Analyzing Software Engineering Courses with Process Mining and Business Intelligence

Dennis Schmitz, Matthias Feldmann and Daniel Moldt

University of Hamburg, Department of Informatics

`http://www.informatik.uni-hamburg.de/TGI/`

Abstract

Context: Data-driven analysis of students behavior and performance in university courses with process mining and business intelligence. The university course, which serves as an example here, teaches high-level Petri nets as well as process mining and business intelligence. Additionally, students should learn how to work together in a software development team and how to work precisely with project management tools and version control systems. The special feature of this course is that the students carry out the analysis on their own data. The challenges for teachers addressed here are, firstly, to provide an environment in which students' data are collected and, secondly, to respond to the real-time data analysis.

Research goal: Examination of the effects of real-time process mining and business intelligence on students and teachers.

This poster presents an extract from our ongoing work.

Data Collection

The data is mainly collected via the process management tool Jira and the version control system Git.
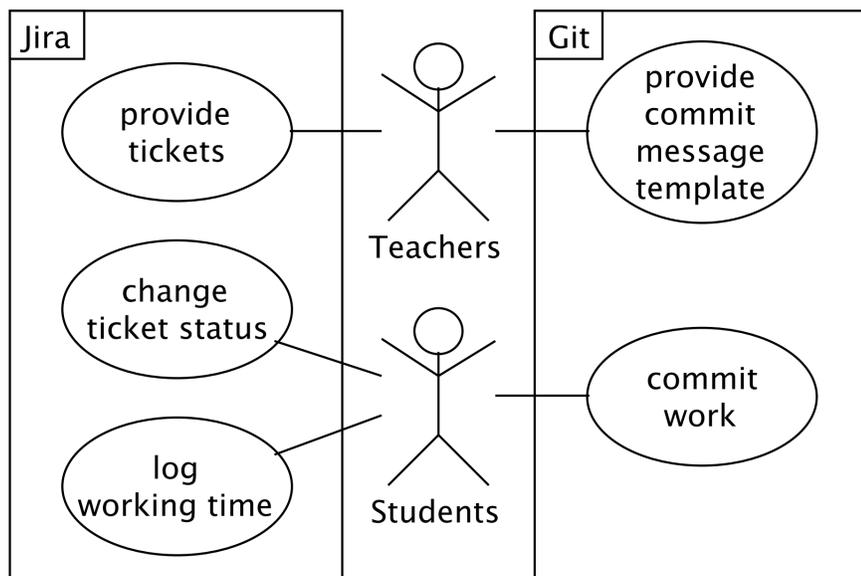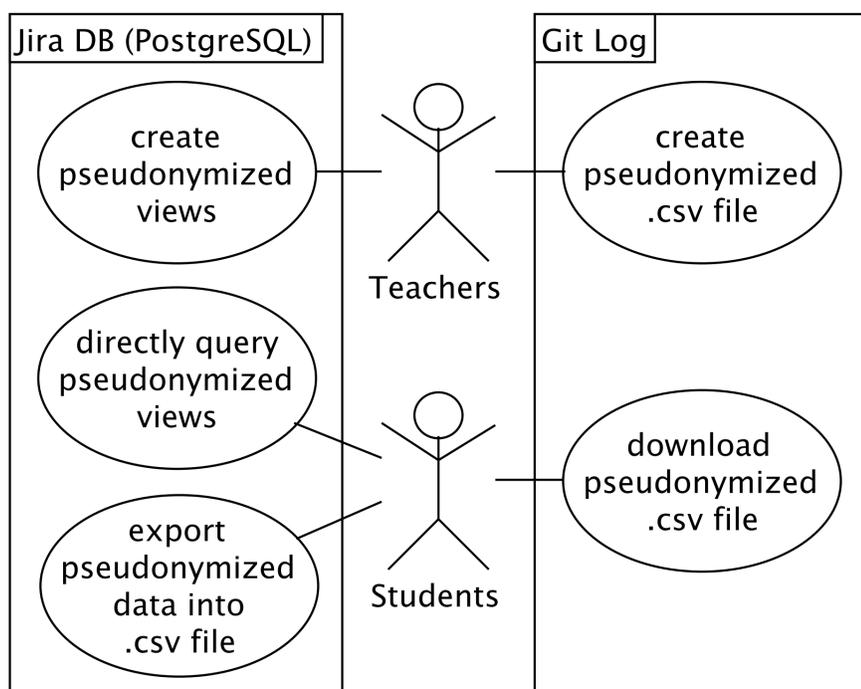

Collecting three student events: change ticket status, log working time and commit work.

The commit message template requires to provide the Jira ticket ID and the cooperating students' names.

Data Extraction

The data is extracted from the Jira database and the Git repositories log.

Direct queries can be made e.g. with PowerBI.

The pseudonymized Git logs consists of: point in time, author, Jira ticket ID, cooperating students' names.

