Targeted Topics: Advanced Java

Targeted Topics: Advanced Java is one of our virtual training courses to help students build on Java skills that were gained in both Intro and Intermediate Java classes. Each individual topic or track focus on deepening students' knowledge around each element of Advanced Java. Each individual topic is 2 hours long, each track is 4 hours long. Students have the ability to pick which topics or tracks they would like to attend.

Tech Set Up:
Please install a Java IDE of your choice and configure it with the most recent version of JDK. Note that the two "new features" topics in this course introduce features provided by the Java Programming Language in versions 9 through 16. If you do not have Java 16, you will not be able to follow along with all of these topics.

Day One

Track One - [8am - 12pm]
Critical Concepts in Real World Design, and Design Patterns
This track will cover the following in four hours:

- Principles of design patterns by investigating the fundamental concepts underlying the design pattern catalog.
- Why generalization is good but inheritance is "bad".
- Avoiding inheritance with the Strategy pattern.
- More key design patterns and their implementation in Java:
    - Command,
    - Factory and Builders
    - Behavior Factory
    - Iterable&Iterator
    - Decorator
    - Function Transformer
    - Functor
    - Monad

Topic One: [2pm - 4pm]
The Java Module System and the var Pseudo-Type
This 2 hour topic will cover:

- Features of the Java Platform Module System "JPMS"
- Writing module definitions for your code
- Providing and using services through modules

- Overview of tools and techniques for migration to modules
- Local variable type inference (using the "var" pseudo-type)

Day Two:

Track Two: [8am - 12pm]

Java Concurrency Primitives

This track will cover the following in four hours:

- The Java memory model
    - understanding happens-before and its consequences
- Understanding the producer-consumer/actor model
- Low-level thread control features:
    - volatile
    - synchronized
    - wait
    - notify
    - notifyAll
    - Interrupts

Topic Two: [2pm - 4pm]

API Thread Control

This 2 hour topic will cover:

- *API Level thread control:*
    - *Pools*
    - *Thread shutdown*
    - *ReentrantLock*
    - *StampedLock*
    - *Semaphore*

Day Three:

Topic Three: [8am - 10am]

Threading Utilities

This 2 hour topic will cover:

- Concurrent utilities:
    - Atomic types
    - Accumulators

    - Concurrent data structures
    - Synchronized data structures

Topic Four: [12pm - 2pm]

Designing with Parallel Streams

This 2 hour topic will cover:

- Parallel and concurrent collection operations.
- Safe coding with parallel streams:
    - thread-safety
    - monoids
    - ordering
- Architectural and performance issues for parallel streams

Topic Five: [3pm - 5pm]

Discovering switch expressions, text blocks, and more new features

This 2 hour topic will cover: (Java's newer features-2 - requires Java 16)

- Switch expressions
- Text blocks
- Pattern matching
- Sealed classes
- Records
- Warnings for value classes