Core Java

17. Database Programming with JDBC
Database

- Traditionally referring to relational databases
- VS Flat Files: concurrency, reliability, scalability, accessibility and availability
- A variety of Databases: Oracle, Microsoft SQL Server, Sybase, IBM DB2, MySQL, PostgreSQL
- Uses a table (relational model)
Table

- Tables refer to entities as well as relations
- Columns are attributes
- Rows are instances
- Joining relation tables to make sense
- Types and Constraints on attributes
- Constraints on instances
- Structured Query Language: Declarative
SQL

• SQL is a functional, declarative programming language

• Tells database to select some data from it, or update/insert/delete new data into it

• Used extensively in JDBC, as opposed to keying in objects (Berkeley DB Java Edition, Persistence APIs like JPA)

• Makes it simpler for the programmer if he knows the database
JDBC

• Java Database Connectivity
• Separates Interface (Vendor-neutral) from the underlying Implementation
• Version 4.0 (backward compatible)
• JDBC drivers are the underlying implementations
• They all use `DriverManager.registerDriver()` in static blocks to register themselves
Basic Steps

- Register driver with `Class.forName()`
- Each driver tells the `DriverManager` if it can service a particular type of URL or not
- Create a `Connection` object with a URL and appropriate `Properties`
- Create a `Statement/PreparedStatement/CallableStatement`
- Execute: `getUpdateCount()` or `ResultSet`
ResultSet

- Cursor pointing to a particular row
- Can sometimes only go `next()`
- Updatable, very useful
- Can get meta-information with `ResultSetMetaData`
- Primarily for select statements; Usually used iterate over the `ResultSet`
Connection Pooling

- *Connections* need to be pooled for high availability
- Time involved in having to use `DriverManager.getConnection` everytime
- Control over number of *Connection* objects
- Use *DataSource* provided with server or application
- References should be `null`-cleaned properly
Embedded JDBC

- How to ship applications with a mini-database
- Example: A Contact Book application
- Embedded databases: Only limited accessibility and availability
- Derby (Cloudscape), HSQLDB
- Written in Java, very portable, free!
- A galore of features, tiny footprint
Demonstration

• Compile and Execute a few programs
Questions?