Wintersemester 2014/15

Selected Topics in Efficient Algorithms

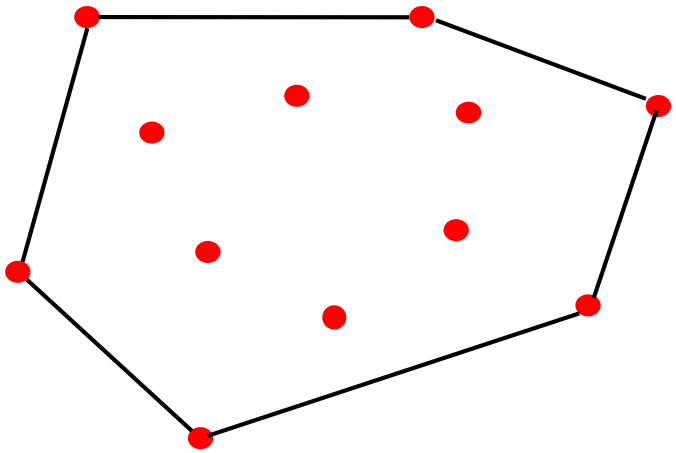
http://www14.in.tum.de/lehre/2014WS/

Susanne Albers
Fakultät für Informatik
TU München

Organization

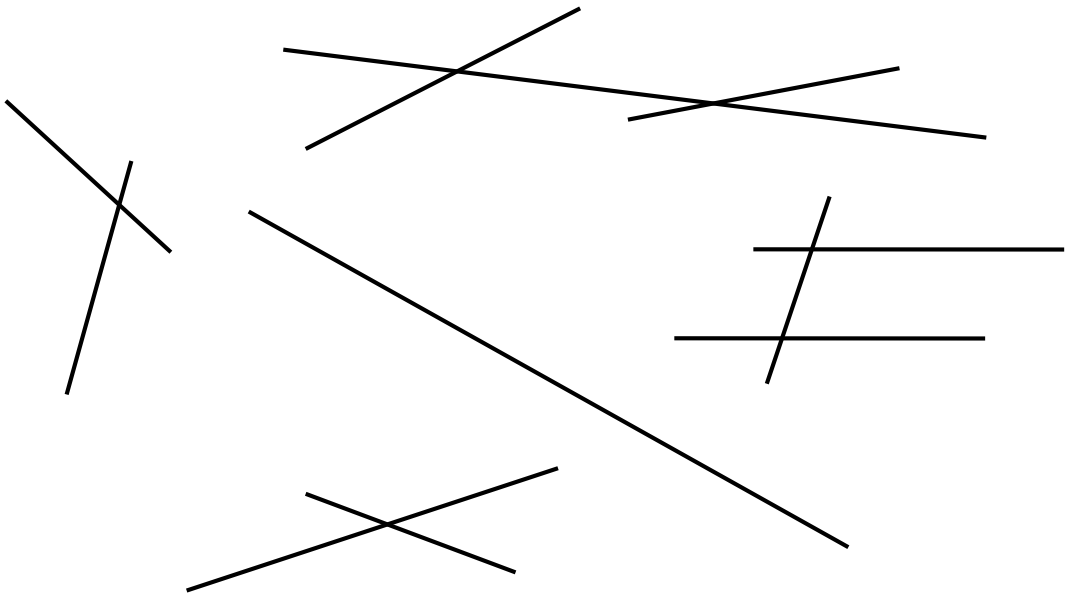
Seminar Sessions:	2 SWS Mon 14:00–16:00, MI 03.11.018
Duties:	Presentation of 60 minutes Write-up of 8 to 10 pages

