Chapter 21
Building Database Applications with JDBC

THE OCP EXAM TOPICS COVERED IN THIS PRACTICE TEST INCLUDE THE FOLLOWING:

✓ **Building Database Applications with JDBC**

- Describe the interfaces that make up the core of the JDBC API including the Driver, Connection, Statement, and ResultSet interfaces and their relationship to provider implementations

- Identify the components required to connect to a database using the DriverManager class including the JDBC URL

- Submit queries and read results from the database including creating statements, returning result sets, iterating through the results, and properly closing result sets, statements, and connections

1. How many of `Connection`, `Driver`, and `DriverManager` are JDBC interfaces included with the JDK?

   A. None

   B. One

   C. Two

   D. Three

2. Which is found in the `java.sql` package?

   A. `DerbyDriver`

   B. `MySqlDriver`

   C. `OracleDriver`

   D. None of the above

3. What must be the first characters of a database URL?

   A. `db,`

   B. `db:`

   C. `jdbc,`

   D. `jdbc:`

4. Which is responsible for getting a connection to the database?

   A. `Driver`

   B. `Connection`

   C. `Statement`

   D. `ResultSet`

5. Which most accurately fills in the blanks in this sentence? With JDBC 3.0, the driver is_____ to contain a `java.sql.Driver` file, and the code getting a `Connection` is _____ to call `Class.forName()`.

   A. allowed, allowed

   B. allowed, required

C. required, allowed

D. required, required

6. Which of these obtains a `Connection`?

    A. `Connection.getConnection(url)`

    B. `Driver.getConnection(url)`

    C. `DriverManager.getConnection(url)`

    D. `new Connection(url)`

7. Which method is overloaded to allow passing a username and password?

    A. `forName()`

    B. `getConnection()`

    C. `getStatement()`

    D. None of the above

8. What is the name of a concrete class that implements `Statement` and is included in the core JDK?

    A. `CallableStatement`

    B. `PreparedStatement`

    C. `StatementImpl`

    D. None of the above

9. How many of the following could be valid JDBC URL formats for an imaginary driver named `magic` and a database named `box`?

    I. `jdbc:magic:127.0.0.1:1234/box`

    II. `jdbc:magic:box`

    III. `jdbc:magic:@127.0.0.1:1234`

    A. None

    B. One

    C. Two

    D. Three

10. Which most accurately fills in the blanks in this sentence? With JDBC 4.0, the driver is_____ to contain a `java.sql.Driver` file, and the code getting a `Connection` is _____ to call `Class.forName()`.

   A. allowed, allowed

   B. allowed, required

   C. required, allowed

   D. required, required

11. Which pair of statements is true when requesting a `ResultSet` to be both scroll sensitive and updatable?

   I. The scroll sensitive option is passed as a parameter before the updatable parameter.

   II. The updatable option is passed as a parameter before the scroll sensitive parameter.

   III. If these options are not available, the database driver returns a `ResultSet` with different options.

   IV. If these options are not available, the database driver throws a `SQLException`.

   A. I, III

   B. I, IV

   C. II, III

   D. II, IV

12. Suppose the `blue` database exists and we are using a JDBC 4.0 driver. Which is the outcome of this code?

```
String url = "jdbc:derby:blue";
Class.forName(url);
try (Connection conn = DriverManager.getConnection(url);
    Statement stmt = conn.createStatement();
    ResultSet rs = stmt.executeQuery("select count(*) from
sky")) {
    System.out.println(rs.getInt(1));
}
```

   A. It runs successfully and prints the number of rows in the `sky`

table.

B. It throws a `ClassNotFoundException`.

C. It throws a `SQLException`.

D. It does not compile.

13. Fill in the blanks: There are _____ `ResultSet` concurrency modes, and drivers are required to support _____.

    A. two, both

    B. two, one of them

    C. three, two of them

    D. three, all of them

14. What is the output when run with a JDBC 4.0 driver if the `clowns` database exists and contains an empty `clowns` table?

```
String url = "jdbc:derby:clowns";
try (Connection conn = DriverManager.getConnection(url);
    Statement stmt = conn.createStatement();
    ResultSet rs = stmt.executeQuery("select count(*) from
clowns")) {

    System.out.println(rs.getInt(1));
}
```

    A. 0

    B. 1

    C. The code does not compile.

    D. The code compiles but throws an exception at runtime.

15. Consider the three methods `execute()`, `executeQuery()`, and `executeUpdate()`. Fill in the blanks: _____ of these methods is/are allowed to run a DELETE SQL statement while _____ of these methods is/are allowed to run an UPDATE SQL statement.

