl.newInstance(DelegatingConstructorAccessorImpl.java:45)
    at java.lang.reflect.Constructor.newInstance(Constructor.java:423)
    at com.mysql.jdbc.Util.handleNewInstance(Util.java:411)
    at com.mysql.jdbc.Util.getInstance(Util.java:386)
    at com.mysql.jdbc.SQLException.createSQLException(SQLException.java:1053)
    at com.mysql.jdbc.MysqlIO.checkErrorPacket(MysqlIO.java:4120)
    at com.mysql.jdbc.MysqlIO.checkErrorPacket(MysqlIO.java:4052)
    at com.mysql.jdbc.MysqlIO.checkErrorPacket(MysqlIO.java:525)
    at com.mysql.jdbc.MysqlIO.proceedHandshakeWithPluggableAuthentication(MysqlIO.java:1704)
    at com.mysql.jdbc.MysqlIO.doHandshake(MysqlIO.java:1250)
    at com.mysql.jdbc.ConnectionImpl.coreConnect(ConnectionImpl.java:2465)
    at com.mysql.jdbc.ConnectionImpl.connectOneTryOnly(ConnectionImpl.java:2498)
    at com.mysql.jdbc.ConnectionImpl.createNewIO(ConnectionImpl.java:2283)
    at com.mysql.jdbc.ConnectionImpl.<init>(ConnectionImpl.java:822)
    at com.mysql.jdbc.JDBC4Connection.<init>(JDBC4Connection.java:47)
    at sun.reflect.NativeConstructorAccessorImpl.newInstance0(Native Method)
    at sun.reflect.NativeConstructorAccessorImpl.newInstance(NativeConstructorAccessorImpl.java:62)

```