1. Computational geometry: Convex hulls



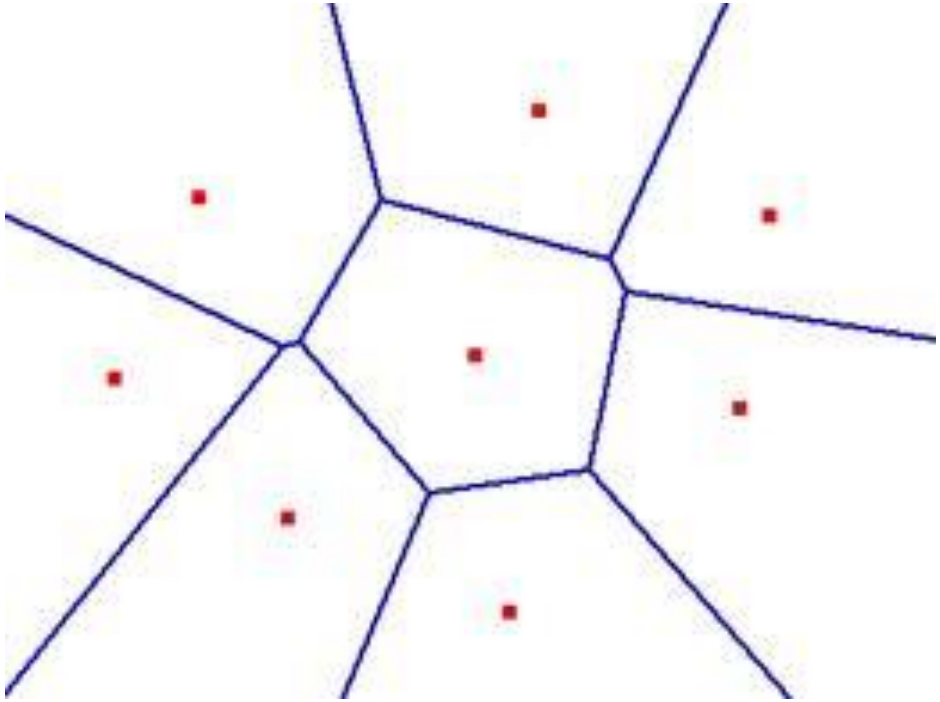
M. De Berg, O. Cheong, M. van Kreveld, M. Overmars.
Computational Geometry. Chapter 1 & 11.

2. Comp. geometry: Line segment intersection



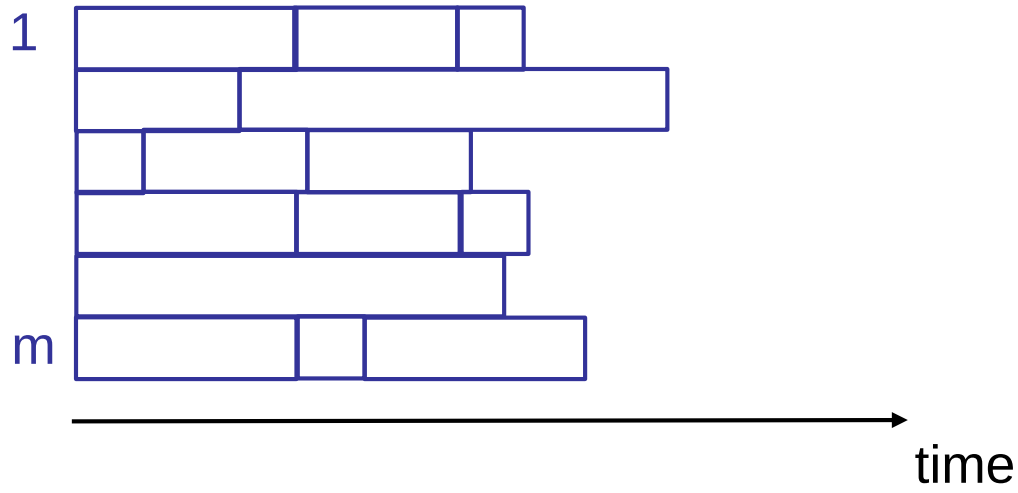
M. De Berg, O. Cheong, M. van Kreveld, M. Overmars.
Computational Geometry. Chapter 2.