Process Mining

Students working on a workflow-net-based worksheet. The order of the exercises is derived from the workflow-nets and students should follow this order.
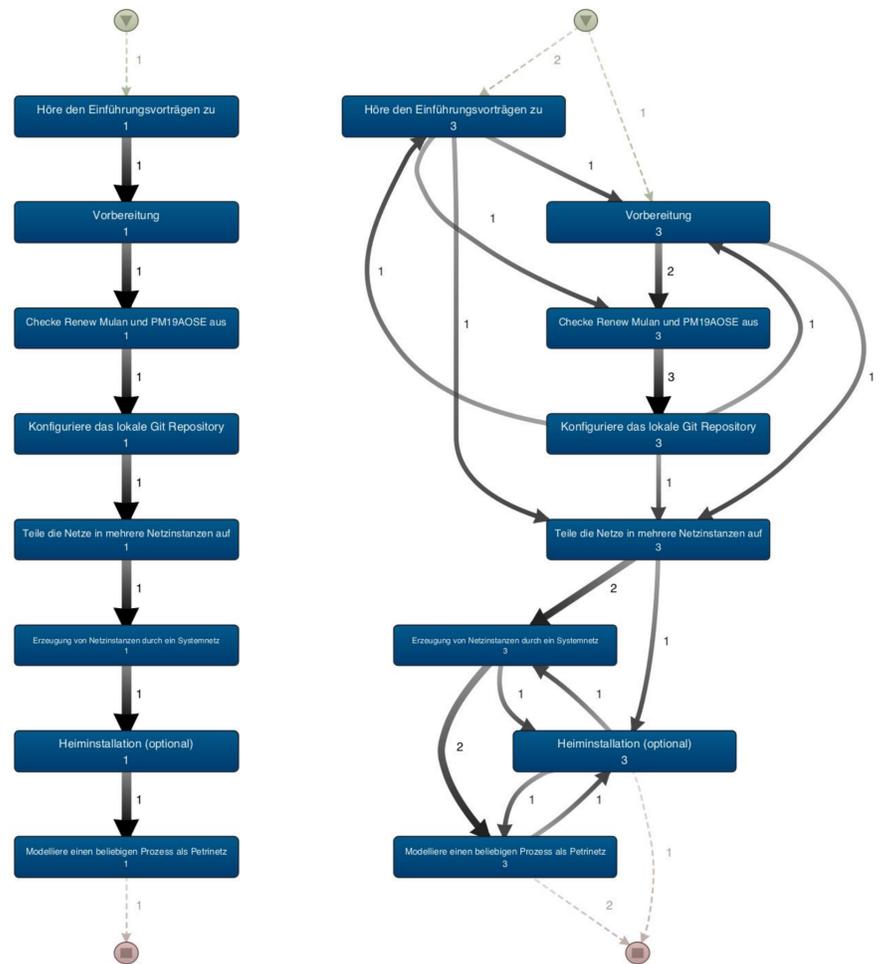

ideal process (left) vs. process variants of three students (right)
generated with Disco based on Jira ticket data

One of the three students on the right followed the ideal process. The other two deviated. Our experience: Showing the students their imprecise working methods creates an awareness for precise work.

Business Intelligence

This analysis compares the estimated working time for each exercises with the actually spent time. The estimated working time for each exercise is provided by the teachers. The students log the actually spent time.
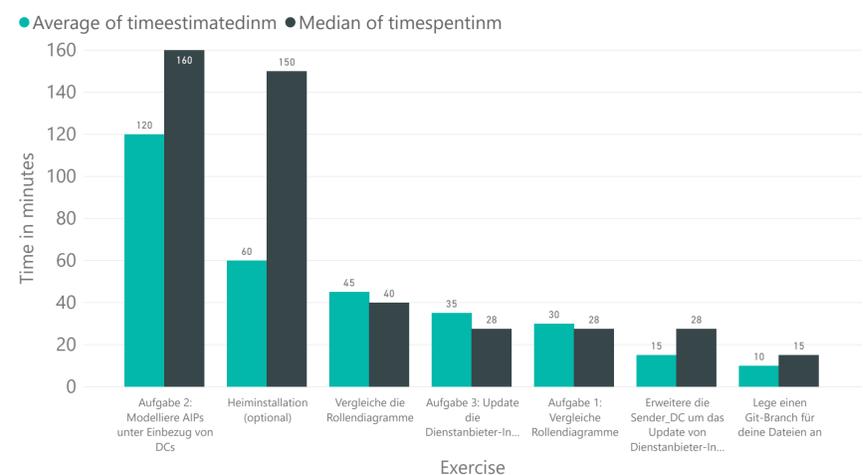
time estimated vs. time spent for exercises (data from 26 Students)
generated with PowerBI based on Jira work log

This analysis shows that teachers over- and underestimated the working time for several exercises. Based on this information, teachers are able to correct the estimated time during the course and also for the next courses. On the other hand, this analysis reveals potentially too difficult tasks. These tasks could be enriched with further information and materials.