

Applets, RMI, JDBC Exam Review

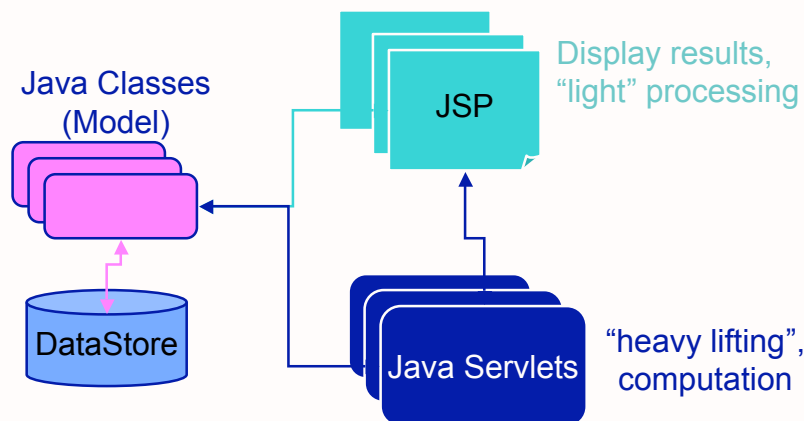
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Announcements

- Quiz today
- Project 2 due tomorrow
- Exam on Thursday

- Web programming
 - CPM and servlets vs JSPs

Division of Labor



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Web App Programming Error

UNIVERSITY OF
DELAWARE

Course Descriptions



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Year:	2005 - 2006
College:	College of Arts and Sciences (AS)
Department:	Computer/Information Sciences (CISC)
Course Number:	CISC481
Course Title:	Artificial Intelligence
Credit Hours:	3 Hrs
Course Description:	Programming techniques for problems not amenable to algorithmic solutions. Problem formulation, search strategies, state spaces, applications of logic, knowledge representation, planning and application areas. May be cross-listed with CGSC481.
	Information valid for courses offered 2005 through 2006.
Prerequisites:	CISC280 and CISC301.
About this Section:	Credit cannot be received for both CISC481 and CISC681.
Current Sections:	View available sections of CISC481

Why do I think this web application is written in Java?

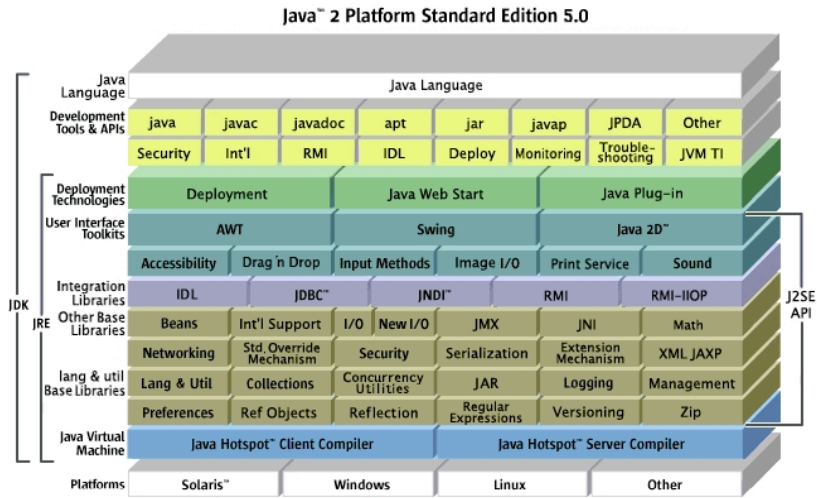
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J2SE

- Remember from the first class?

