EXPERIMENT -3

Working with HQL - Sorting, Pagination & Aggregates

Hibernate is an Object Relational Mapping (ORM) framework that maps Java classes to database tables.
Hibernate Query Language (HQL) is similar to SQL but operates on **Java objects instead of database tables**.

HQL supports:

- **Sorting** using ORDER BY
- **Pagination** using setFirstResult() and setMaxResults()
- **Aggregate functions** such as COUNT, AVG, MAX

Database Table

Table Name: student

Field	**Type**
id	int (Primary Key)
name	varchar
marks	int

Program Code

1. Student Entity Class

```
package com.example.entity;

import jakarta.persistence.*;
```

```
@Entity
@Table(name = "student")
public class Student {
    @Id
    @GeneratedValue(strategy = GenerationType.IDENTITY)
    private int id;
    private String name;
    private int marks;
    public Student() {}
    public Student(String name, int marks) {
        this.name = name;
        this.marks = marks;
    }
    public int getId() { return id; }
    public void setId(int id) { this.id = id; }
    public String getName() { return name; }
    public void setName(String name) { this.name = name; }
    public int getMarks() { return marks; }
    public void setMarks(int marks) { this.marks = marks; }
    @Override
    public String toString() {
        return "Student{id=" + id + ", name='" + name + "', marks=" + marks + "}";
    }
}
```

2. StudentDAO Class (HQL Operations)

```
package com.example.dao;
import java.util.List;
import org.hibernate.Session;
import org.hibernate.Transaction;
import org.hibernate.query.Query;
import com.example.entity.Student;
import com.example.util.HibernateUtil;
public class StudentDAO {
    public void saveStudent(Student student) {
        Session session = HibernateUtil.getSessionFactory().openSession();
        Transaction tx = session.beginTransaction();
        session.save(student);
        tx.commit();
        session.close();
    }
    public List<Student> getStudentsSortedByMarks() {
        Session session = HibernateUtil.getSessionFactory().openSession();
        String hql = "FROM Student ORDER BY marks DESC";
        List<Student> list = session.createQuery(hql, Student.class).list();
        session.close();
        return list;
    }
    public List<Student> getStudentsWithPagination(int start,
int limit) {
        Session session =
HibernateUtil.getSessionFactory().openSession();
        Query<Student> query = session.createQuery("FROM
Student", Student.class);
        query.setFirstResult(start);
        query.setMaxResults(limit);
        List<Student> list = query.list();
        session.close();
        return list;
    }
    public long getStudentCount() {
        Session session =
HibernateUtil.getSessionFactory().openSession();
        Query<Long> query = session.createQuery(
                "SELECT COUNT(*) FROM Student", Long.class);
        long count = query.uniqueResult();
        session.close();
        return count;
    }
    public double getAverageMarks() {
        Session session =
HibernateUtil.getSessionFactory().openSession();
```

```
        Query<Double> query = session.createQuery(
                "SELECT AVG(marks) FROM Student", Double.class);
        double avg = query.uniqueResult();
        session.close();
        return avg;
    }
    public int getMaxMarks() {
        Session session = HibernateUtil.getSessionFactory().openSession();
        Query<Integer> query = session.createQuery(
                "SELECT MAX(marks) FROM Student", Integer.class);
        int max = query.uniqueResult();
        session.close();
        return max;
    }
}
```

