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# Master Thesis Proposal

# Subproblems in Airline Crew Scheduling

The Airline Crew Scheduling problem is one of the most complex crew scheduling problems in transportation, therefore a sequential solution approach is state of the art: The Crew pairing problem creates pairings by deciding which flights are combined to become a work schedule of several days for a crew. In the crew assignment problem, these pairings are assigned to particular crew members for a planning period such as a month. Column generation is the most common solution technique; it consists of two linked problems. In the master problem, the set of best pairings or bidlines is chosen while the subproblem generates these pairings and subproblems with the dual information provided by the master problem. Additionally, multiple flight time limitations, representing rules from regulators, working contracts or the operator itself, have to be considered when creating pairings or bidlines. As most prominent technique, the Resource Constrained Shortest Path Problem is used to find the best new candidate pairing or bidline which satisfies all rules.

The objectives of this thesis are to…
- introduce crew scheduling and provide an overview about column generation,
- introduce and compare the different subproblem formulations including their advantages and disadvantages and capabilities to cover scheduling rules,
- discuss one model and its included subproblem in detail,
- to implement a shortest path algorithm or other subproblem formulation,
- to provide open research gaps and future trends.

**Basic Literature:**

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