Fab Analytic Miner

Implementation of a demonstrator application for the analysis of IT-supported, manual lot transport and handling

Student

Benjamin Frei

Result: The goal of this project is to develop a demonstrator application for process mining purposes called Fab Analytic Miner. This task was achieved with the help of log file data provided by Intellion, the industry partner for this thesis.

Specifically, the Fab Analytic Miner can be used to preprocess and interpret log files generated by an Intellion application called DisTag server.

The Fab Analytic Miner provides filtering, process discovery and conformance checking functionalities to analyze the complex production processes of Intellion's customers. To achieve this goal, a process mining library, called pm4py, was used. This library is used in the backend part of the application, called Fab Analytics Engine. A web application called Fab Analytics Server, implemented with the Blazor Server framework, uses this backend to display the calculated results. A gRPC API provided by the Fab Analytics Engine serves as the connection between backend and frontend. This report describes the process of developing a minimum viable product and discusses the results achieved.

Problem: Intellion designs, develops and implements individual solutions for control and assistance of manual processes in the production of semiconductors.

Using technologies such as Radio Frequency Identification (RFID), sensors and displays enables innovative tracking and assistance solutions.

The production of semiconductors is very complex. The planning of employees and machines is very challenging, as several lots take different paths through the production process at the same time. It is not assembly line manufacturing. Instead, the lots are processed in loops in about 400 production steps. It can take up to three months for a lot to be produced. The lots are moved manually by operators or by Automated Material Handling Systems (AMHS) from one production step to the next.

The processes used are very difficult or even impossible to track, and their efficiency cannot be measured. Customers have only a limited view of their production and cannot see the whole picture of a production process and its impact on other parts of a factory.

Approach / Technology: In semiconductor fabrications (fabs) using the Intellion solution "LotTrack", workflow information about the global processes in production is contained in the log files of the LotTrack system. Based on this data, a process analysis can be performed. Using process mining techniques, workflow models can be extracted. Subsequently, their performance and conformance can be measured.
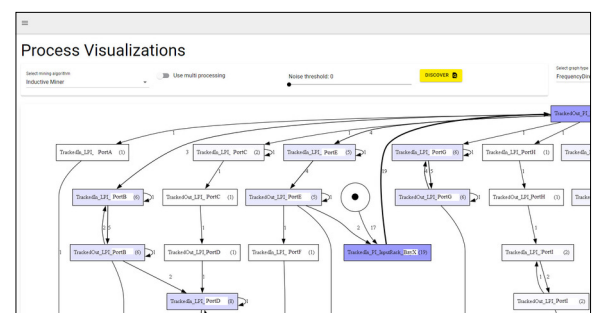
Fab Analytic Miner architecture
Own presentment
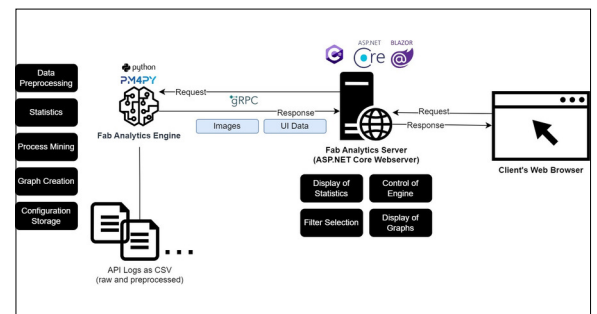
LotTrack system architecture
intellion.com (2023)
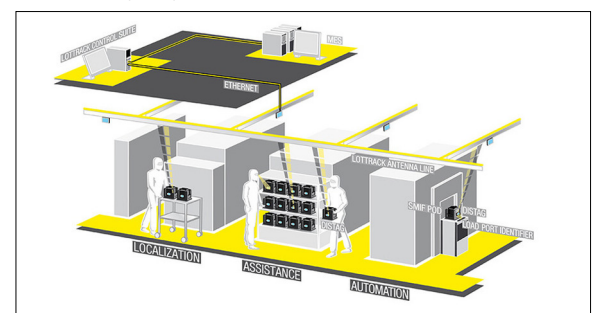
Example process model generated with the Fab Analytic Miner
Own presentment

Advisor
Prof. Dr. Mitra Purandare

Subject Area
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