3. Main Application Class

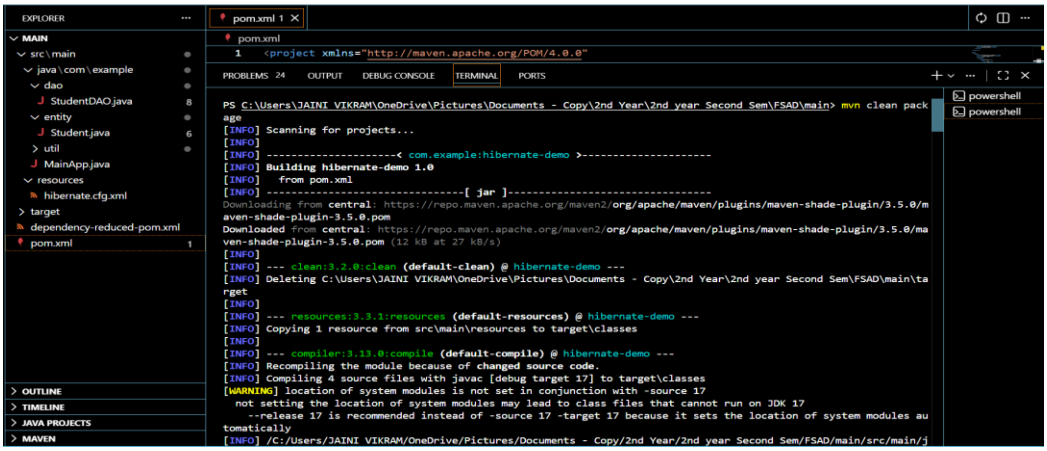
```
package com.example;
import java.util.List;
import com.example.dao.StudentDAO;
import com.example.entity.Student;
public class MainApp {
    public static void main(String[] args) {
        StudentDAO dao = new StudentDAO();
        dao.saveStudent(new Student("Karthik", 100));
        dao.saveStudent(new Student("Vikram", 85));
        dao.saveStudent(new Student("Anjali", 90));
        dao.saveStudent(new Student("Ravi", 75));
        System.out.println("Students Sorted by Marks:");
        List<Student> sorted = dao.getStudentsSortedByMarks();
        sorted.forEach(System.out::println);
        System.out.println("\nPagination (First 2 Records):");
        dao.getStudentsWithPagination(0, 2)
           .forEach(System.out::println);
        System.out.println("\nAggregate Functions:");
        System.out.println("Total Students: " +
dao.getStudentCount());
        System.out.println("Average Marks: " +
dao.getAverageMarks());
        System.out.println("Maximum Marks: " +
dao.getMaxMarks());
    }
}
```

4. Hibernate Configuration File

```
<hibernate-configuration>
    <session-factory>
        <property name="hibernate.connection.driver_class">
            com.mysql.cj.jdbc.Driver
        </property>
        <property name="hibernate.connection.url">
```

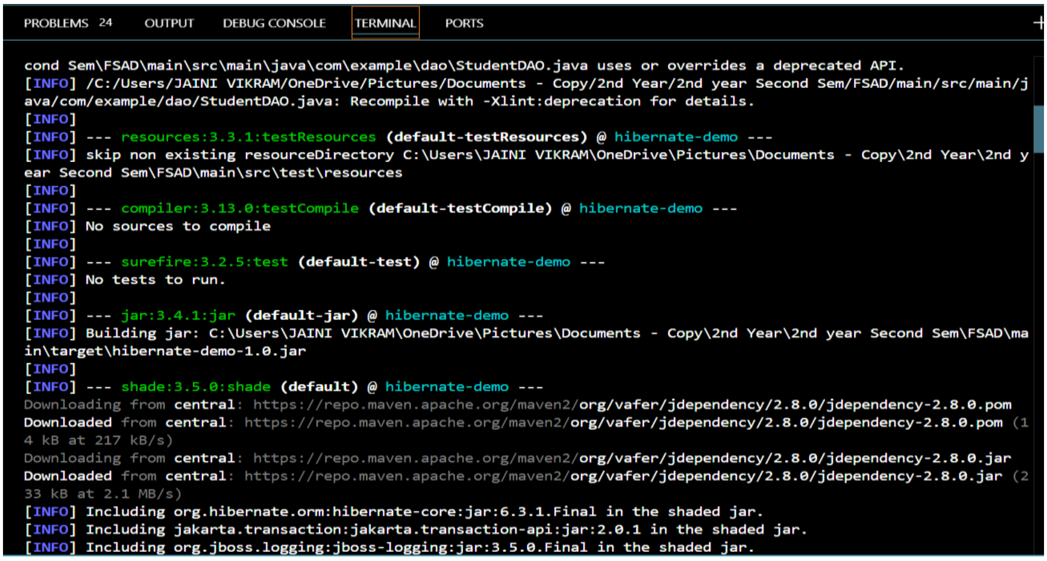
```
            jdbc:mysql://localhost:3306/experiment
        </property>
        <property
name="hibernate.connection.username">root</property>
        <property
name="hibernate.connection.password">1313</property>
        <property name="hibernate.dialect">
            org.hibernate.dialect.MySQL8Dialect
        </property>
        <property
name="hibernate.hbm2ddl.auto">create</property>
        <property name="show_sql">true</property>
        <property name="format_sql">true</property>
        <mapping class="com.example.entity.Student"/>
    </session-factory>
</hibernate-configuration>
```

