

# Parallel and Distributed Systems at Masaryk University

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Masaryk University  
Czech Republic

# Brno, Czech Republic



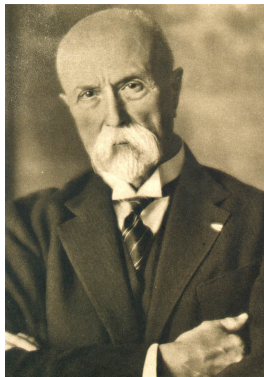
Czech Republic

# Brno, Czech Republic



- Second largest university in the Czech Republic
- Founded in 1919
- 9 faculties, more than 200 departments, institutes and clinics
- 45,000 students
- Student-driven education and an ECTS system





*T. G. Masaryk.*

- Faculty of Law
- Faculty of Medicine
- Faculty of Science
- Faculty of Arts
- Faculty of Education
- Faculty of Economics
- **Faculty of Informatics**
- Faculty of Social Studies
- Faculty of Sports Studies

# Faculty of Informatics

- Established in 1994
- The very first faculty of its kind in the Czech Republic
- 2,300 students at Bachelor, Master and Doctoral level



## **Bachelor Degree Programmes – Bc.**

- 3 years
- 180 ETCS credits

## **Master Degree Programmes – Mgr.**

- 2 years,
- 120 ETCS credits

## **Doctoral Degree Programme – Ph.D.**

- 4 years
- 240 ETCS credits

## **Long-life Learning**

## Informatics

- Informatics
- Mathematical Computer Science
- **Parallel and Distributed Systems**
- Computer Systems and Data Processing
- Computer Networks and Communication
- Computer Graphic and Image Processing
- Embedded Systems
- Artificial Intelligence and Natural Language Processing

## Applied Informatics

- Applied Informatics
- Bioinformatics
- Informatics for Public Administration

## Informatics with another discipline



# **Parallel Distributed Systems**

Bachelor Degree at Faculty of Informatics, MU

## **General Computer Science – Bachelor Degree**

- Compulsory courses shared among all fields
- Basics in computer science and math
- Bachelor's Thesis
- 110 of 180 ETCS credits (60%)

## **Obligatory PDS courses**

- Lectures, projects.
- 40 of 180 ETCS credits (22%)

## **Student-Driven Education**

- Any courses provided by Masaryk University
- 30 of 180 ETCS credits (18%)

## **”Standard” topics from PDC curriculum**

- Architecture and technology
- Programming skills
- Algorithmics

## **Specific ingredients**

- Solid mathematical background
- Formal verification and validation
- Participation on research activities

## General Idea of Education @ FI

- Studies of math is good way of brain exercising.
- Value that will survive dynamic evolution in computer science.

## Well trained brains can

- Abstract from details while preserving the essence.
- Separate cause from consequences.
- Learn and apply new concepts easily.
- Identify known in new.
- ...

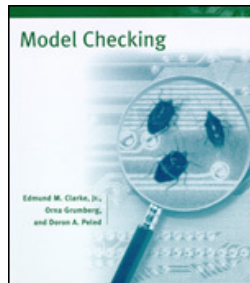


## Reasoning about parallel systems

- Much more complicated than in sequential case.
- Lack of compositionality.

## Correctness of a PDS is an issue

- Testing is insufficient in sequential case
- Situation is even worse for parallel systems
- Need for formal reasoning and formal verification methods



## Laboratories @ FI

- Service to exceptional students of individual working groups
- Participation in education and research activities

## ParaDiSe Lab @ FI MU

- Research interest in parallel methods of formal verification.
- DiVinE – Distributed-memory tool for verification of discrete parallel systems.



## **Architecture**

- Supercomputer Architectures and Intensive Computations

## **Programming**

- Design and Implementation of Parallel Systems
- GP GPU Programming
- Project on Programming Parallel Applications

## **Algorithmics**

- Parallel Algorithms and Models of Computation

## **Analysis**

- Introduction to Validation and Verification

## **Theoretical background**

- Communication and Parallelism

## Mental Training

- Will never become obsolete.
- Achieved by strong emphasis on theory and math.
- Significantly shortens time to learn

## Analysis of Parallel Systems

- Analysis and verification of PDS is much more complicated compared to sequential case.
- Formal verification techniques are **a must** for PDC curriculum.