Linear and Integer Programming Project

Jianlin Cheng, PhD
Computer Science Department
University of Missouri, Columbia
Fall, 2014
Problem 1: Network Flow
Network Flow on a Directed Graph

- Source(s) s, sink (consumers) t
- Capacity (bottom number)
- Flow (top number)
- Maximize flow from s to t obeying
  - Capacity constraints on edges
  - Conservation constraints on all nodes other than s, t
Problem 2: Min Cut
Min Cut Problem on a Undirected Graph

- Special nodes $s$ and $t$
- Each edge $e$ has capacity $u_e$. Set of edges $S$ has capacity $\sum_{e \in S} u_e$
- Partition vertex set $V$ into $S, T$ where $s \in S$ and $t \in T$
- A cut is the edges $(u, v)$ such that $u \in S$ and $v \in T$

Find a cut with minimum capacity
Discussions

• Use IP & LP to solve the network flow problem
• Use IP to solve the min-cut problem
• Design algorithms (variables, objective, constraints)
• Compare the results of IP and LP
• Implementation (language and tools)
• Evaluation of results
• Visualization of results
• Presentation of Plan (**Wednesday, Nov. 5**)  
• Presentation of Results (**next Wednesday, Nov. 12**