OUTPUT:

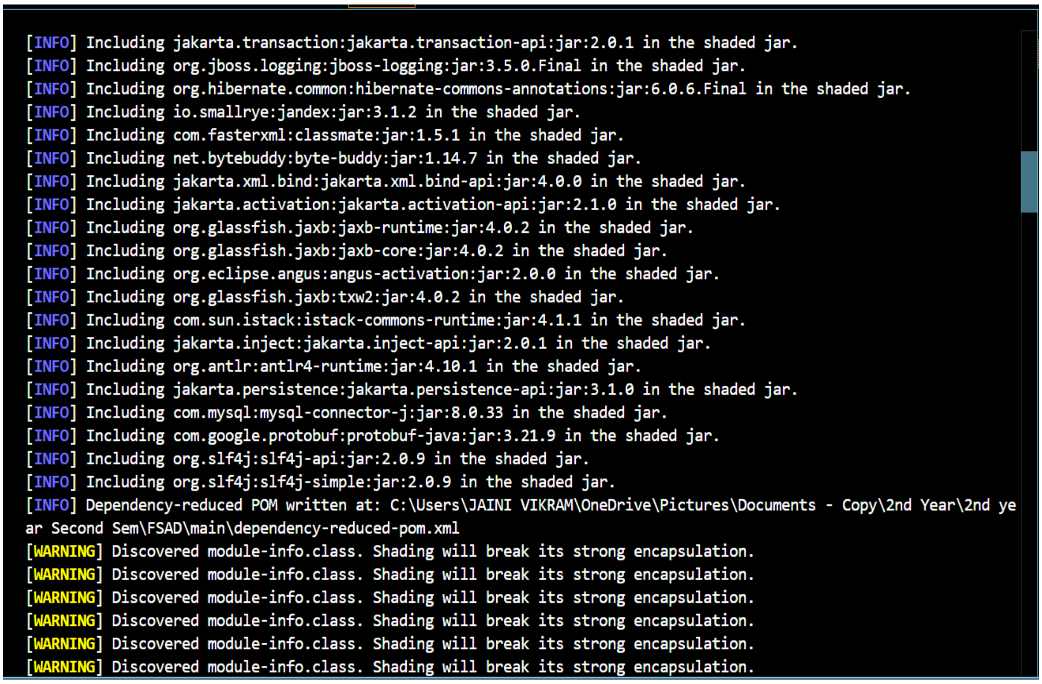


```
pom.xml
    <project xmlns="http://maven.apache.org/POM/4.0.0"
```

```
PS C:\Users\JAINI VIKRAM\OneDrive\Pictures\Documents - Copy\2nd Year\2nd year Second Sem\FSAD\main> mvn clean pack
age
[INFO] Scanning for projects...
[INFO]
[INFO] --------------------< com.example:hibernate-demo >--------------------
[INFO] Building hibernate-demo 1.0
[INFO]   from pom.xml
[INFO] --------------------------------[ jar ]--------------------------------
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-shade-plugin/3.5.0/m
aven-shade-plugin-3.5.0.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-shade-plugin/3.5.0/ma
ven-shade-plugin-3.5.0.pom (12 kB at 27 kB/s)
[INFO]
[INFO] --- clean:3.2.0:clean (default-clean) @ hibernate-demo ---
[INFO] Deleting C:\Users\JAINI VIKRAM\OneDrive\Pictures\Documents - Copy\2nd Year\2nd year Second Sem\FSAD\main\ta
rget
[INFO]
[INFO] --- resources:3.3.1:resources (default-resources) @ hibernate-demo ---
[INFO] Copying 1 resource from src\main\resources to target\classes
[INFO]
[INFO] --- compiler:3.13.0:compile (default-compile) @ hibernate-demo ---
[INFO] Recompiling the module because of changed source code.
[INFO] Compiling 4 source files with javac [debug target 17] to target\classes
[WARNING] location of system modules is not set in conjunction with -source 17
  not setting the location of system modules may lead to class files that cannot run on JDK 17
    --release 17 is recommended instead of -source 17 -target 17 because it sets the location of system modules au
tomatically
[INFO] /C:/Users/JAINI VIKRAM/OneDrive/Pictures/Documents - Copy/2nd Year/2nd year Second Sem/FSAD/main/src/main/j
```



```
cond Sem\FSAD\main\src\main\java\com\example\dao\StudentDAO.java uses or overrides a deprecated API.
