



Bachelor Project: GPU Programming for Process Mining

Process mining aims to enable analysts to obtain insights about business processes running in organisations. Using these insights, the organisation can improve and optimise its processes. Stochastic process mining is a sub-field of process mining that takes the likelihood of behaviour into account. Given an event log, process discovery aims to find a process model that represents the event log well. Given an event log and a process model, conformance checking aims to measure to what extent the log and the model agree with one another. Ebi (<https://ebitools.org>) implements several of these techniques and makes them available for end users.

Many of such techniques require the manipulation of large matrices, which can be tedious and slow if performed on CPU cores.

In this project, we aim to:

- Choose a GPU library that is vendor-independent and accessible from Rust.
- Implement existing matrix and vector routines on standard floating point values with this GPU library.
- Explore the option to compute matrices and vectors of exact fractions on the GPU.
- Evaluate the speed of the new implementations with existing Ebi and ProM implementations.

About the BPM group

The Business Process Management: Foundations and Engineering group is a new group in the Informatik faculty RWTH. 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.

Pre-requisites

To apply for this project, you must demonstrably have experience with process mining. For instance, you have followed Business Process Modelling & Computation, Introduction to Data Science, Business Process Intelligence or Advanced Process Mining. Preferably, you have done your seminar in the BPM or PADS groups, and have some experience with GPU computing.

How to apply

In an at-most 0.5-page A4 application, motivate what triggers you to pursue this opportunity, and indicate your prior experience with process mining, including relevant courses and your marks. Please send your application to s.leemans@bpm.rwth-aachen.de. Applications close by 1 June 2025, or when a suitable candidate has been found.