Chip Design
Summer term 2010

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Exercises 10

1) Show that the Vertex-Disjoint Steiner Trees Problem is NP-complete even if G is a sub-graph of a track graph with two routing planes.
Hint: Consider the proof of Theorem 4.2.

(4 points)

2) Let G be an undirected rectangle graph with $V(G) = \{1, \dots, n_1\} \times \{1, \dots, n_2\}$ and H a demand graph on $V(G)$ with $|\delta_H(v)| \leq 1$ for all $v \in V(H)$ and $|\delta_H(v)| = 0$ for $v \in \{1, \dots, n_1\} \times \{2, \dots, n_2 - 1\} \cup \{(1, 1)\}$. Show that the Undirected Edge-Disjoint Paths Problem for such a supply graph G and demand graph H can be decided in polynomial time.
Hint: Show that there are edge-disjoint paths $(Y_f)_{f \in E(H)}$ in G such that $f \subseteq V(Y_f)$ for each $f \in E(H)$ if and only if for each $1 \leq i \leq n_1 - 1$

$$|\delta_H(X_i)| \leq |\delta_G(X_i)|,$$

where $X_i := \{(a, b) | \, 1 \leq a \leq i, 1 \leq b \leq n_2\}$.

(4 points)

3) Formulate the Simple Global Routing Problem as an integer linear program with a polynomial number of variables and constraints.

(4 points)

Deadline: June 29 before the lecture (12.15 pm).

Das nächste Treffen der Mentorengruppe des Forschungsinstituts für Diskrete Mathematik findet am Dienstag, den 29. Juni um 18:00 Uhr im Konferenzraum des Arithmeums statt. Das Thema lautet Einführung in C++, alle interessierten Studenten sind herzlich eingeladen. Gerne kann man seinen Laptop mitbringen.