3. Comp. geometry: Voronoi diagrams



M. De Berg, O. Cheong, M. van Kreveld, M. Overmars.
Computational Geometry. Chapter 7.

4. Scheduling: Makespan minimzation



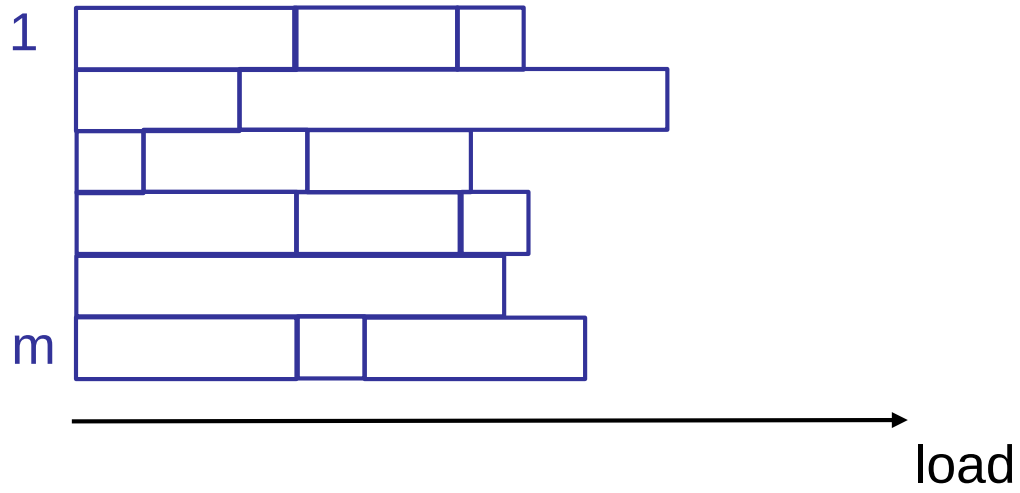
m identical parallel machines

Input portion: Job J_i with individual processing time p_i.

Goal: Minimize the completion time of the last job in the schedule.