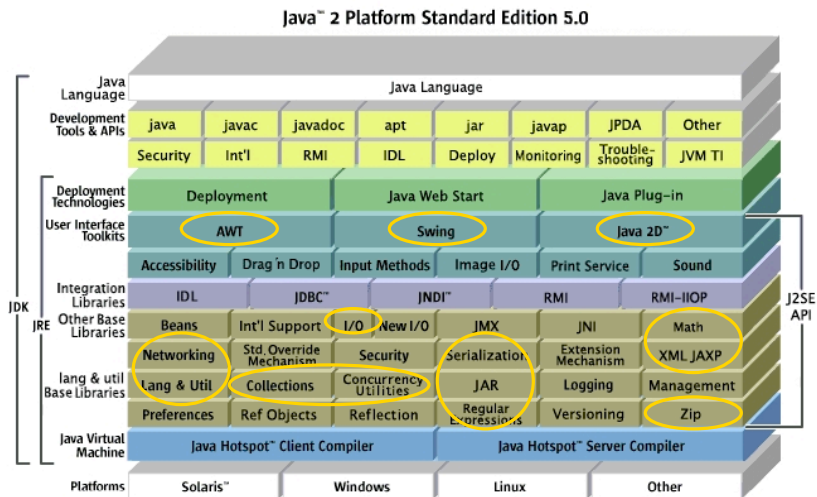


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What We Have Done



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Applets

- Like servlets, but on the client-side (“application-side”)
- Deployed on the web
 - Pulls code down from the server on to your machine
 - Can be slow
 - Can be displayed in an HTML page, embedded in `<applet>` tags
 - Used to provide functions in a web page that require more interactivity or animation than HTML
 - graphical game, complex editing, or interactive data visualization
 - Issues with different web browsers

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Applets

- Way cool for specific uses
 - Graphics/animation on the web
- Security issues, running someone else’s code on your machine?
 - Run in an “sandbox”
 - Sun’s FAQ: <http://java.sun.com/sfaq/>
- Example applets online
 - <http://www.anfyteam.com/anj/index.html>
 - <http://www.aharef.info/static/htmlgraph/>
 - Do a search for your own!
- [Java Web Start](#) - deploy applications

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Creating applets

- Create applets by extending
 - `java.awt.Applet` class or
 - `java.swing.JApplet` is subclass of `java.awt.Applet`
 - Subclass of `Panel`
- Find tutorials online
 - <http://java.sun.com/docs/books/tutorial/deployment/applet/>

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JDBC: Java Database Connectivity

- Database-independent connectivity
 - Connect to database
 - Get information from database
 - Update data in database
- Classes in `java.sql.*` package
- In Java, two steps
 - Establish a connection with a database
 - Execute queries, statements against database

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JDBC: Creating a Connection

- Load the DB driver
 - Classes/library used to connect to the database
 - Specific to the type of database
 - Load the class by name
 - `Class.forName("sun.jdbc.odbc.JdbcOdbcDriver");`
- Create the connection (see API for all ways)
 - Type of DB Location of DB, port DB name
 - `String url = "jdbc:mysql://localhost:3306/masplasDB";`
 - `Connection con = DriverManager.getConnection(url, loginname, password);`
- Need to close connection when done
 - `con.close();`

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JDBC: Executing Queries: Statements

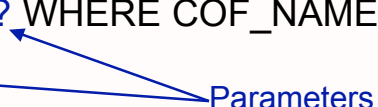
- `Statement stmt = con.createStatement();`
- `executeQuery(String query)`
 - Returns a **ResultSet**
 - Iterate through **ResultSet**, row-by-row, getting results from each column
 - `stmt.executeQuery("SELECT * FROM COFFEES");`
- `executeUpdate(String query)` to update table
 - Returns an integer representing the number of affected rows or 0 for SQL statements that don't execute anything

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JDBC: Prepared Statements

- `prepareStatement(String template)`
 - Compile SQL statement “templates”
- Reuse statement, passing in parameters
 - Java handles formatting of Strings, etc. as parameters
- `updateSales = con.prepareStatement("UPDATE COFFEES SET SALES = ? WHERE COF_NAME LIKE ?");`
 - 
- Set parameters
 - `updateSales.setInt(1, 100);`
 - `updateSales.setString(2, "French Roast");`