    A. One, one

    B. One, two

    C. Two, one

    D. Two, two

16. Assuming the `clowns` database exists and contains one empty table named `clowns`, what is the output of the following when run using a JDBC 4.0 driver?

```java
import java.sql.*;

public class EmptyTable {
    public static void main(String[] args) throws SQLException {  // s1
        String url = "jdbc:derby:clowns";
        try (Connection conn = new Connection(url);    // s2
            Statement stmt = conn.createStatement();
            ResultSet rs = stmt.executeQuery("select * from clowns")) {

            if (rs.next())
                System.out.println(rs.getString(1));
        }
    }
}
```

A. The code terminates successfully without any output.

B. The code does not compile due to line s1.

C. The code does not compile due to line s2.

D. None of the above

17. Which are valid `ResultSet` types?

   I. `TYPE_BACKWARD_ONLY`

   II. `TYPE_FORWARD_ONLY`

   III. `TYPE_REVERSE_ONLY`

A. II

B. I and II

C. II and III

D. None of the above

18. Given the table `books` in the figure and a `ResultSet` created by running the following SQL statement, which option prints the value `379`?

| title | num_pages |
character varying(255)	integer
OCA	379
OCP	669

```
select * from cert where title = 'OCA'
```

A. `System.out.println(rs.getInt(1));`

B. `System.out.println(rs.getInt(2));`

C. `System.out.println(rs.getInteger(1));`

D. `System.out.println(rs.getInteger(2));`

19. Given the table `books` in the previous question and a `ResultSet` created by running this SQL statement, which option prints `OCP`?

```
select title from cert where num_pages > 500
```

A. `System.out.println(rs.getString());`

B. `System.out.println(rs.getString("0"));`

C. `System.out.println(rs.getString("1"));`

D. `System.out.println(rs.getString("title"));`

20. Assume the database exists with all referenced table and column names. Which is a true statement when a JDBC 4.0 driver is used?

```
String url = "jdbc:derby:precipitation";
try (Connection conn = DriverManager.getConnection(url);
   Statement stmt = conn.createStatement(
       ResultSet.CONCUR_READ_ONLY,
       ResultSet.TYPE_SCROLL_INSENSITIVE);
   ResultSet rs = stmt.execute(      "select total from precip
where type = 'rain'")) {
   System.out.println(rs.getString("total"));
}
```

A. There is a compiler error on the line of code that creates the `Statement`.

B. There is a compiler error on the line of code that creates the `ResultSet`.

C. This code compiles and runs without error.

D. This code throws a `SQLException` at runtime.

21. Which resources have their `close()` method called when this code runs?

```
public static void runQuery(Connection conn) throws
SQLException{
   try (Statement stmt = conn.createStatement()) {
      ResultSet rs = stmt.executeQuery("select * from clowns");
      rs.next();
   }
}
```

A. No `close()` methods are called.

B. Only `Statement`

C. Only `Statement` and `Connection`

D. Only `Statement` and `ResultSet`

22. Which statement is true about the JDBC core classes?

A. `Driver` is an implementation of `DriverManager`.

B. A general `Connection` implementation is included in the JDK.

C. A `Statement` automatically starts in auto-commit mode.

D. A `ResultSet` automatically starts pointing to the first row of data.

23. Which of the following is required in a database driver implementation?

A. A file named `jdbc.driver`

B. A file named `java.sql.Driver`

C. At least one implementation of the `Connection` interface

D. None of the above

24. Given that the `people` table has 10 rows, what is the result of the following when using a driver that supports a scroll sensitive `ResultSet`?

```
try (Connection conn = DriverManager.getConnection(url);
   Statement stmt = conn.createStatement(
      ResultSet.TYPE_SCROLL_SENSITIVE,
```

```
ResultSet.CONCUR_READ_ONLY);
    ResultSet rs = stmt.executeQuery("select count(*) from
people")) {
    rs.next();
    rs.absolute(0);                        // q1
    System.out.print(rs.getInt(1));    // q2
}
```