[INFO] /C:/Users/JAINI VIKRAM/OneDrive/Pictures/Documents - Copy/2nd Year/2nd year Second Sem/FSAD/main/src/main/j
ava/com/example/dao/StudentDAO.java: Recompile with -Xlint:deprecation for details.
[INFO]
[INFO] --- resources:3.3.1:testResources (default-testResources) @ hibernate-demo ---
[INFO] skip non existing resourceDirectory C:\Users\JAINI VIKRAM\OneDrive\Pictures\Documents - Copy\2nd Year\2nd y
ear Second Sem\FSAD\main\src\test\resources
[INFO]
[INFO] --- compiler:3.13.0:testCompile (default-testCompile) @ hibernate-demo ---
[INFO] No sources to compile
[INFO]
[INFO] --- surefire:3.2.5:test (default-test) @ hibernate-demo ---
[INFO] No tests to run.
[INFO]
[INFO] --- jar:3.4.1:jar (default-jar) @ hibernate-demo ---
[INFO] Building jar: C:\Users\JAINI VIKRAM\OneDrive\Pictures\Documents - Copy\2nd Year\2nd year Second Sem\FSAD\ma
in\target\hibernate-demo-1.0.jar
[INFO]
[INFO] --- shade:3.5.0:shade (default) @ hibernate-demo ---
Downloading from central: https://repo.maven.apache.org/maven2/org/vafer/jdependency/2.8.0/jdependency-2.8.0.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/vafer/jdependency/2.8.0/jdependency-2.8.0.pom (1
4 kB at 217 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/vafer/jdependency/2.8.0/jdependency-2.8.0.jar
Downloaded from central: https://repo.maven.apache.org/maven2/org/vafer/jdependency/2.8.0/jdependency-2.8.0.jar (2
33 kB at 2.1 MB/s)
[INFO] Including org.hibernate.orm:hibernate-core:jar:6.3.1.Final in the shaded jar.
[INFO] Including jakarta.transaction:jakarta.transaction-api:jar:2.0.1 in the shaded jar.
[INFO] Including org.jboss.logging:jboss-logging:jar:3.5.0.Final in the shaded jar.
```



```
[INFO] Including jakarta.transaction:jakarta.transaction-api:jar:2.0.1 in the shaded jar.
[INFO] Including org.jboss.logging:jboss-logging:jar:3.5.0.Final in the shaded jar.
[INFO] Including org.hibernate.common:hibernate-commons-annotations:jar:6.0.6.Final in the shaded jar.
