

CmpE 473

Internet Programming

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Chapter 3

JDBC

JDBC (1)

- **Java DataBase Connectivity**
 - Access to data in relational databases or spreadsheet
- **Packages**
 - java.sql: Access to DB
 - javax.sql: Also, server side capabilities
- **Need a driver between JDBC and the DB**
 - Existing JDBC-ODBC bridge
- **Open source DBMS: MySql**

JDBC (2)

- **Establish a connection with the DBMS**
 - `Class.forName("sun.jdbc.odbc.JdbcOdbcDriver");`
 - Loads the jdbc-odbc bridge driver
- **Connect with the driver**
 - String url = "jdbc:odbc:dbname"
 - Connection con = DriverManager.getConnection(url, "pyolum", "pass");
- **URL always starts with jdbc:**
- **Followed by the subprotocol name:**
- **The rest depends on where the database is**
 - Ex: `jdbc:z1MySQL://luna.oit.unc.edu/CES`
- **con: open connection to make SQL statements**

JDBC (3)

- General rule for executing SQL statement
 - Write the SQL query
 - Convert it into a string
 - Create a statement object
 - Call `Statement.executeUpdate` with the string for UPDATE and CREATE queries OR
 - Call `Statement.executeQuery` with the string for SELECT queries
- Use `java.sql.Types` for datatypes in SQL queries

Example (1)

- CREATE TABLE COFFEES
(COF_NAME VARCHAR(32),
SUP_ID INTEGER,
PRICE FLOAT,
SALES INTEGER,
TOTAL INTEGER)
- String createTableCoffees =
"CREATE TABLE COFFEES " +
"(COF_NAME VARCHAR(32), SUP_ID INTEGER, PRICE
FLOAT, " +
"SALES INTEGER, TOTAL INTEGER)";
- Statement stmt = con.createStatement();
- stmt.executeUpdate(createTableCoffees);

Example (2)

- ResultSet object keeps a set of rows of data
- Use `.next` to move through a ResultSet

```
ResultSet rs = stmt.executeQuery( "SELECT COF_NAME,  
PRICE FROM COFFEES");
```
- To retrieve data, use a `getDataType` method that matches the entry

```
String query = "SELECT COF_NAME, PRICE FROM COFFEES";  
ResultSet rs = stmt.executeQuery(query);  
while (rs.next()) {  
    String s = rs.getString("COF_NAME"); //Note conversion to string  
    float n = rs.getFloat("PRICE"); //Note conversion to Java float  
    System.out.println(s + " " + n);  
}
```
- Watch out for type conversions.
 - Ex: You can use `getBytes` to retrieve a float!

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Example (3)

- Alternative SELECT (with column numbers)

```
ResultSet rs = stmt.executeQuery(query);  
while (rs.next()) {  
    String s = rs.getString(1);  
    int n = rs.getInt(2);  
    System.out.println(n + " pounds of " + s + " sold to date.");  
}
```
- Update table

```
String updateString = "UPDATE COFFEES " +  
    "SET SALES = 75 " +  
    "WHERE COF_NAME LIKE 'Colombian'";
```
- `stmt.executeUpdate(updateString);`

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Prepared Statement

- Prepared Statement
 - Fix the SQL query when creating the statement
 - SQL will be precompiled by the DBMS
 - Speed things up
- PreparedStatement updateSales =
con.prepareStatement("UPDATE
COFFEES SET SALES = ? WHERE
COF_NAME LIKE ?");
- updateSales.setInt(1, 75)
- updateSales.setString(2, "Colombian")
- updateSales.executeUpdate():

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Join

- Consult two tables to get the results

```
String query = " SELECT COFFEES.COF_NAME " +  
"FROM COFFEES, SUPPLIERS " +  
"WHERE SUPPLIERS.SUP_NAME LIKE 'Acme, Inc.' " +  
"and SUPPLIERS.SUP_ID = COFFEES.SUP_ID";
```

```
ResultSet rs = stmt.executeQuery(query);  
System.out.println("Coffees bought from Acme, Inc.: ");
```

```
while (rs.next()) {  
    String coffeeName = rs.getString("COF_NAME");  
    System.out.println(" " + coffeeName);  
}
```

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Transactions

- Group statements to be committed at once

```
con.setAutoCommit(false);
PreparedStatement updateSales = con.prepareStatement( "UPDATE COFFEES
    SET SALES = ? WHERE COF_NAME LIKE ?");
updateSales.setInt(1, 50);
updateSales.setString(2, "Colombian");
updateSales.executeUpdate();

PreparedStatement updateTotal = con.prepareStatement( "UPDATE COFFEES
    SET TOTAL = TOTAL + ? WHERE COF_NAME LIKE ?");
updateTotal.setInt(1, 50);
updateTotal.setString(2, "Colombian");
updateTotal.executeUpdate();
con.commit();
con.setAutoCommit(true);
```