Master Thesis Proposal

Crew Assignment Problem – the Bidline Approach

The crew scheduling problem for airlines is very complex due to a large number of flights, which have to be covered, and many regulatory, union, and internal rules which must not be violated. This complexity results in the separation of the problem in two steps: the crew pairing problem generating cost-efficient trips, called pairings, and the crew assignment problem assigning the trips to single pilots; often in the second step the preferences of crew members are considered to some degree.

While most airlines use crew rostering, which assigns pairings to specific crew members, the US airlines prefer the bidline approach. It first generates unassigned schedules consisting of multiple pairings over the month. In a second step, crew members bid on the schedules. Based on these bids the available schedules are then assigned to their pilots.

The objective of this thesis is to

- review the recent literature on crew scheduling and specifically the crew assignment model;
- show the differences between the rostering, preferential bidding and bidline approach in academia and show how the problem is handled in (real-life) airline operations;
- present and analyze a chosen bidline model in detail;
- create an academical example based on the chosen model with an implementation in AMPL;
- identify and evaluate future directions of research in the crew scheduling area.

Recommended Basic Literature

Barnhart, C., Cohn, A. M., Johnson, E. L., Klabjan, D., Nemhauser, G. L., & Vance, P. H. (2003): Airline crew scheduling. In Handbook of transportation science (pp. 517-560). Springer, Boston, MA. – available by mail to makroeme@mail.uni-mannheim.de
