# DUCAT

## Distributed Network Computing through the Lens of Combinatorial Topology


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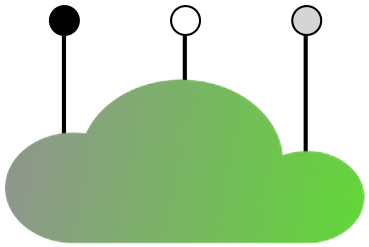
# Distributed Computing and Combinatorial Topology

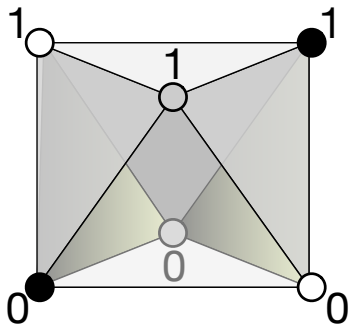


Processes

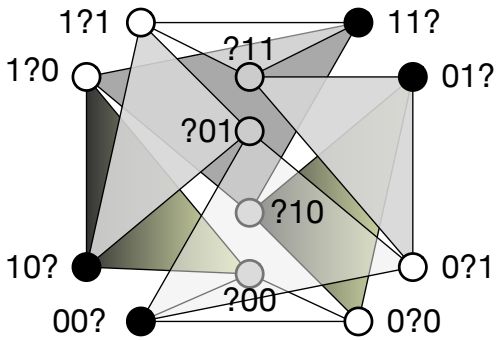
Communication medium

- autonomous processes
- no central coordination

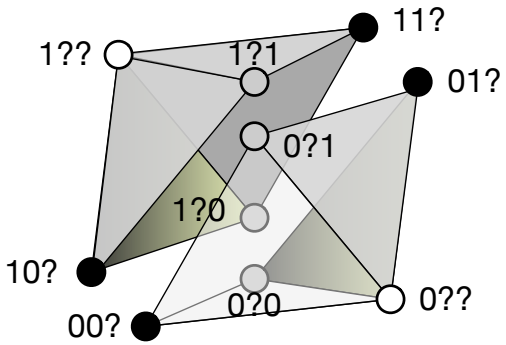
Input complex



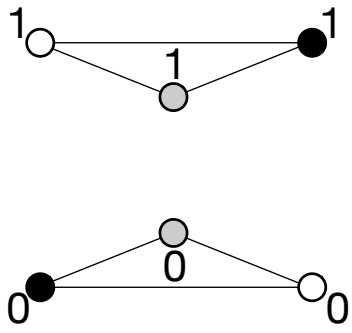

Protocol complex for $C_3$




Protocol complex for $S_3$




Output complex



# Context and Objectives

- **Algorithms design and analysis:** establishing lower bounds or impossibility results is extremely difficult.
- **Combinatorial topology:** extensively used in the context of crash-prone asynchronous shared-memory (or message-passing).
- **Objective of DUCAT:** Extending these results to other models
  - Network computing
  - Dynamic networks
  - Beyond full-information protocols

# Expected Outcomes

1. Complexity results: New lower bounds, but also new upper bounds

2. Better understanding of the nature of distributed computing

3. Unified framework for distributed computing