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Data Transfer Optimization - Going Beyond Heuristics

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Scheduling data transfers is frequently realized using heuristic approaches. This is justifiable for on-line systems when extremely fast response is required, however, when sending large amount of data such as transferring large files or streaming video, it is worthwhile to do real optimization. This paper describes formal models for various networking problems with the focus on data networks. In particular we describe how to model path placement problems where the task is to select a path for each demand starting at some source node and finishing at the destination node. The demands can be instantaneous, for example in data streaming, or spread in time in so called bandwidth on demand problems. This second problem is a complex combination of path placement and cumulative scheduling problems. As constraint programming is a successful technology for solving scheduling problems, we sketch the basic principles of constraint programming and illustrate how constraint programming can be applied to solve the above mentioned problems. The main advantage of this solving approach is extendibility where the base model can be augmented with additional constraints derived from the specific problem requirements.

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