Learning Java (and review of advanced topics)

For those of you learning Java for the first time, Java is a Class-based Object Oriented programming language, with similar syntax to C++. It is among the most popular languages with particular heavy use in enterprise applications. One of the major benefits of the Java programming language is that code is compiled into "Java Byte Code" which can then run on any platform that has a Java Virtual Machine (JVM) available.

Below is a list of free courses and books which you can use to learn/review Java.

How to go through these resources

- If you are new to Java and many of its concepts, I recommend you start out with the "Think Java" book, and then look at the advanced topics in "Introduction to Programming using Java, Seventh Edition" book.
- If you want a refresher of Java concepts, start with the MIT course "Java Preparation", if there are concepts you are not familiar with, look them up in the two book resources, in particular the "Introduction to Progamming using Java, Seventh Edition" is an in-depth look at many of these topics.

Java Books

1. Think Java
   - http://greenteapress.com/wp/think-java/
2. Introduction to Programming using Java, Seventh Edition
   - http://math.hws.edu/javanotes/index.html

Java Courses

These courses only have slides and assignments available, no video.

1. Java Preparation (MIT Open Courseware)
   - http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-092-java-preparation-for-6-170-january-iap-2006/index.htm
2. Introduction to Programming in Java (MIT Open Courseware)
   - http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-092-introduction-to-programming-in-java-january-iap-2010/index.htm

"Think Java" Chapters

The Think Java book is a introduction meant for people with little to no experience in computer science and programming. Therefore, most of this book will be a quick read for us. Below are annotations of the Table of Contents

of the book, most chapters can be skimmed, but I have marked important topics/sections with a (*), where you should pay extra attention.

Let's start with the Appendices:

1. Appendix A: Development tools
   - This chapter presents the "Dr. Java" IDE. You don't have to use this IDE, I recommend the IntelliJ IDE, which we will use with the Play Framework later on. The rest of the sections explain how to compile and test your programs.
   - (*) A.3, A.4, A.6, A.7
2. Appendix B [SKIP]
3. Appendix C: Debugging (*)
   - Read this up front and refer back to this appendix when you need to debug your programs.

Now for the Chapters:

1. Java Syntax and Programming Basics (skim)
2. Java Syntax and Programming Basics (skim)
3. Java Syntax and Programming Basics (skim)
   - (*) 3.9: Writing a complete Java Program
4. Void Methods
   - (*) 4.4: Flow of execution
5. Conditionals and logic
   - (*) 5.8, 5.9, 5.10 **Recursion**
6. Value methods
   - (*) 6.4: **Overloading**, **Recursion:** 6.7, 6.8, 6.9
7. Loops
   - (*) **Encapsulation and generalization:** 7.3, 7.4
8. Arrays
   - (*) 8.10: Alternative for loop (also know as foreach)
9. Strings and things
   - (*) 9.2 **Immutability**
10. Objects (*)
    - (*) 10.5 **Mutability**, 10.6 **References**(aliasing), 10.8 (concept only), 10.9 How to think about classes.
11. Classes (*)
    - (*) **Encapsulation**, **pure functions**, **side-effects**
12. Arrays of objects (*)
    - (*) **Search**, **mutability**, **tracing**, **recursion**
13. Objects of arrays (*)
    - (*) **Sorting**, **recursion**
14. Objects of objects (*)
    - (*) Designing and using classes/objects, **Inheritance**

"Introduction to Programming using Java, Seventh Edition"

This book contains more advanced topics and an in-depth look at the various Java concepts. For CTP program preparation you can skip any sections dealing with Graphical User Interface (GUI) programming.

If you've already worked through "Think Java", you can look at **Chapters 5,7,8,9, and 10**. Chapter's 11 and 12 are also useful, but get into advanced topics and low-level details in Networking and Parallel processing with threads. In the CTP program we will use these concepts through the PlayFramework, which will abstract the low-level details of these topics for us.

Advanced Java Topic List

The following is a list of topics you should look for in this book.

- Polymorphism
- Interfaces
- Inner Classes
- Exceptions
- Generics
- Annotations