   A. 10

   B. The code does not compile.

   C. Line q1 throws a SQLException.

   D. Line q2 throws a SQLException.

25. Given a scrollable updatable ResultSet that contains the following, what does the code snippet output?

color character varying(255)	count integer
black	20
blue	5
red	0

```
rs = stmt.executeQuery("select * from pens");
rs.afterLast();
rs.previous();
rs.updateInt(2, 10);
rs.updateRow();
rs = stmt.executeQuery("select * from pens where color =
'red'");
while (rs.next())
    System.out.println(rs.getInt(2));
```

   A. 0

   B. 10

   C. The code does not compile.

   D. The code compiles but throws an exception at runtime.

26. Given a scrollable updatable ResultSet represented by the image in the previous question, what does the code snippet output?

```
rs = stmt.executeQuery("select * from pens");
```

```
rs.afterLast();
while(rs.prev())
   rs.updateInt(2,0);
rs = stmt.executeQuery("select * from pens where color =
'black'");
while (rs.next())
   System.out.println(rs.getInt(2));
```

A. 0

B. 20

C. The code does not compile.

D. The code compiles but throws an exception at runtime.

27. How many rows are added to the `colors` table from running the following?

```
try (Connection conn = DriverManager.getConnection(url);
   Statement stmt = conn.createStatement()) {

   conn.setAutoCommit(false);
   stmt.executeUpdate("insert into colors values ('red')");
   stmt.executeUpdate("insert into colors values ('blue')");
   conn.commit();
   conn.setAutoCommit(true);
   stmt.executeUpdate("insert into colors values ('green')");
}
```

A. None

B. One

C. Two

D. Three

28. Which is true if the `clowns` database exists and contains an empty `clowns` table?

```
String url = "jdbc:derby:clowns";
try (Connection conn = DriverManager.getConnection(url);
    Statement stmt = conn.createStatement();
    ResultSet rs = stmt.executeQuery("select count(*) from
clowns")) {

    rs.next();    // r1
    System.out.println(rs.getInt(1));    // r2
```

```
}
```

A. The code compiles and runs without error.

B. The code does not compile.

C. The code compiles but throws an exception at runtime on line r1.

D. The code compiles but throws an exception at runtime on line r2.

29. Suppose the `ResultSet` is scrollable and contains 10 rows with the values 1–10 respectively. What is the output of the following?

```
5:   rs.absolute(0);
6:   rs.relative(5);
7:   rs.relative(-10);
8:   rs.relative(5);
9:   System.out.print(rs.getInt(1));
```

A. 4

B. 5

C. The code does not compile.

D. The code compiles but throws an exception at runtime.

30. Suppose the `blue` database does not exist and we are using a JDBC 4.0 driver. Which is the outcome of this code?

```
String url = "jdbc:derby:blue";
try (Connection conn = DriverManager.getConnection(url);
   Statement stmt = conn.createStatement();
   ResultSet rs = stmt.executeQuery("select count(*) from
sky")) {
   System.out.println(rs.getInt(1));
}
```

A. It runs successfully and prints the number of rows in the `sky` table.

B. It throws a `ClassNotFoundException`.

C. It throws a `SQLException`.

D. It does not compile.

31. What is the most likely outcome of this code if the `people` table is

empty?

```
6:   Statement stmt = conn.createStatement();
7:   ResultSet rs1 = stmt.executeQuery("select * from people");
8:   ResultSet rs2 = stmt.executeQuery("select * from people");
9:   System.out.println(rs1.next() + " " + rs2.next());
```

A. It prints `false false`.

B. It prints `true false`.

C. It does not terminate.

D. It throws a `SQLException`.

32. How many rows are added to the `colors` table from running the following?

```
try (Connection conn = DriverManager.getConnection(url);
   Statement stmt = conn.createStatement()) {

   conn.setAutoCommit(false);
   stmt.executeUpdate("insert into colors values ('red')");
   stmt.executeUpdate("insert into colors values ('blue')");
   conn.rollback();
   conn.setAutoCommit(true);
   stmt.executeUpdate("insert into colors values ('green')");
}
```

A. None

B. One

C. Two

D. Three

33. Assuming the `clowns` database exists and contains one empty table named `clowns`, what is the output of the following when run using a JDBC 4.0 driver?

```
import java.sql.*;

public class EmptyTable {
   public static void main (String[] args) throws SQLException
{  // s1
      String url = "jdbc:derby:clowns";
      try (Connection conn = DriverManager.getConnection(url);
// s2
         Statement stmt = conn.createStatement();
```

```
        ResultSet rs = stmt.executeQuery("select * from
clowns")) {

        if (rs.next())
            System.out.println(rs.getString(1));
      }
    }
}
```

