Master Project: Querying Infinite Process Models

In process mining, we aim to provide analysts with software that they can use to optimise business processes in organisations. Often, we need to make assumptions on the processes: that the process is block-structured, that all transitions are uniquely labelled, that the model has no silent transitions, and that the model has a finite state space. The fewer assumptions we need to make, the more widely applicable our techniques will be.

In practise, nothing is unlimited. However, when modelling, no upper bounds need to be specified if infinite models are supported.

In this project, we will develop methods to query Petri nets with infinite state spaces. Examples of questions we would like to answer include:

- Is transition a always executed before transition b?
- Is transition a always executed a fixed number of times before transition b?
- Are two transitions a and b always executed the same number of times before transition c?

Answering such questions will assist in the development of reduction rules for models with infinite state spaces. In the project, several ways to answer such queries will be explored, such as coverability graphs and translating queries to existing model checking techniques.

Pre-requisites

To apply for this project, you must demonstrably have experience with Petri net theory or model checking. Preferably, you have done your seminar in the i9 or i2 chair.

About the BPM group

The Business Process Management: Foundations and Engineering group is a new group in the Informatik i9 chair. The focus of the BPM group, led by Prof. Sander Leemans, is on the combination of data-based process analysis and the optimisation of processes in organisations.

How to apply

In an at-most 1-page A4 application, motivate what triggers you to pursue this opportunity, and indicate your prior experience with process mining and/or Petri net theory and/or model checking, including relevant courses and your marks. Please send your application to applications@bpm.rwth-aachen.de before 1 March 2023. The start date is flexible, but projected to fall with the start of the summer semester of 2023.