

## 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

- Theoretical course
  - PDF course material (in English) supplemented by a printed version for face-to-face courses.
  - Online courses are dispensed using the Teams video-conferencing system.
  - The trainer answers trainees' questions during the training and provide technical and pedagogical assistance.
- Practical activities
  - Practical activities represent from 40% to 50% of course duration.
  - Code examples, exercises and solutions
  - For remote trainings:
    - ▶ One Online Linux PC per trainee for the practical activities.
    - ▶ The trainer has access to trainees' Online PCs for technical and pedagogical assistance.
    - ▶ QEMU Emulated board or physical board connected to the online PC (depending on the course).
    - ▶ Some Labs may be completed between sessions and are checked by the trainer on the next session.
  - For face-to-face trainings:
    - ▶ One PC (Linux ou Windows) for the practical activities with, if appropriate, a target board.
    - ▶ One PC for two trainees when there are more than 6 trainees.
  - For onsite trainings:
    - ▶ An installation and test manual is provided to allow preinstallation of the needed software.
    - ▶ The trainer come with target boards if needed during the practical activities (and bring them back at the end of the course).
- Downloadable preconfigured virtual machine for post-course practical activities
- At the start of each session the trainer will interact with the trainees to ensure the course fits their expectations and correct if needed

#### Prerequisites

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

#### Target Audience

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

## Evaluation modalities

- The prerequisites indicated above are assessed before the training by the technical supervision of the trainee in his company, or by the trainee himself in the exceptional case of an individual trainee.
- Trainee progress is assessed in two different ways, depending on the course:
  - For courses leading themselves to practical exercises, the results of the exercises are checked by the trainer while, if necessary, helping trainees to carry them out by providing additional details.
  - Quizzes are offered at the end of sections that do not include practical exercises to verify that the trainees have assimilated the points presented
- At the end of the training, each trainee receives a certificate attesting that they have successfully completed the course.
  - In the event of a problem, discovered during the course, due to a lack of prerequisites by the trainee a different or additional training is offered to them, generally to reinforce their prerequisites, in agreement with their company manager if applicable.

## Plan

### 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*

## **Renseignements pratiques**

**Inquiry : 2 days**