artist : Miriam Stroop

Network Application of Cooperative Game Theory

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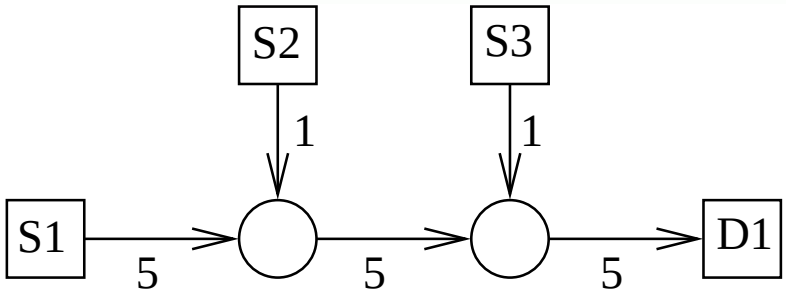
7th workshop on dynamics and computation: iterated games and cooperation

Introduction : bandwidth allocation



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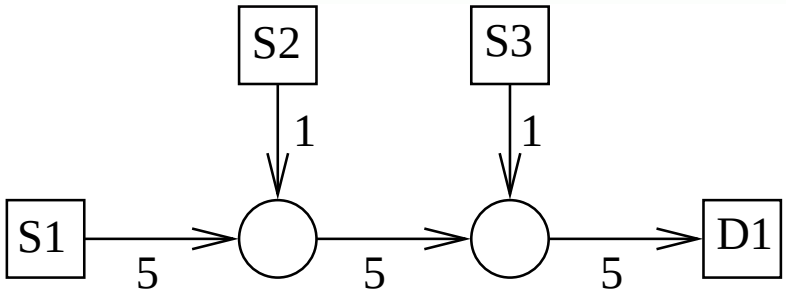

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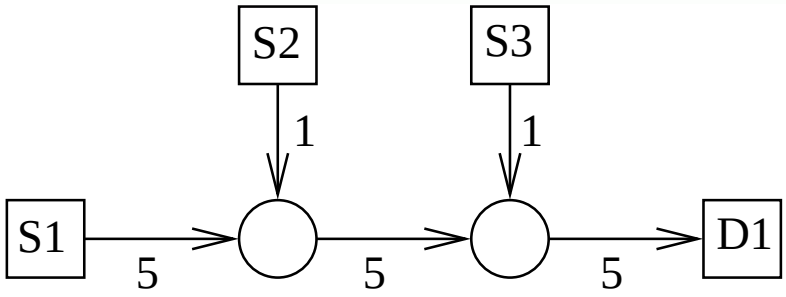

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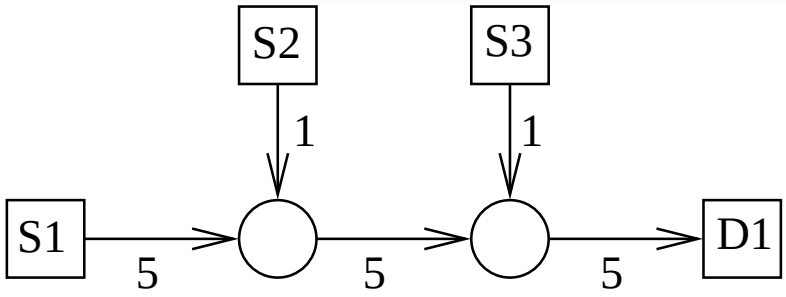

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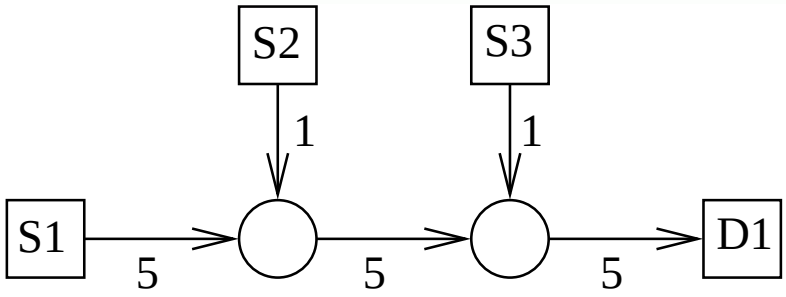

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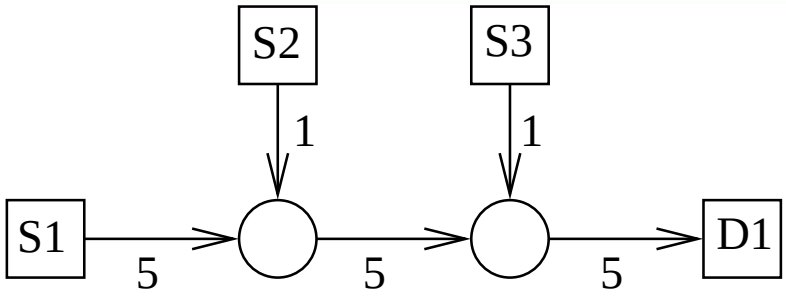

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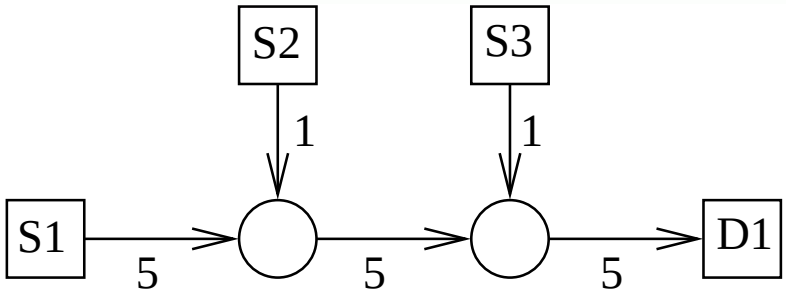

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- Solution proposed in *Mazumdar, IEEE/ACM TON, 2000*

The Nash Bargaining Solution (NBS)

- This convex optimization problem leads to NBS

$$\max_{\{x\}} \prod_{i=1}^{N} (x_i - MR_i)$$

x_i	$\geq$	MR_i	Minimun rate
x_i	$\leq$	PR_i	Peak rate
$(Ax)_l$	$\leq$	$(C)_l$	$a_{lp} = 1$ if link l belongs to path p

- NBS is
  - Pareto-Optimum
  - Fair
  - Unique

The user problem

- Algorithm needs to be distributed (decentralized)
- Greedy procedure leads to *Nash equilibria* (not PO)
- Needs to introduce extra N positive network parameters $\alpha_i, i = 1, \ldots, N$ (cost per bandwidth)
- The objective of each user is to maximize its net utility

$$\max_{\{x\}} ln(x_i - MR_i) - \alpha_i x_i$$

- The network aims to maximize its revenue

$$\max_{\{x\}} \sum_{i=1}^{N} \alpha_i x_i$$