[INFO] Including io.smallrye:jandex:jar:3.1.2 in the shaded jar.
[INFO] Including com.fasterxml:classmate:jar:1.5.1 in the shaded jar.
[INFO] Including net.bytebuddy:byte-buddy:jar:1.14.7 in the shaded jar.
[INFO] Including jakarta.xml.bind:jakarta.xml.bind-api:jar:4.0.0 in the shaded jar.
[INFO] Including jakarta.activation:jakarta.activation-api:jar:2.1.0 in the shaded jar.
[INFO] Including org.glassfish.jaxb:jaxb-runtime:jar:4.0.2 in the shaded jar.
[INFO] Including org.glassfish.jaxb:jaxb-core:jar:4.0.2 in the shaded jar.
[INFO] Including org.eclipse.angus:angus-activation:jar:2.0.0 in the shaded jar.
[INFO] Including org.glassfish.jaxb:txw2:jar:4.0.2 in the shaded jar.
[INFO] Including com.sun.istack:istack-commons-runtime:jar:4.1.1 in the shaded jar.
[INFO] Including jakarta.inject:jakarta.inject-api:jar:2.0.1 in the shaded jar.
[INFO] Including org.antlr:antlr4-runtime:jar:4.10.1 in the shaded jar.
[INFO] Including jakarta.persistence:jakarta.persistence-api:jar:3.1.0 in the shaded jar.
[INFO] Including com.mysql:mysql-connector-j:jar:8.0.33 in the shaded jar.
[INFO] Including com.google.protobuf:protobuf-java:jar:3.21.9 in the shaded jar.
[INFO] Including org.slf4j:slf4j-api:jar:2.0.9 in the shaded jar.
[INFO] Including org.slf4j:slf4j-simple:jar:2.0.9 in the shaded jar.
[INFO] Dependency-reduced POM written at: C:\Users\JAINI VIKRAM\OneDrive\Pictures\Documents - Copy\2nd Year\2nd ye
ar Second Sem\FSAD\main\dependency-reduced-pom.xml
[WARNING] Discovered module-info.class. Shading will break its strong encapsulation.
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```
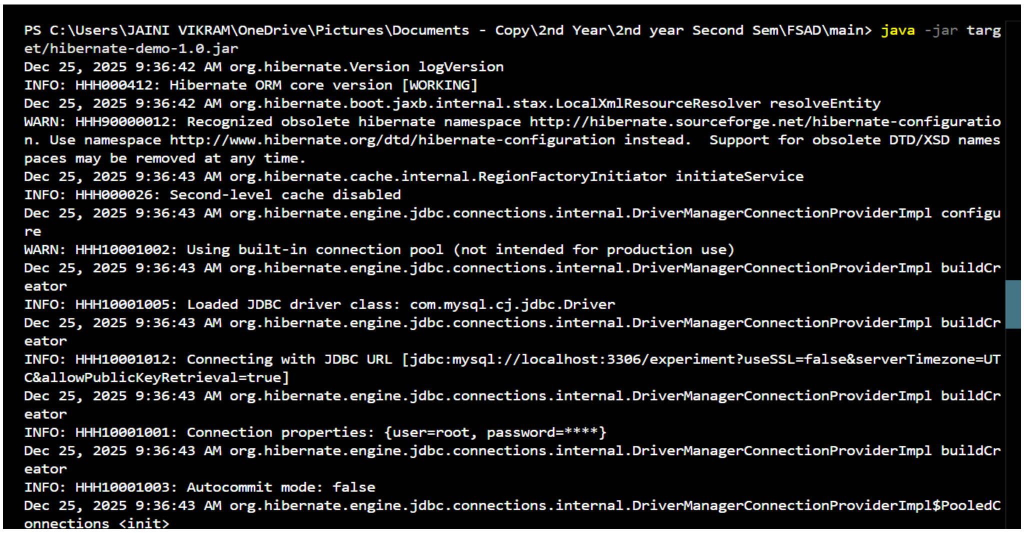
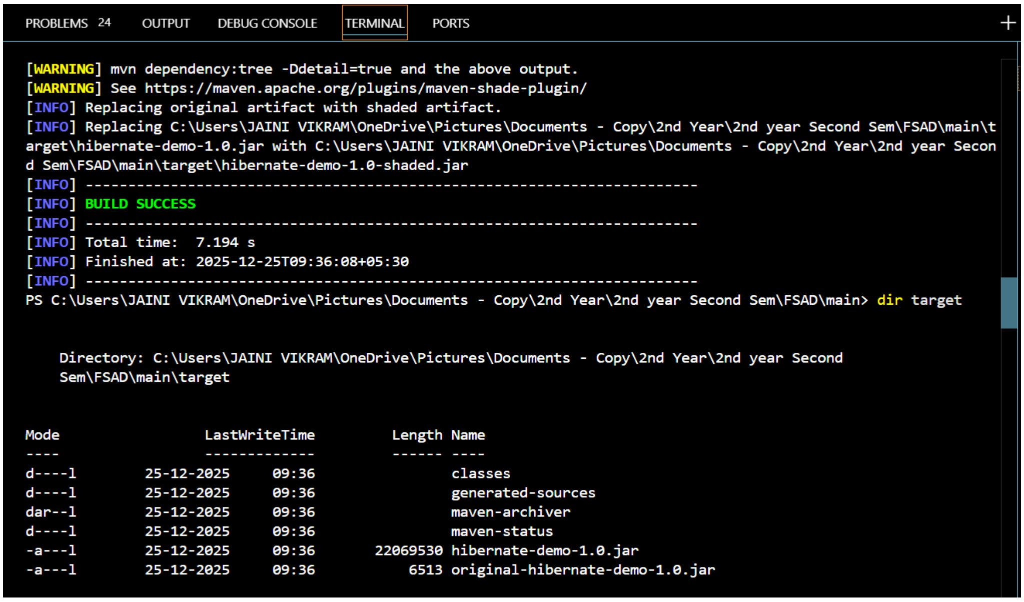
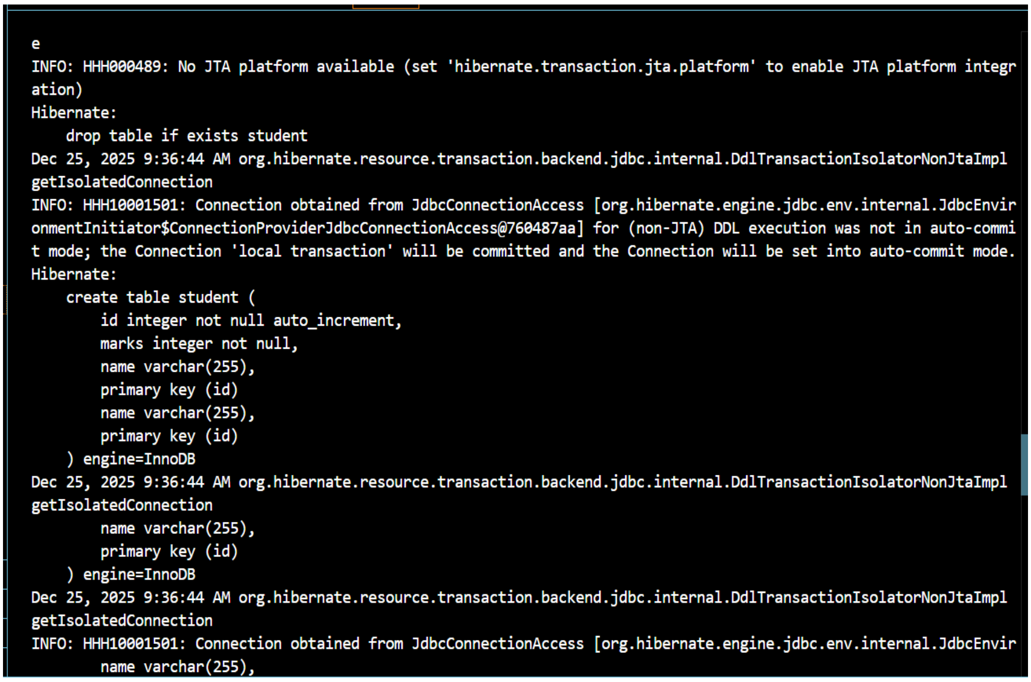



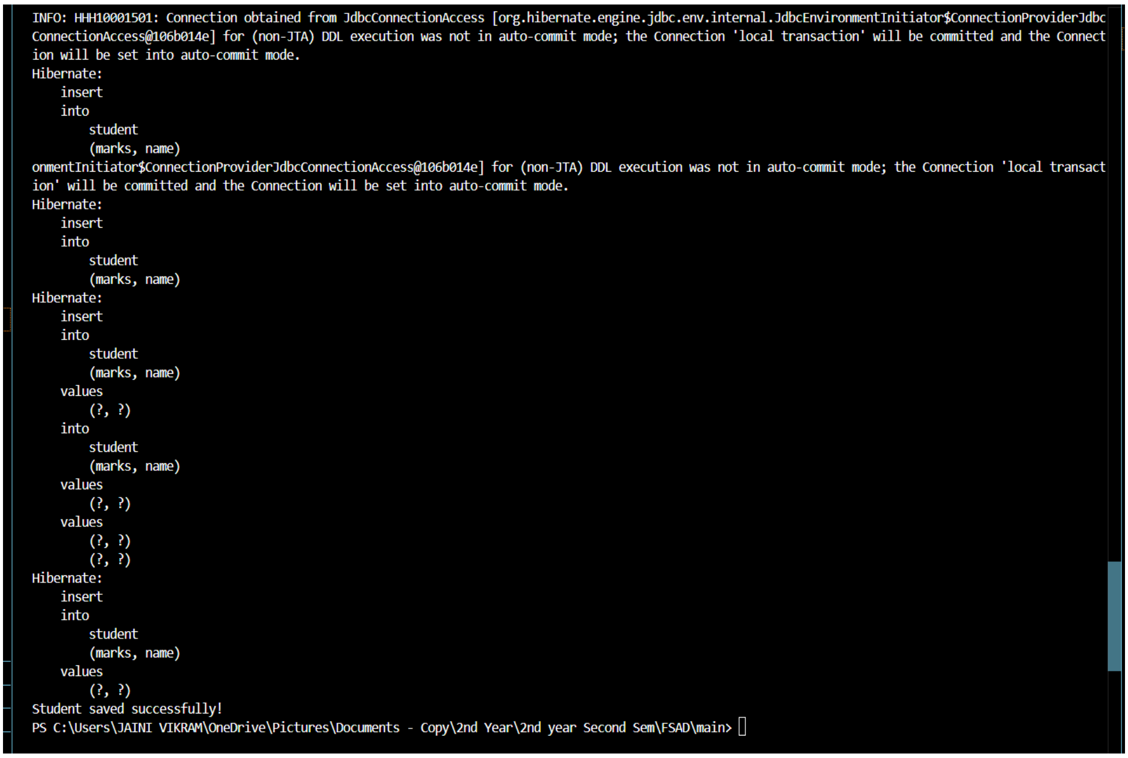
```