R. Graham. Bell Systems Techn. Journal 1965;
SIAM J. Applied Math., 1969.

5.Scheduling: Load balancing game



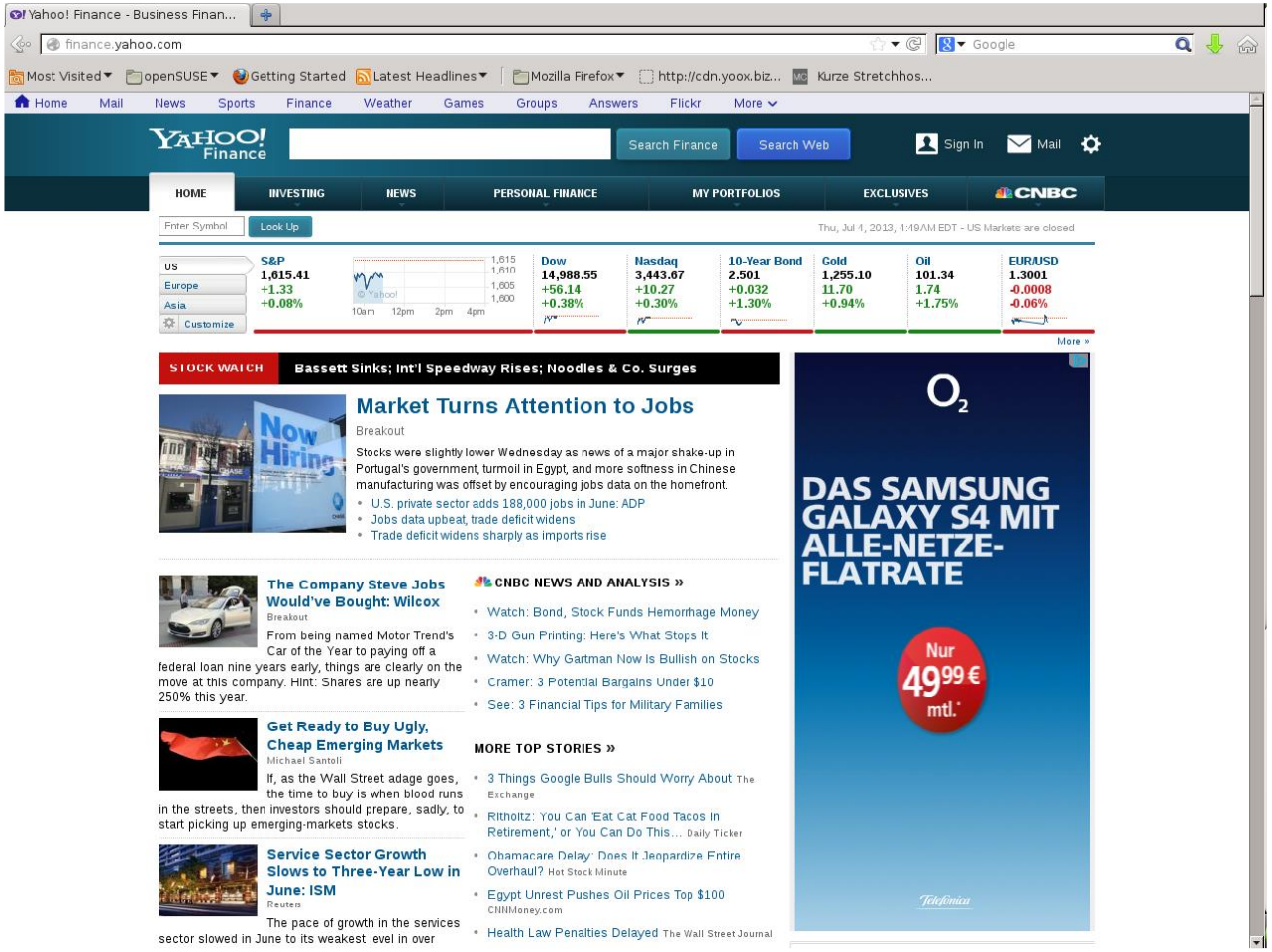
Each job controlled by selfish agent.

Cost of an agent is the load of the selected machine.

Social cost: Makespan of the solution.

B. Vöcking. In: Algorithmic Game Theory, Chapter 20, 2007.

6.Scheduling: Story boarding



A. Dasgupta, A. Ghosh, H. Nazerzadeh, P. Raghavan SODA 2009.
S. Albers, A. Passen, ICALP 2013.

7. Data structures: List update

Unsorted linear list

L: 