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JDBC

- API Documentation: `java.sql.*`
 - Statements, Connections, ResultSets, etc. are all **Interfaces**
 - Driver/Library implements interfaces for its database
- Limitations
 - Java doesn't **compile** the SQL statements
 - Exact syntax depends on DB
 - Compile, run, verify queries outside of Java for your database
 - Then copy and use in Java code

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Distributed Programming

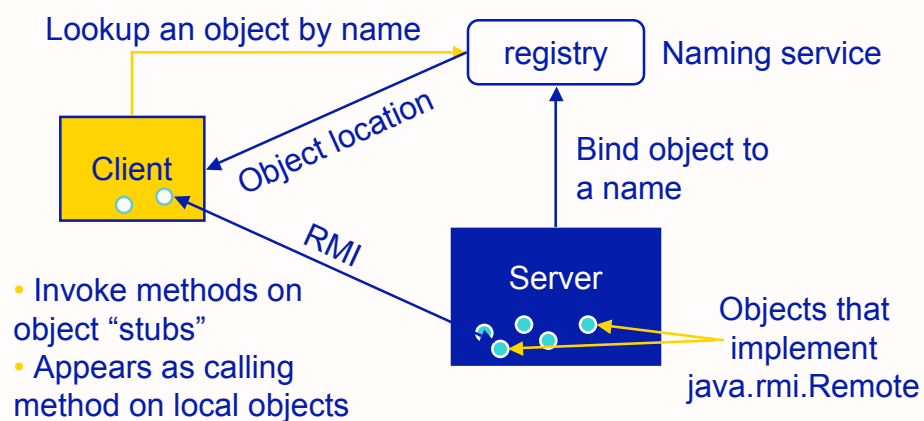
- Two primary ways to communicate
 - Message passing (servlets, web services)
 - Remote method calls
 - an object on one computer calls methods of an object on a different computer
 - method call looks like a method call on a local object
 - Remote Method Invocation (RMI)

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Java RMI: Remote Method Invocation



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Why Java RMI?

- Write distributed programs
 - Distributed games
 - Distributed locks to coordinate multiple machines
 - ...
- RMI automates a lot of process
 - Does not require network programming, sockets

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Ant

- Java-based build tool
 - Like Java “make” files
 - “without make’s wrinkles”
 - Works cross-platform
- Some IDEs use ant to compile projects
 - NetBeans

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Ant

- Configuration files: written in XML

```
<project name="DSpace" default="compile">
  ...
  <target name="compile"
    description="Compile the source code">
    <mkdir dir="build/classes"/>
    <javac srcdir="src"
      destdir="build/classes"
      debug="on">
      <include name="**/*.java"/>
      <classpath refid="build.class.path"/>
    </javac>
  </target>
</project>
```

- <http://ant.apache.org/>

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Exam Review

- All topics from the semester
 - Know what we did
 - Know how/when to apply/use
- Review quizzes for example questions
 - Probably no fill in the blank questions
 - Know **content** from those questions

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Topics

- Java fundamentals
- OOP
- Javadoc
- Inheritance
- Polymorphism
- Abstract classes
- Interfaces
- Exceptions
- I/O Streams
- Serialization
- Compression
- Cloning
- Collections
- Inner Classes
- GUIs
 - Swing, AWT
 - Components
 - Event Handling
 - Design
- Regular Expressions
- JUnit
- Threads, Synchronization
- Network Programming
- XML
- Web Programming

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Using Java

- JDK
- JRE
- Java libraries
- CLASSPATH

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Using Java ...

- When to extend a class
- When to implement an interface
- When to use a class

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Object-oriented Programming

- Objects and primitives
- Data encapsulation
- Access modifiers
- Mutable/immutable objects

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In C++, the following function swaps any two values passed:

```
template<class T>
void swap (T& a, T& b)    {
    T tmp = a;
    a = b;
    b = tmp;
}
```

In Java, the following version of the method has no effect on the two values passed:

```
public static void swap (Object a, Object b)  {
    Object tmp = a;
    a = b;
    b = tmp;
}
```

Even though all object variables in Java are actually references, explain why the Java version of swap does not work.