A. The code terminates successfully without any output.

B. The code does not compile due to line s1.

C. The code does not compile due to line s2.

D. None of the above

34. Given the following code snippet and the table below, what is the output of the following when using a driver that supports a scroll sensitive ResultSet?

```
try (Connection conn = DriverManager.getConnection(url);
    Statement stmt = conn.createStatement(
        ResultSet.TYPE_SCROLL_SENSITIVE,
ResultSet.CONCUR_READ_ONLY);
    ResultSet rs = stmt.executeQuery(        "select * from
people order by last_name asc")) {

    rs.afterLast();
    rs.next();
    rs.next();
    rs.previous();
    rs.previous();
    System.out.println(rs.getString(1));
}
```

first_name character varying(255)	last_name character varying(255)
Jeanne	Boyarsky
Janeice	DelVecchio
Elena	Felder
Scott	Selikoff

A. Janeice

B. Elena

C. Scott

D. The code throws a `SQLException` at runtime.

35. Given the following code snippet and the table in question 34, what is the output of the following when using a driver that supports a scroll sensitive `ResultSet`?

```
try (Connection conn = DriverManager.getConnection(url);
   Statement stmt = conn.createStatement(
      ResultSet.TYPE_SCROLL_SENSITIVE,
ResultSet.CONCUR_READ_ONLY);
   ResultSet rs = stmt.executeQuery(      "select * from people
order by last_name asc")) {

   rs.absolute(-1);
   System.out.print(rs.getString(1));
   System.out.print(" ");
   rs.absolute(1);
   System.out.print(rs.getString(1));
}
```

A. Jeanne Scott

B. Scott Jeanne

C. The code compiles, but the output is neither of these.

D. The code throws a `SQLException` at runtime.

36. Given the following code snippet and the table in question 34, what is the output of the following?

```
try (Connection conn = DriverManager.getConnection(url);
   Statement stmt = conn.createStatement();
   ResultSet rs = stmt.executeQuery(      "select * from
people order by last_name asc")) {
   rs.next();
   rs.next();
   System.out.print(rs.getString(1));
   System.out.print(" ");
   rs.absolute(1);
   System.out.print(rs.getString(1));
}
```

A. Jeanne Scott

B. Scott Jeanne

C. The code compiles, but the output is neither of these.

D. The code throws a `SQLException` at runtime.

37. Given that the `people` table has 10 rows, what is the result of the following when using a driver that supports a scroll sensitive `Resultset`?

```
String sql = "select count(*) from people";
try (Connection conn = DriverManager.getConnection(url);
   Statement stmt = conn.createStatement();
   ResultSet rs = stmt.executeQuery(sql,
      ResultSet.TYPE_SCROLL_SENSITIVE,
ResultSet.CONCUR_READ_ONLY)) {
   rs.next();
   rs.absolute(0);                          // q1
   System.out.print(rs.getInt(1));    // q2
}
```

  A. `10`

  B. The code does not compile.

  C. Line `q1` throws a `SQLException`.

  D. Line `q2` throws a `SQLException`.

38. How many rows are added to the `colors` table from running the following?

```
try (Connection conn = DriverManager.getConnection(url);
   Statement stmt = conn.createStatement()) {
   conn.setAutoCommit(false);
   stmt.executeUpdate("insert into colors values ('red')");
   stmt.executeUpdate("insert into colors values ('blue')");
   conn.rollback();
   conn.setAutoCommit(true);
   stmt.executeUpdate("insert into colors values ('green')");
   conn.rollback();
}
```

  A. None

  B. One

  C. Two

  D. Three

39. Suppose the `ResultSet` is scrollable and contains 10 rows. How many times does the following print `true`?

```
16:   System.out.println(rs.absolute(-2));
17:   System.out.println(rs.relative(-1));
18:   System.out.println(rs.beforeFirst());
19:   System.out.println(rs.relative(5));
```

A. Two

B. Three

C. Four

D. None of the above

40. What is the correct order to close database resources?

   A. `Connection` then `Statement` then `ResultSet`

   B. `ResultSet` then `Statement` then `Connection`

   C. `Statement` then `Connection` then `ResultSet`

   D. `Statement` then `ResultSet` then `Connection`