σ = A A C B E D A …

Request: Access to item in the list

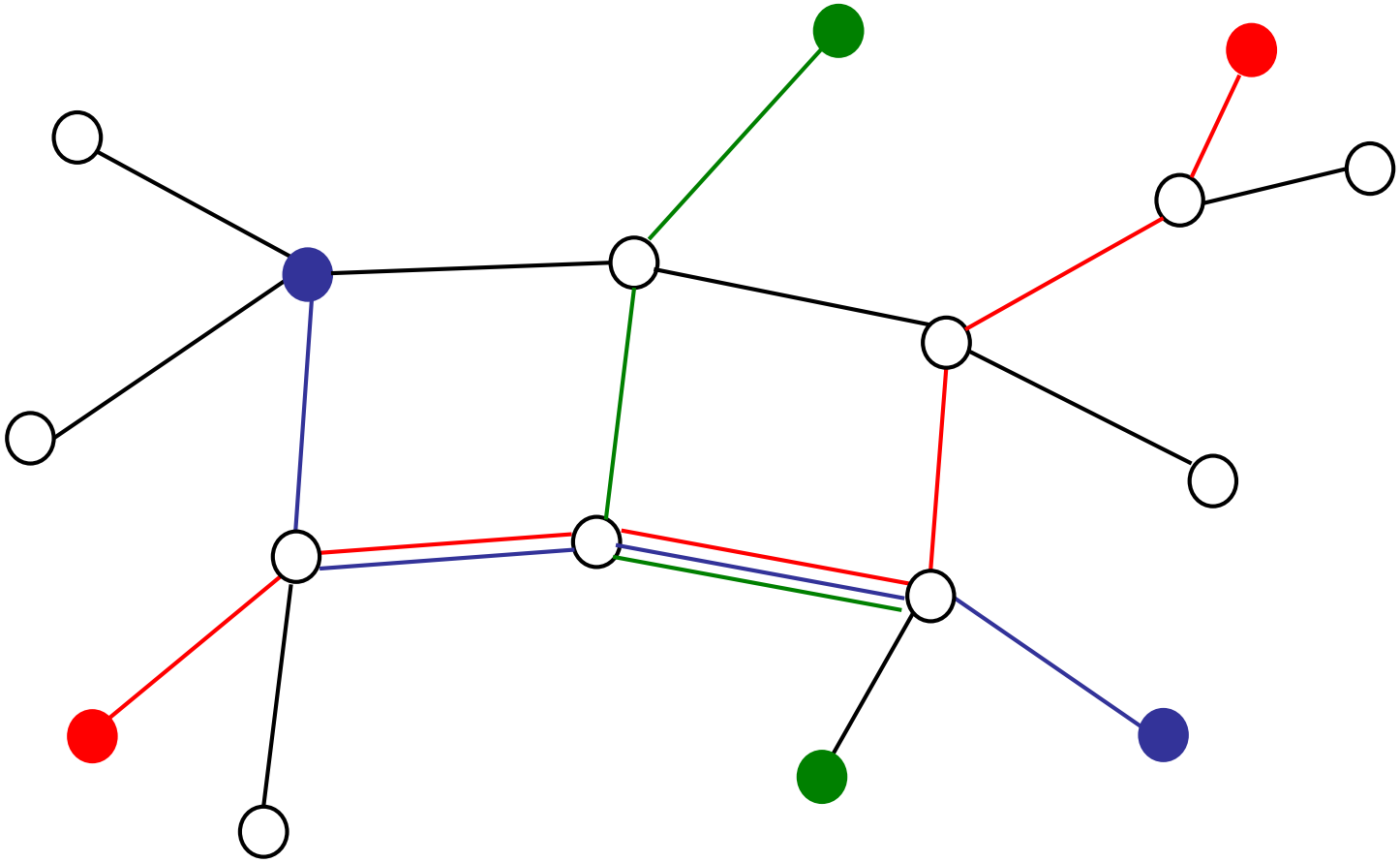
Cost: Accessing the i-th item in the list incurs a cost of i.

Goal: Minimize cost paid in serving σ.

