**You are invited to the 57th edition of the PRAGUE COMPUTER SCIENCE SEMINAR**

# ONDŘEJ ČEPEK

# Knowledge representation languages and knowledge compilation

*The lecture will be followed by a discussion*

## ABSTRACT

In this talk, the word "knowledge" has a rather restricted meaning. It is just a set of rules and constraints over variables with a binary domain. Although this setting may seem to be very restricted, in fact a vast number of practical problems can be formulated using this formalism. There is a number of different knowledge representation languages which fit into this framework. Perhaps the most popular one consists of Boolean formulas in conjunctive normal form, others include various types of binary decision diagrams, negational normal forms, circuits and list-based representations. Of course, different languages are suitable for different tasks, and hence selecting the right language is a key ingredient in obtaining a useful knowledge representation. In this talk we will survey a number of standard and also less known knowledge representation languages and discuss their properties.

Knowledge compilation is a research area that studies how the computational complexity of standard tasks such as queries (e.g., consistency check, validity check, model counting, etc.) and transformations (negation, conjunction, disjunction, conditioning, etc.) depends on the chosen knowledge representation language. Furthermore, knowledge compilation studies the complexity of translating (i.e. compiling) given knowledge from one language into another one for various pairs of knowledge representation languages. We will look at some interesting recent results from this area, in particular those connected to the SLR language introduced by the speaker and his students.

### ABOUT THE PRAGUE COMPUTER SCIENCE SEMINAR

The seminar takes place once a month on Thursdays at 4:15pm (except June to September, and December) alternately in the buildings of Faculty of Electrical Engineering, Czech Technical University in Prague, Karlovo nám. 13, Praha 2 and Faculty of Mathematics and Physics, Charles University, Malostranské nám. 25, Praha 1. Its program typically consists of a one-hour lecture followed by a discussion. The lecture is based on an (internationally) exceptional or remarkable achievement of the lecturer, presented in a way which is comprehensible and interesting to a broad computer science community. The lectures are in English.

**Ondřej Čepek** is a full professor at the Department of Theoretical Computer Science and Mathematical Logic, Faculty of Mathematics and Physics, Charles University. He received his Ph.D. in Operations Research at Rutgers University, New Jersey, USA, in 1995. Since then, he has been working at Charles University with many research and teaching stays abroad. He was a postdoc at Japan Advanced Institute of Science and Technology (JAIST) in 1997-1998 and then held several visiting professor positions at various U.S. universities (in 2000, 2008, 2011, and 2020). He served as a vice-dean for computer science at the Faculty of Mathematics and Physics from 2012 until 2017. His main research interest is currently the theory of Boolean functions, in particular its applications to knowledge compilation and knowledge compression. He regularly serves as a program committee member at international conferences on artificial intelligence (AAAI, IJCAI) and works as an editorial board member at Discrete Applied Mathematics (Elsevier journal).