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?

   1. None
   2. One
   3. Two
   4. Three

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

   1. `DerbyDriver`
   2. `MySqlDriver`
   3. `OracleDriver`
   4. None of the above

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

   1. `db,`
   2. `db:`
   3. `jdbc,`
   4. `jdbc:`

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

   1. `Driver`
   2. `Connection`
   3. `Statement`
   4. `ResultSet`

and the code getting a `Connection` is _____ to call `Class.forName()`.

1. allowed, allowed
2. allowed, required
3. required, allowed
4. required, required

6. Which of these obtains a `Connection`?

1. `Connection.getConnection(url)`
2. `Driver.getConnection(url)`
3. `DriverManager.getConnection(url)`
4. `new Connection(url)`

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

1. `forName()`
2. `getConnection()`
3. `getStatement()`
4. None of the above

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

1. `CallableStatement`
2. `PreparedStatement`
3. `StatementImpl`
4. 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`?

1. `jdbc:magic:127.0.0.1:1234/box`
2. `jdbc:magic:box`
3. `jdbc:magic:@127.0.0.1:1234`

1. None
2. One
3. Two
4. 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()`.

1. allowed, allowed
2. allowed, required
3. required, allowed
4. required, required

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

1. The scroll sensitive option is passed as a parameter before the updatable parameter.
2. The updatable option is passed as a parameter before the scroll sensitive parameter.
3. If these options are not available, the database driver returns a `ResultSet` with different options.
4. If these options are not available, the database driver throws a `SQLException`.

1. I, III

2. I, IV
3. II, III
4. 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));
}
```

1. It runs successfully and prints the number of rows in the `sky` table.
2. It throws a `ClassNotFoundException`.
3. It throws a `SQLException`.
4. It does not compile.

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

1. two, both
2. two, one of them
3. three, two of them
4. 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));
}
```

1. `0`
2. `1`
3. The code does not compile.
4. 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.

1. One, one
2. One, two
3. Two, one
4. 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?

```
import java.sql.*;

public class EmptyTable {
   public static void main(String[] args) throws SQLException {  //
      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));
      }
```

```
    }
}
```

1. The code terminates successfully without any output.
2. The code does not compile due to line `s1`.
3. The code does not compile due to line `s2`.
4. None of the above

17. Which are valid `ResultSet` types?

1. `TYPE_BACKWARD_ONLY`
2. `TYPE_FORWARD_ONLY`
3. `TYPE_REVERSE_ONLY`

1. II
2. I and II
3. II and III
4. 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 character varying(255)	num_pages integer
OCA	379
OCP	669

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

1. `System.out.println(rs.getInt(1));`
2. `System.out.println(rs.getInt(2));`
3. `System.out.println(rs.getInteger(1));`
4. `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
```

1. `System.out.println(rs.getString());`
2. `System.out.println(rs.getString("0"));`
3. `System.out.println(rs.getString("1"));`
4. `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 whe
   System.out.println(rs.getString("total"));
}
```

1. There is a compiler error on the line of code that creates the `Statement`.
2. There is a compiler error on the line of code that creates the `ResultSet`.

3. This code compiles and runs without error.
4. 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();
   }
}
```

1. No `close()` methods are called.
2. Only `Statement`
3. Only `Statement` and `Connection`
4. Only `Statement` and `ResultSet`

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

1. `Driver` is an implementation of `DriverManager`.
2. A general `Connection` implementation is included in the JDK.
3. A `Statement` automatically starts in auto-commit mode.
4. A `ResultSet` automatically starts pointing to the first row of data.

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

1. A file named `jdbc.driver`
2. A file named `java.sql.Driver`
3. At least one implementation of the `Connection` interface
4. 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
}
```

1. `10`
2. The code does not compile.
3. Line `q1` throws a `SQLException`.
4. 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));
```

1. `0`
2. `10`
3. The code does not compile.
4. 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));
```

1. `0`
2. `20`
3. The code does not compile.
4. 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')");
}
```

1. None
2. One
3. Two
4. 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
}
```

1. The code compiles and runs without error.
2. The code does not compile.
3. The code compiles but throws an exception at runtime on line `r1`.
4. 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));
```

1. 4
2. 5
3. The code does not compile.
4. 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));
}
```

1. It runs successfully and prints the number of rows in the `sky` table.
2. It throws a `ClassNotFoundException`.
3. It throws a `SQLException`.
4. 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());
```

1. It prints `false false`.
2. It prints `true false`.
3. It does not terminate.
4. 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')");
}
```

1. None
2. One
3. Two
4. 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 {  /
      String url = "jdbc:derby:clowns";
      try (Connection conn = DriverManager.getConnection(url);   //
         Statement stmt = conn.createStatement();
         ResultSet rs = stmt.executeQuery("select * from clowns")) {

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

1. The code terminates successfully without any output.

2. The code does not compile due to line `s1`.
3. The code does not compile due to line `s2`.
4. 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 or

   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

1. `Janeice`
2. `Elena`
3. `Scott`
4. 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 ord

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

1. `Jeanne Scott`
2. `Scott Jeanne`
3. The code compiles, but the output is neither of these.
4. 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 or
   rs.next();
   rs.next();
   System.out.print(rs.getString(1));
   System.out.print(" ");
   rs.absolute(1);
   System.out.print(rs.getString(1));
}
```

1. `Jeanne Scott`
2. `Scott Jeanne`

3. The code compiles, but the output is neither of these.
4. 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
}
```

1. `10`
2. The code does not compile.
3. Line `q1` throws a `SQLException`.
4. 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();
}
```

1. None
2. One
3. Two
4. 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));
```

1. Two
2. Three
3. Four
4. None of the above

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

1. `Connection` then `Statement` then `ResultSet`
2. `ResultSet` then `Statement` then `Connection`
3. `Statement` then `Connection` then `ResultSet`
4. `Statement` then `ResultSet` then `Connection`

PREV
Chapter 20 Java Concurrency

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