PS C:\Users\JAINI VIKRAM\OneDrive\Pictures\Documents - Copy\2nd Year\2nd year Second Sem\FSAD\main> java -jar targ
et/hibernate-demo-1.0.jar
Dec 25, 2025 9:36:42 AM org.hibernate.Version logVersion
INFO: HHH000412: Hibernate ORM core version [WORKING]
Dec 25, 2025 9:36:42 AM org.hibernate.boot.jaxb.internal.stax.LocalXmlResourceResolver resolveEntity
WARN: HHH90000012: Recognized obsolete hibernate namespace http://hibernate.sourceforge.net/hibernate-configuratio
n. Use namespace http://www.hibernate.org/dtd/hibernate-configuration instead.  Support for obsolete DTD/XSD names
paces may be removed at any time.
Dec 25, 2025 9:36:43 AM org.hibernate.cache.internal.RegionFactoryInitiator initiateService
INFO: HHH000026: Second-level cache disabled
Dec 25, 2025 9:36:43 AM org.hibernate.engine.jdbc.connections.internal.DriverManagerConnectionProviderImpl configu
re
WARN: HHH10001002: Using built-in connection pool (not intended for production use)
Dec 25, 2025 9:36:43 AM org.hibernate.engine.jdbc.connections.internal.DriverManagerConnectionProviderImpl buildCr
eator
INFO: HHH10001005: Loaded JDBC driver class: com.mysql.cj.jdbc.Driver
Dec 25, 2025 9:36:43 AM org.hibernate.engine.jdbc.connections.internal.DriverManagerConnectionProviderImpl buildCr
eator
INFO: HHH10001012: Connecting with JDBC URL [jdbc:mysql://localhost:3306/experiment?useSSL=false&serverTimezone=UT
C&allowPublicKeyRetrieval=true]
Dec 25, 2025 9:36:43 AM org.hibernate.engine.jdbc.connections.internal.DriverManagerConnectionProviderImpl buildCr
eator
INFO: HHH10001001: Connection properties: {user=root, password=****}
Dec 25, 2025 9:36:43 AM org.hibernate.engine.jdbc.connections.internal.DriverManagerConnectionProviderImpl buildCr
eator
INFO: HHH10001003: Autocommit mode: false
Dec 25, 2025 9:36:43 AM org.hibernate.engine.jdbc.connections.internal.DriverManagerConnectionProviderImpl$PooledC
onnections <init>
```



