Responsible AI in software development (RAIISD)

ID RAIISD **Price** CHF 750.—(excl. VAT) **Duration** 1 days

Who should attend

All people involved in using GenAI or developing machine learning

Prerequisites

General development

Course Objectives

- Understand various aspects of responsible AI
- How to use generative AI responsibly in software development
- Prompt engineering for optimal outcomes
- How to apply generative AI throughout the SDLC

Course Content

A brief history of Artificial Intelligence

- The origins of AI
- Neural networks and “probability engines”
- Early ML coding tools
- The AI coding revolution of the 2020s
- Threats against ML systems

Responsible AI

- What is responsible AI?
- Accountability and transparency
- Mitigation of harmful bias
- Validity and reliability
- Validity and reliability – non-determinism of the code
- Demonstration – Experimenting with validity and reliability in Copilot
- Explainability and interpretability
- Safety, security, privacy and resilience
- Security and responsible AI in software development

Using GenAI responsibly in software development

- LLM code generation basics
- Basic building blocks and concepts
- Prompt templating
- System prompts in AI-driven coding
- GenAI tools in coding: Copilot, Codeium and others
- Can AI… boost your productivity?
- Can AI… take care of the ‘boring parts’?
- Can AI… be more thorough?
- Reviewing generated code – the black box blues
- The danger of hallucinations
- Can AI… teach you how to code (better)?
- Demonstration – Experimenting with an unfamiliar API in Copilot
- The effect of GenAI on programming skills
- Some further long-term effects of using GenAI
- Where AI code generation doesn’t do well
- Prompt engineering
    - Why is a good prompt so important?
    - Establishing the context for generative AI
    - Zero-shot, one-shot, and few-shot prompting
    - Reasoning-based prompt engineering, chain-of-thought
    - Demonstration – Experimenting with prompts in Copilot
    - Enforcing and following token limits
    - Prompt patterns
        - Prompt patterns and prompt priming
        - The 6 categories of prompt patterns
        - Prompt pattern: Meta Language Creation
        - Prompt pattern: Persona
        - Prompt pattern: Visualization Generator
        - Prompt pattern: Fact Check List
        - Prompt pattern: Alternative Approaches
        - Prompt pattern: Refusal Breaker
        - Prompt pattern: Flipped Interaction
        - Prompt pattern: Context Manager
    - Some further prompting approaches
        - Least-to-Most and Self-Planning: decomposition of complex tasks
        - Demonstration – Task decomposition with Copilot
        - Prompt engineering techniques for refinement and iteration
        - Unit tests, TDD and GenAI
        - Demonstration – Test-based code generation with Copilot

Integrating generative AI into the SDLC

- Using GenAI beyond code generation
- Using AI during requirements specification
- Prompt patterns for requirements capturing
- Software design and AI
- Prompt patterns for software design
- Demonstration – Requirements capturing and API design with Copilot
- Using AI during implementation
- Prompt patterns for implementation
- Demonstration – Finding hidden assumptions with Copilot
- Using AI during testing and QA
- Using AI during maintenance
- Prompt patterns for refactoring
- Demonstration – Experimenting with code refactoring in Copilot
- Prompt patterns for change request simulation

Security of AI-generated code

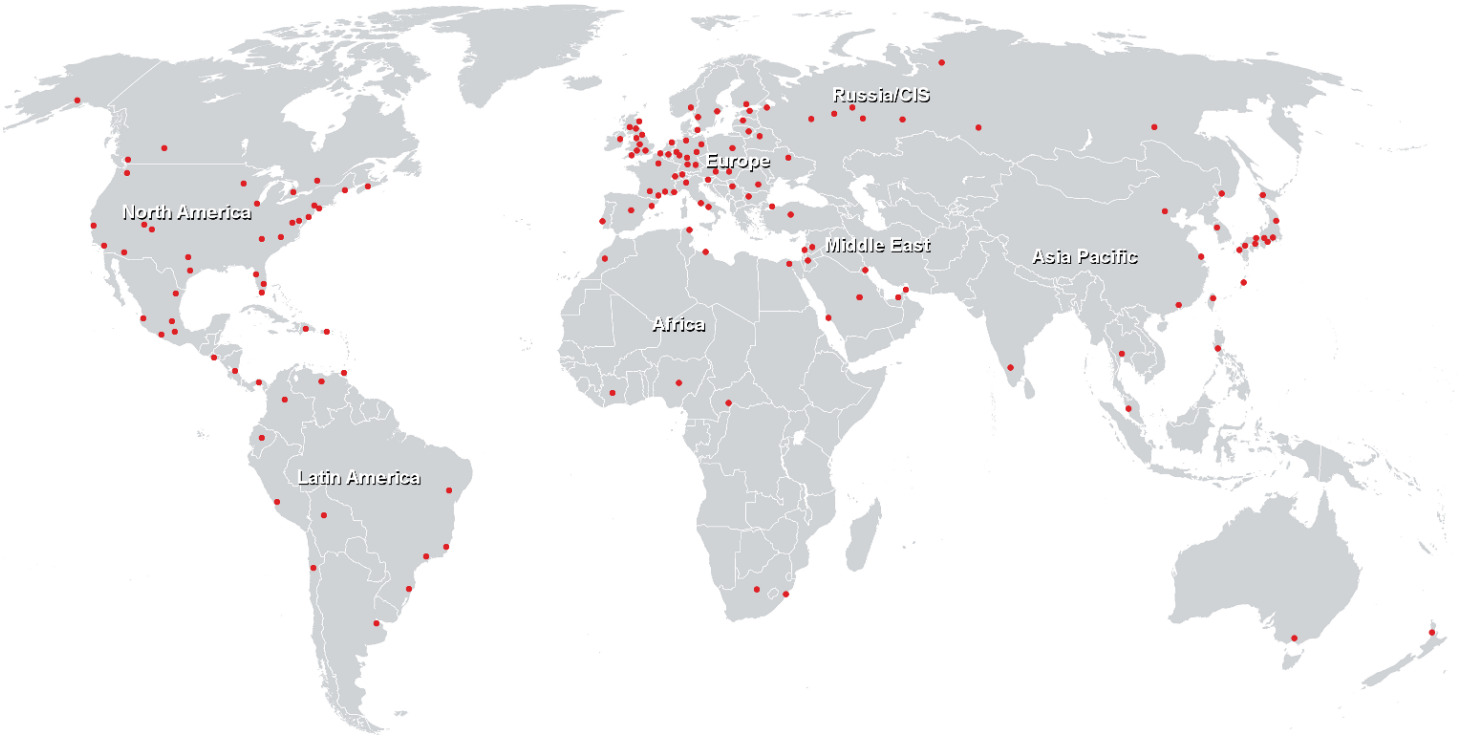
- Security of AI generated code
- Practical attacks against code generation tools
- Dependency hallucination via generative AI
- Case study – A history of GitHub Copilot weaknesses (up to mid 2024)
- A sample vulnerability
    - Path traversal
    - Demonstration – Path traversal
    - Path traversal-related examples
    - Path traversal best practices
    - Demonstration – Path canonicalization
    - Demonstration – Experimenting with path traversal in Copilot

Summary and takeaways

- Responsible AI principles in software development
- Generative AI – Resources and additional guidance

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Training Centres worldwide





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