Distributed Algorithms 2021

Port-numbering model
Port-numbered network
\( N = (V, P, p) \)

Distributed algorithm
\( A = (\text{init}, \text{send}, \text{receive}) \)

Output of algorithm \( A \) in network \( N \)
Bipartite maximal matching
Input:
proper 2-coloring

Output:
maximal matching

Model of computing:
PN model
Algorithm

• **Orange** nodes send *proposals* to their neighbors, one by one
  • order by port numbers

• **Blue** nodes *accept* the first proposal they get, reject everything else
  • break ties by port numbers
Vertex cover
Input: nothing

Output: 3-approximation of minimum vertex cover

Model of computing: PN model
Algorithm

- Construct bipartite double cover $G'$
  - one node in $G$: two virtual copies in $G'$
  - one edge in $G$: two virtual copies in $G'$
- Find a maximal matching $M'$ in $G'$
- Take all original nodes of $G$ whose virtual copies are matched in $M'$
Graph $G$
Graph $G'$
Maximal matching $M'$
Set of edges $M$
Set of nodes C