

# CS 240 Final Exam Topics

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## Java

Write a class, including:

- 1) toString, equals, and hashCode methods
- 2) Implement the Comparable interface

## Databases

Relational Data Model

Primary keys, Foreign keys, Null

Model a given problem with a relational schema

Modeling relationships: One-to-One, One-to-Many, Many-to-Many

SQL

Create Table, Drop Table

Insert, Update, Delete

Select

SELECT, FROM, WHERE

JOINS

Transactions

What are they?

How do use them in JDBC

## XML / Object Serialization

How to parse XML files using the StAX and DOM parsers

What is “object serialization”?

How to serialize a graph of objects using Java’s built-in serialization

## Web Services

What is a “web service”?

The HTTP protocol

Request message format, Response message format, Headers

Difference between GET and POST request methods

Response codes (200, 404, etc.)

How to make a web request in Java using URL and HttpURLConnection classes

## Software Engineering

Principles of Software Design (Study the paper & slides on the web site)

1. Abstraction
  - a. Naming
  - b. Cohesion
  - c. Abstracting All the Way
2. Decomposition
  - a. Levels of Design (System, Subsystem, Package, Class, Routine)
  - b. Hypo- and Hyper- Decomposition
  - c. Size and Length Metrics
  - d. Complexity Metrics
3. Algorithm & Data Structure Selection
4. Minimize Dependencies (or, Low Coupling)
  - a. Separation of Interface and Implementation
  - b. Information Hiding
5. Avoid Code Duplication

Describe the attributes of a well-designed class

Unit Testing: Role in software development, how it is done, benefits

Defensive Programming: Assertions & Parameter Checking

## Testing

Levels of testing: Unit, Integration, System

Black Box Testing

Principles of “Equivalence Partitioning” and “Boundary Value Analysis”

Design a set of black box test cases for a program or method using EP and BVA.

## White Box Testing

Line Coverage, Branch Coverage, Condition Testing (Complete & Partial)

Design a set of white box test cases for a method that achieves {Line Coverage, Branch Coverage, Complete Condition Testing, or Partial Condition Testing}

## GUIs

### Drawing

Origin in top-left corner, Color class, JComponent.paint(Graphics), drawLine, drawImage, etc.

### Event Handling

Listeners: MouseListener, MouseMotionListener, KeyListener, FocusListener, WindowListener, ComponentListener, etc.

Writing anonymous inner classes

The concept of “keyboard focus”

### Layout

Layout Managers: Flow, Grid, Border, Box, GridBag; how to layout components with each

## Streams & Files

Reading/writing bytes with the InputStream/OutputStream interfaces

Using “filters” to add features to InputStreams/OutputStreams

Reading binary-formatted data with DataInputStream/DataOutputStream

Reading/writing characters with Reader/Writer interfaces

Converting InputStream to Reader with InputStreamReader

Converting OutputStream to Writer with OutputStreamWriter

Writing text-formatted data with PrintWriter

Reading text-formatted data with Scanner

Random file access with RandomAccessFile