Distributed Algorithms 2023

3 Port-numbering model
Port-numbered network

\[ N = (V, P, p) \]

Distributed algorithm

\[ A = (\text{init, send, receive}) \]

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