UNIVERSITATEA DIN BUCUREȘTI

VIRTUTE ET SAPIENTIA

WEB TECHNOLOGIES USING JAVA

COURSE 8 – JDBC

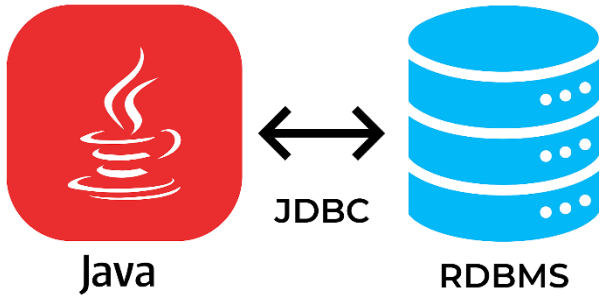
AGENDA

- JDBC OVERVIEW
- JDBC ARCHITECTURE
- CONNECTING TO A DATABASE
- WORKING WITH QUERIES
- CLOSING DATABASE RESOURCES
- JDBCTEMPLATE

JDBC OVERVIEW

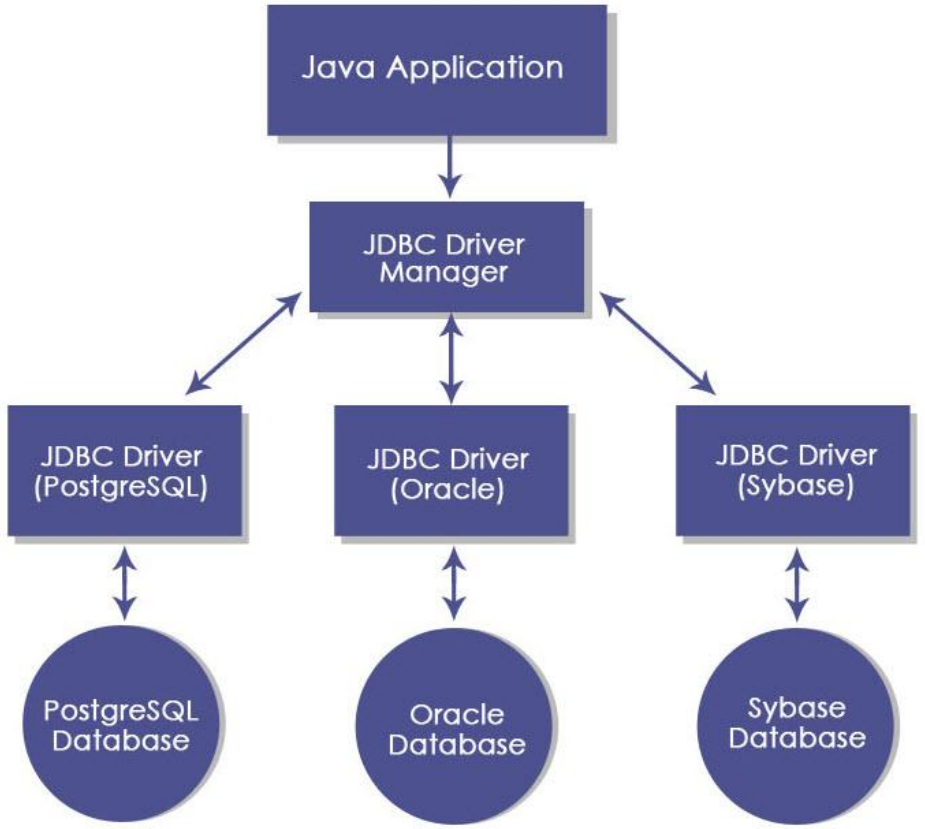
- There are two main ways to access a relational database from Java:
  - Java Database Connectivity Language (JDBC): accesses data as rows and columns
  - Java Persistence API (JPA): accesses data through Java objects using a concept called object-relational mapping (ORM)

- JDBC allows you to construct SQL statements and embed them inside Java API calls



JDBC ARCHITECTURE

- JDBC API provides a shared language through which Java applications can talk to database engines
- JDBC driver is the set of classes that implement the JDBC interfaces for a particular database engine



