Brno University of Technology
Faculty of Information Technology

Department of Information Systems (DIFS) Academic year 2021/2022

Master's Thesis Specification

Student: **Hammer Jan, Bc.**
Programme: Information Technology
Field of study: Information Systems
Title: **Watson-Crick Models for Formal Language Processing**
Category: Algorithms and Data Structures
Assignment:

1. Study unconventional models working with double-stranded strings with a focus on Watson-Crick automata and grammars.
2. According to the supervisor's instructions, study and design algorithms to answer the membership of a given sentence in the language defined by the given Watson-Crick model (grammar/automaton).
3. Implement the proposed algorithms as an application with an emphasis on time efficiency.
4. Test the application and experimentally evaluate it on at least 20 examples consulted with the supervisor. Discuss the possibility of parallelizing these algorithms.

Recommended literature:

- N. L. M. Zulkufli et al. The Computational Power of Watson-Crick Grammars: Revisited. In: International Conference on Bio-Inspired Computing: Theories and Applications, p. 215-225, 2016.
- N. L. M. Zulkufli et al. Generative Power and Closure Properties of Watson-Crick Grammars. Applied Computational Intelligence and Soft Computing, 12 p., 2016. DOI 10.1155/2016/9481971.
- N. L. M. Zulkufli et al. Watson-Crick Context-Free Grammars: Grammar Simplifications and a Parsing Algorithm. The Computer Journal 61(9), p. 1361-1373, 2018.

Detailed formal requirements can be found at https://www.fit.vut.cz/study/theses/

Supervisor: **Křivka Zbyněk, Ing., Ph.D.**
Head of Department: Kolář Dušan, doc. Dr. Ing.
Beginning of work: November 1, 2021
Submission deadline: May 18, 2022
Approval date: October 26, 2021