Applications: Data compression

S. Albers, S. Lauer. On list update with locality of reference. ICALP 2008.

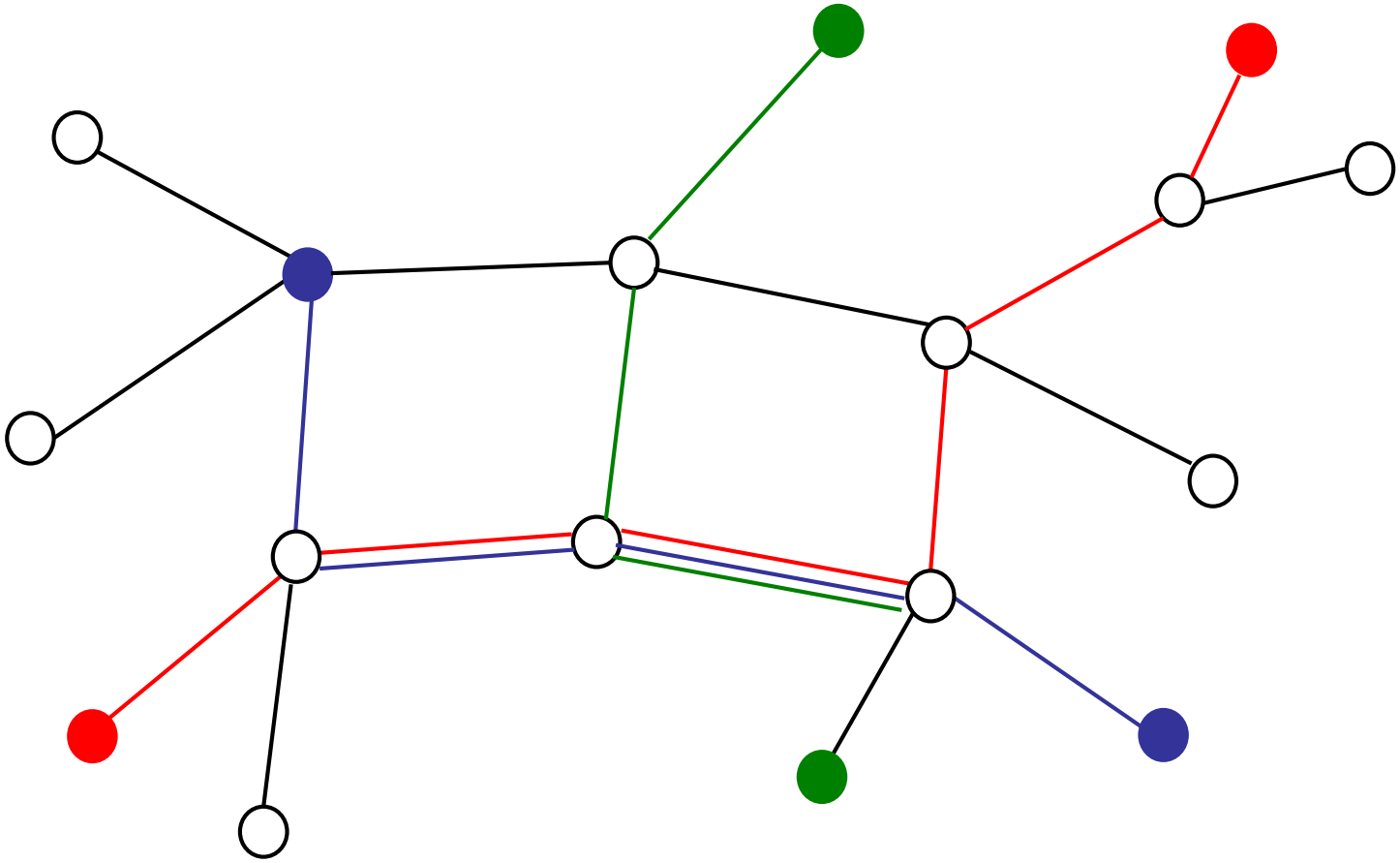
8. Network design: Fair cost allocation



G=(V,E,c) pairs (s_i,t_i) If k agents use e, each pays c(e)/k

Anshlevich, Dasgupta, Kleinberg, Tardos, Wexler. SICOMP 2008.