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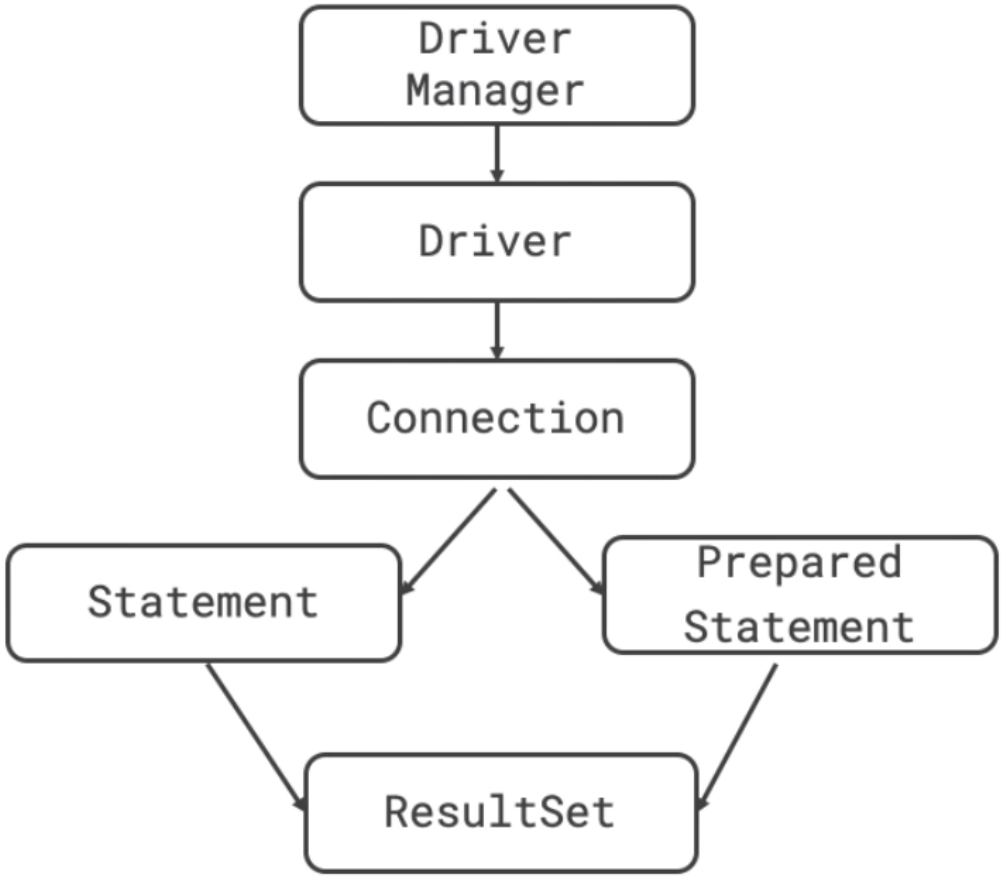
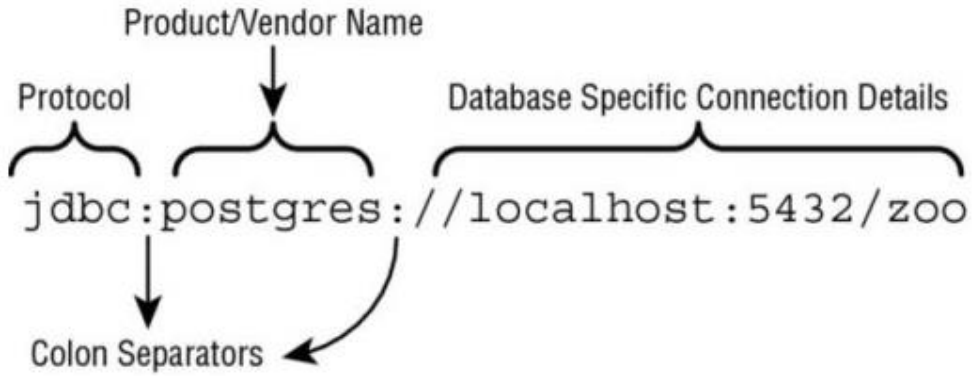
JDBC ARCHITECTURE

- JDBC interfaces (contracts):
  - Driver: establishes a connection to the database
  - Connection: sends commands to a database
  - Statement: executes a SQL query
  - PreparedStatement: executes a SQL query
  - CallableStatement: executes commands stored in the database
  - ResultSet: reads results of a query
- All database interfaces are in the package java.sql



