RPT03 — Worst-Case Execution Time Analysis

Course description
This is an advanced course on the theoretical principles of worst-case execution time analysis.

Course Objectives
- Understand theoretical principles of worst-case execution time analysis
- Understand the different WCET approaches: static analysis and measurement-based analysis.
- Understand the impact of different advanced hardware features in worst-case execution time. This includes analysis of caches, pipelines, buses, and multicores.
- Understand the requirements for certification regarding timing analysis in the DO-178B and ISO 26262 standards.

Who should attend
This technical course is intended for all people interested in the underlying principles behind worst-case execution time analysis. It is addressed to students in their last year of their degree, PhD students, researchers, academics and practitioners.

Duration
One and a half days.

Course Contents
- What is worst-case execution time (WCET)
- Why is WCET necessary
- A survey of WCET approaches
  - Static analysis
  - Measurement based analysis
- High level analysis techniques
  - Path analysis
  - Tree based approaches
  - IPET based approaches
- Low-level analysis techniques
  - Timing models
  - Multilevel caches, instruction and data caches.
  - Pipelines and buses
  - Multicores
- Certification requirements
  - DO-178B
  - ISO 26262
  - Approaches to provide evidence for certification
  - Avionics case study
  - Automotive case study
- Design principles for verification