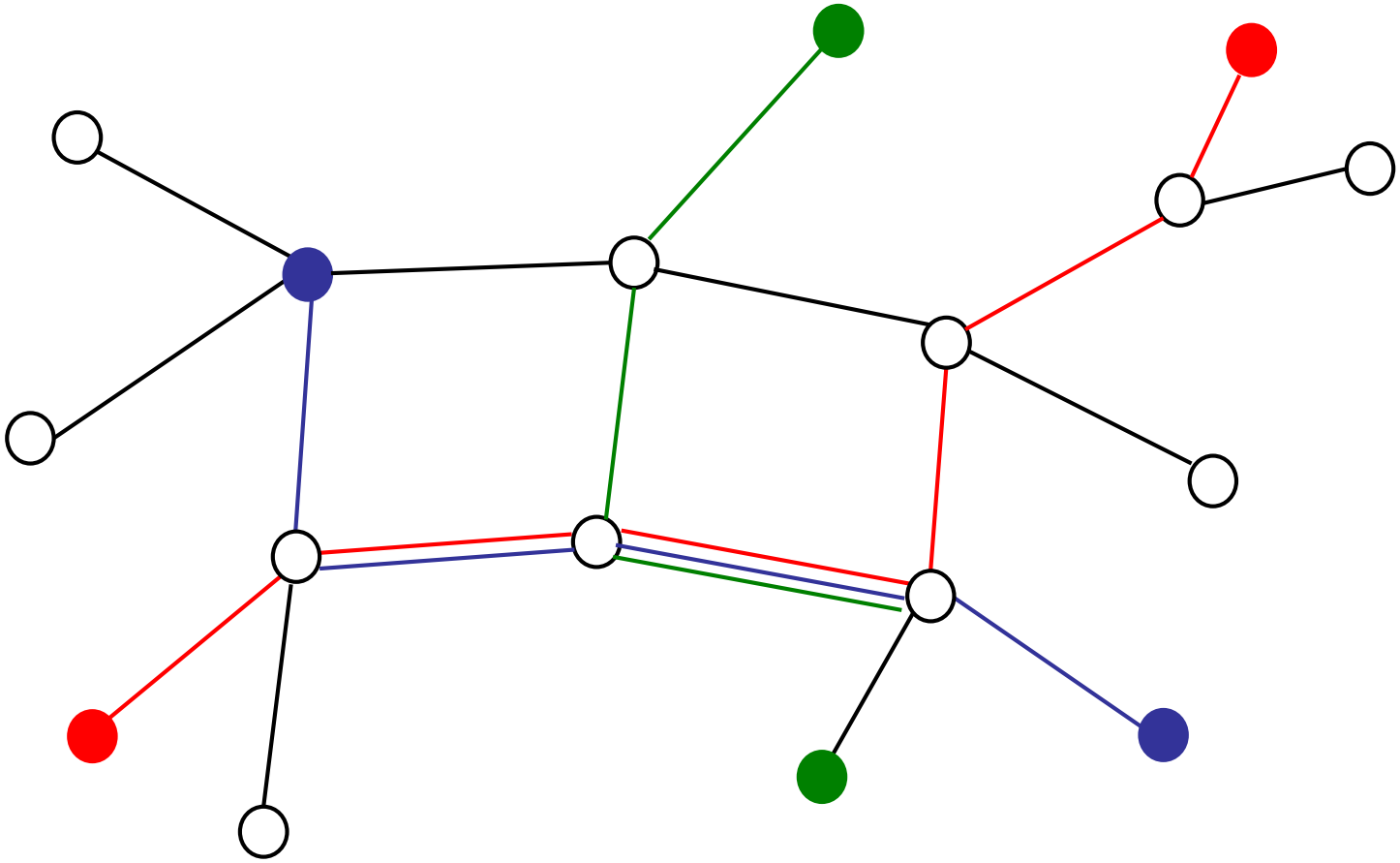
9. Network design: Arbitrary payments



G=(V,E,c) pairs (s_i,t_i) Cost of an edge may be split arbitrarily.

Anshlevich, Dasgupta, Tardos, Wexler. Theory of Computing, 2008.

10. Routing: Energy optimization



G=(V,E) pairs (s_i,t_i) min $\Sigma_e f(l_e)$ where $f(l) = c + l^{\alpha}$

Andrew, Antonakopoulos, Zhang, Min-cost network design with dis-(economies) of scale. FOCS 2010.