



## C1 - Effective MISRA C

*MISRA C:2023, including guidelines for safety and security supporting all published versions of the C standard*

### Objectives

- Understand the C language pitfalls, the compilation process, static analysis techniques and tools
- Understand the origin and nature of MISRA C and its role in the development of safe and secure software
- Learn all important MISRA C guidelines and the unwanted phenomena they are designed to prevent
- Understand the notion of compliance to MISRA C and the permitted deviation procedures
- Discover and understand the advantages of the adoption of MISRA C and other best practices.

### Environnement du cours

- Cours théorique
  - Support de cours au format PDF (en anglais) et une version imprimée lors des sessions en présentiel
  - Cours dispensé via le système de visioconférence Teams (si à distance)
  - Le formateur répond aux questions des stagiaires en direct pendant la formation et fournit une assistance technique et pédagogique
- Au début de chaque demi-journée une période est réservée à une interaction avec les stagiaires pour s'assurer que le cours répond à leurs attentes et l'adapter si nécessaire

### Audience visée

- Tout ingénieur ou technicien en systèmes embarqués possédant les prérequis ci-dessus.

## Plan du cours

### Introduction

- Review of undefined, unspecified and implementation-defined behavior in C
- How the compilers may take advantage of undefined behavior
- Review of explicit and implicit casts
  - Balancing
  - Promotion
  - Arithmetic conversions
- Review of enumerated, integer and floating-point types: representation and operations.
- Review of common integer pitfalls
  - Overflow
  - Sign error
  - Extension
  - Truncation
- Review of common floating-point pitfalls
  - Error propagation
  - Comparison
  - Excess precision
- Review of arrays, strings, pointer types and associated programming errors
  - access outside bounds
  - Null-termination
  - Truncation

- Off-by-one errors

## **Comprehensive Overview of MISRA C**

- Introduction to MISRA
- The purpose of MISRA C and its role in improving code quality
- The MISRA C essential type system and other preliminary notions
- MISRA C:2012 guidelines related to not fully defined behavior of C
- Test on not fully defined behavior of C and related MISRA C guidelines

## **Advanced MISRA Guidelines**

- Other important MISRA C:2012 guidelines.
- MISRA C:2012 guidelines for security
- Test on MISRA C violations and the best ways to deal with them.
- Properly formulating defensible claims of MISRA compliance.

## **Automated MISRA C Compliance**

- Automatic verification of compliance to the MISRA C rules
  - Available tools
  - Tools proper configuration and use.
- Demonstrative analysis of the MISRA C violations in real software projects
  - Along with the correct remediation measures.