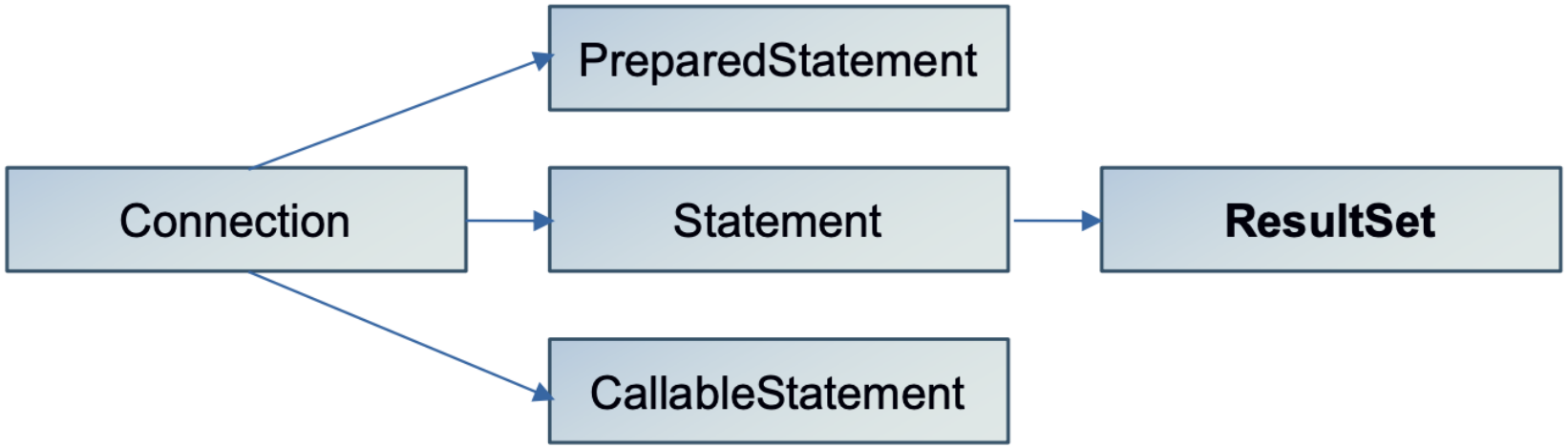
CONNECTING TO A DATABASE

- steps needed in order to establish a connection to a database:
  1. define the JDBC url
  2. create a Connection based on DriverManager or DataSource
- in SpringBoot applications, the configuration of a DataSource can be done:
  - using a DataSource bean
  - using certain properties in application.properties (recommended)



NOTE: A DataSource has more features than DriverManager (it can pool connections or store the database connection information outside the application)

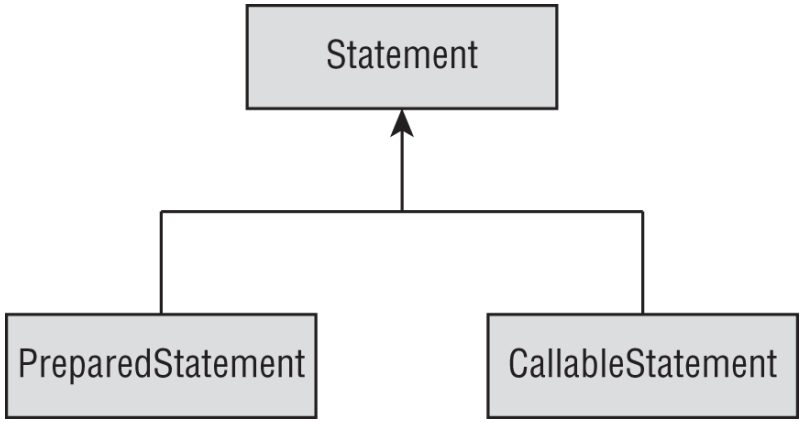
WORKING WITH QUERIES



WORKING WITH QUERIES

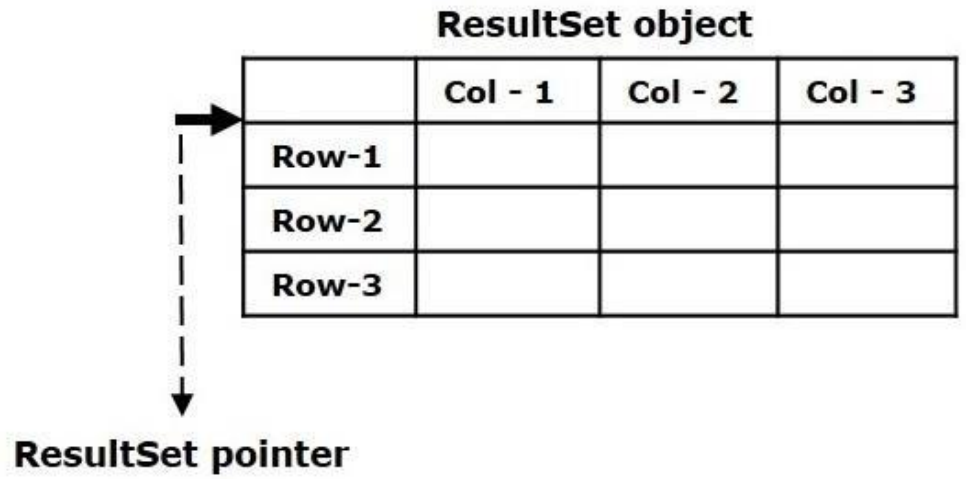
- Statement or PreparedStatement: used to run queries
- CallableStatement: used to run stored procedures

- recommendation is to use PreparedStatement:
  - performance: it figures out a plan to run the SQL well and remembers it
  - security: protects against an attack called SQL injection
  - readability: no need to use string concatenation in building a query string with lots of parameters
- PreparedStatement uses parameter binding:
  - through parameter position (index)
  - through parameter name



WORKING WITH QUERIES

- ResultSet: provides a collection with all records retrieved from a select query on the database
- You can use a loop to iterate through all records
- You can access values using the index or the column name



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CLOSING DATABASE RESOURCES

- JDBC resources are expensive to create. Not closing them creates a resource leak that will eventually slow down your program
- resources must be closed in the right order, to avoid resource leaks and exceptions
- closing a JDBC resource should close any resources that it created:
  - closing a Connection also closes PreparedStatement / CallableStatement and ResultSet
  - closing a PreparedStatement / CallableStatement also closes the ResultSet

JDBCTEMPLATE

- Spring support for working with JDBC
- Used for creating connections, executing queries and retrieving results

BIBLIOGRAPHY

- Spring in Action, by Craig Walls
- Spring REST, by Balaji Varanasi, Sudha Belida
- Database Programming with JDBC and Java, George Reese

Q&A

THANK YOU

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