Publication date : 05/31/2024

Course : Advanced algorithms

Practical course - 5d - 35h00 - Ref. AGR
Price : 3070 CHF E.T.

This course introduces the main families of algorithms.

Teaching objectives

At the end of the training, the participant will be able to:

- Learn about the main data compression algorithms
- Know the main cryptographic algorithms
- Understand the principle and usefulness of stochastic algorithms
- Understand the main principles of distributed algorithms and their usefulness
- Understand the principle and usefulness of adaptive algorithms
- Know the principle of emergent algorithms

Intended audience

Application developers.

Prerequisites

Knowledge of basic algorithms, data structures and imperative programming.

Practical details

Hands-on work

Training alternating theory and practice.

Course schedule

1 Data compression algorithms

- Huffman coding.
- The Lempel-Ziv algorithm.

Hands-on work

Writing a compression algorithm.

PARTICIPANTS

Application developers.

PREREQUISITES

Knowledge of basic algorithms, data structures and imperative programming.

TRAINER QUALIFICATIONS

The experts leading the training are specialists in the covered subjects. They have been approved by our instructional teams for both their professional knowledge and their teaching ability, for each course they teach. They have at least five to ten years of experience in their field and hold (or have held) decision-making positions in companies.

ASSESSMENT TERMS

The trainer evaluates each participant's academic progress throughout the training using multiple choice, scenarios, hands-on work and more.
Participants also complete a placement test before and after the course to measure the skills they've developed.

2 Cryptographic algorithms

- Symmetrical (secret-key) cryptographic algorithms.
- Asymmetric cryptographic algorithm (public and private keys). RSA algorithm.

Hands-on work

Overview of the algorithms used in the SSL encryption layer.

3 Heuristic and meta-heuristic algorithms

- Notion of heuristics. AI algorithms using heuristics.
- Example of a meta-heuristic.

4 Stochastic algorithms

- Monte Carlo method, examples of use.
- Simulated annealing algorithm to obtain the extrema of a function. Example of use.
- Back to meta-heuristics: distribution estimation algorithms, evolution strategy algorithms.
- Genetic algorithms to obtain the extrema of a function (combinatorial optimization).

Hands-on work

Write a stochastic algorithm to evaluate a probability.

5 Distributed algorithms

- Basic concepts: message, wave, ring/token, stamp.
- Calculating a spanning tree from a center, using waves.
- Synchronization of producers and consumers.
- The Map/Reduce algorithm and its use in Big Data.

Hands-on work

Design a simple distributed algorithm.

6 Adaptive algorithms

- Example of adaptive MCQs.
- Die and retry learning algorithm.

Hands-on work

Write a statfull program.

7 Neural networks

- Emerging algorithms.
- The principle of neural networks with supervised learning.
- Areas of use for neural networks.

TEACHING AIDS AND TECHNICAL RESOURCES

• The main teaching aids and instructional methods used in the training are audiovisual aids, documentation and course material, hands-on application exercises and corrected exercises for practical training courses, case studies and coverage of real cases for training seminars.
• At the end of each course or seminar, ORSYS provides participants with a course evaluation questionnaire that is analysed by our instructional teams.
• A check-in sheet for each half-day of attendance is provided at the end of the training, along with a course completion certificate if the trainee attended the entire session.

TERMS AND DEADLINES

Registration must be completed 24 hours before the start of the training.

ACCESSIBILITY FOR PEOPLE WITH DISABILITIES

Do you need special accessibility accommodations? Contact Mrs. Fosse, Disability Manager, at psh-accueil@orsys.fr to review your request and its feasibility.