



## L4G - Java for Android

### *Java for Android Applications Programming*

Java is a registered trade mark of Oracle

#### Objectives

- Master the concepts of Java
- Secure your Java applications exception handling language
- Control mechanism threads
- Control function call C / C ++ Java programs via JNI
- Use collections of objects in Java
- Master the main utility classes in Java
- Optimize the Java code

This course is the prerequisite to our Android programming courses:

- [G2 - Android Programming](#)course
- [G5 - Android for Industrial System Control](#)course

#### Course environment

- A PC for two trainees with
  - The JDK
  - Eclipse development environment for Java applications
- Course material, printed (for face to face trainings) and in PDF format
- Exercises source code (with solutions)

#### Prerequisites

- Knowledge of a programming language like C or C ++

#### Target Audience

- Any embedded systems engineer or technician with the above prerequisites.

## Course Outline

### First Day

#### Introduction

- History of Java
- Features of Java
  - Portability
  - Security
  - Robustness
  - Simplicity
  - Multithreading
- The JDK (Java Development Kit)
- The virtual machine
- The basics of JAVA
  - Data types

- Operators
- Flow control

**Exercise:** Write the "Hello World" program in Java

## Object Programming in Java

- Classes
  - Encapsulation
  - Inheritance
  - Polymorphism
  - Interfaces

**Exercise:** Write a producer-consumer program in java (plant)

- The nested classes and interfaces
  - Internal Classes
  - Anonymous Classes
- Typecasts and instanceof operator
- Packages: definition, import, search order

**Exercise:** Rewrite the plant using anonymous classes

## Advanced aspects

- Generics in Java
  - Generic Classes (parameterized)
  - Generic Methods

**Exercise:** Configuring the plant with generic types

- Java exceptions
  - Presentation of exceptions and their mechanism
  - Capture and propagation of exceptions
  - Exception classes
  - Business exceptions

**Exercise:** Controlling the plant with exceptions

## Second Day

### Multitask programming in Java

- What is a thread
- The Java threading API
- Inter-thread synchronization
- Thread scheduling
- Asynchronous communication between threads

**Exercise:** Create two plants working in parallel, the second consuming the products of the first

### Java utility classes

- Manipulating strings
  - The String class
  - The StringBuffer class
- Input/Output
  - The java.io package
  - Standard I/O read and write
  - Reading and writing text files

**Exercise:** Write a program that reads a text file and print one word per line

- Mathematical computations:
  - The java.lang.Math class
- Date management
  - The Calendar class

- Environment access
  - The System class
  - The Runtime class

**Exercise:** Modify the program to sort the result (using the "sort" command)

## Data management in Java

- Collections
  - The collection types and interfaces
  - The collection abstract classes
  - The implementation classes
- The Iterator interface
- Comparing and sorting objects
- Rational use of collections

**Exercise:** Rewrite the previous program to count the number of occurrences of each word and display the 10 most frequent