```
[WARNING] mvn dependency:tree -Ddetail=true and the above output.
[WARNING] See https://maven.apache.org/plugins/maven-shade-plugin/
[INFO] Replacing original artifact with shaded artifact.
[INFO] Replacing C:\Users\JAINI VIKRAM\OneDrive\Pictures\Documents - Copy\2nd Year\2nd year Second Sem\FSAD\main\t
arget\hibernate-demo-1.0.jar with C:\Users\JAINI VIKRAM\OneDrive\Pictures\Documents - Copy\2nd Year\2nd year Secon
d Sem\FSAD\main\target\hibernate-demo-1.0-shaded.jar
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  7.194 s
[INFO] Finished at: 2025-12-25T09:36:08+05:30
[INFO] ------------------------------------------------------------------------
PS C:\Users\JAINI VIKRAM\OneDrive\Pictures\Documents - Copy\2nd Year\2nd year Second Sem\FSAD\main> dir target


    Directory: C:\Users\JAINI VIKRAM\OneDrive\Pictures\Documents - Copy\2nd Year\2nd year Second
    Sem\FSAD\main\target


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
d----l        25-12-2025     09:36                classes
d----l        25-12-2025     09:36                generated-sources
dar--l        25-12-2025     09:36                maven-archiver
d----l        25-12-2025     09:36                maven-status
-a---l        25-12-2025     09:36       22069530 hibernate-demo-1.0.jar
-a---l        25-12-2025     09:36           6513 original-hibernate-demo-1.0.jar
```



