Distributed Algorithms 2020

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 $G'$