

## AUDIT-STAFF SCHEDULING: METHODS FOR THE MEDIUM-TO-SHORT-TERM LEVEL

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The *medium-to-short-term model* is a component of an hierarchical approach with three levels, which is suitable to represent the problem of audit-staff scheduling from the user's point of view [2]. The formulation of the model is based on the results of an empirical study conducted among 200 of the biggest German audit companies. The *medium-to-short-term planning* disaggregates the results of the first level, the medium-term planning, for one week and all auditors [1]. The outcome is a schedule that specifies for each auditor - on the basis of periods of four hours - all the phases in which the auditor is involved in the considered week. The objective function minimizes the total costs of the resulting schedule.

The corresponding problem is formulated in terms of a binary optimization model which is closely related to resource-constraint project scheduling. Apart from job completion, time, resource, and precedence constraints this model comprises also setup (travel) times.

However, widely-known heuristics adopted to "classical" project scheduling are not directly applicable since they aim at minimizing project makespan. In order to minimize costs, it may be preferable to schedule jobs *not always* as early as possible. First, we present a parallel-randomized algorithm which is tailored to the structure of the problem. With this method each job gets a selection probability. Second, we discuss a genetic algorithm which manipulates such probabilities.

To evaluate the efficiency of the implemented solution methods we have developed an instance generator for which the results of the empirical study served as a basis. We produced twelve types of test instances with different sizes and tractabilities. Afterwards, each heuristic was applied to these instances. Furthermore, small instances have been solved to optimality with the state-of-the-art MIP solvers OSL and LINDO, in order to provide evaluation benchmarks.

Results obtained so far indicate that the proposed methods are capable of solving instances of practical size in neglectible amounts of time.

### References

- [1] Salewski, F., T. Bartsch, E. Pesch (1993): Auftragsterminierung für die taktisch-operative Personaleinsatzplanung in Wirtschaftsprüfungsgesellschaften, Discussion Paper, Universität Kiel.
- [2] Salewski, F., A. Drexel (1993): Personaleinsatzplanung in Wirtschaftsprüfungsgesellschaften - Bestandsaufnahme und konzeptioneller Ansatz, to appear in: Zeitschrift für Betriebswirtschaft.