```
e
INFO: HHH000489: No JTA platform available (set 'hibernate.transaction.jta.platform' to enable JTA platform integr
ation)
Hibernate:
    drop table if exists student
Dec 25, 2025 9:36:44 AM org.hibernate.resource.transaction.backend.jdbc.internal.DdlTransactionIsolatorNonJtaImpl
getIsolatedConnection
INFO: HHH10001501: Connection obtained from JdbcConnectionAccess [org.hibernate.engine.jdbc.env.internal.JdbcEnvir
onmentInitiator$ConnectionProviderJdbcConnectionAccess@760487aa] for (non-JTA) DDL execution was not in auto-commi
t mode; the Connection 'local transaction' will be committed and the Connection will be set into auto-commit mode.
Hibernate:
    create table student (
        id integer not null auto_increment,
        marks integer not null,
        name varchar(255),
        primary key (id)
        name varchar(255),
        primary key (id)
    ) engine=InnoDB
Dec 25, 2025 9:36:44 AM org.hibernate.resource.transaction.backend.jdbc.internal.DdlTransactionIsolatorNonJtaImpl
getIsolatedConnection
        name varchar(255),
        primary key (id)
    ) engine=InnoDB
Dec 25, 2025 9:36:44 AM org.hibernate.resource.transaction.backend.jdbc.internal.DdlTransactionIsolatorNonJtaImpl
getIsolatedConnection
INFO: HHH10001501: Connection obtained from JdbcConnectionAccess [org.hibernate.engine.jdbc.env.internal.JdbcEnvir
        name varchar(255),
```



```
INFO: HHH10001501: Connection obtained from JdbcConnectionAccess [org.hibernate.engine.jdbc.env.internal.JdbcEnvironmentInitiator$ConnectionProviderJdbc
ConnectionAccess@106b014e] for (non-JTA) DDL execution was not in auto-commit mode; the Connection 'local transaction' will be committed and the Connect
ion will be set into auto-commit mode.
Hibernate:
    insert
    into
        student
        (marks, name)
onmentInitiator$ConnectionProviderJdbcConnectionAccess@106b014e] for (non-JTA) DDL execution was not in auto-commit mode; the Connection 'local transact
ion' will be committed and the Connection will be set into auto-commit mode.
Hibernate:
    insert
    into
        student
        (marks, name)
Hibernate:
    insert
    into
        student
        (marks, name)
    values
        (?, ?)
    into
        student
        (marks, name)
    values
        (?, ?)
    values
        (?, ?)
        (?, ?)
Hibernate:
    insert
    into
        student
        (marks, name)
    values
        (?, ?)
Student saved successfully!
PS C:\Users\JAINI VIKRAM\OneDrive\Pictures\Documents - Copy\2nd Year\2nd year Second Sem\FSAD\main>
```