

# Model Checking Lab

Meeting II: Syzmanski Mutual Exclusion Protocol

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# Szymanski Mutual Exclusion Protocol

## Idea

Mutual Exclusion in four phases:

- Announce **intention**
- **Enter** waiting room and wait for other processes
- **Enter** waiting room and **close door**
- **Leave** waiting room and **access CS**

# Szymanski Algorithm

## Algorighm

- P10     $\text{flag}[i]:=1$
- P11    **wait until**  $\forall j, \text{flag}[j]<3$
- P20     $\text{flag}[i]:=3$
- P21    **if**  $\exists j, \text{flag}[j]:=1$  {  
         $\text{flag}[i]:=2$
- P22    **wait until**  $\exists j, \text{flag}[j]=4$   
        }
- P30     $\text{flag}[j]:=4$
- P31    **wait until**  $\forall j < i, \text{flag}[j]<2$   
        **Critical section**
- E0    **wait until**  $\forall j > i, \text{flag}[j] \in \{0, 1, 4\}$
- E1     $\text{flag}[i]:=0$

# Presentation of some Models

# Fault-Tolerant Communication Protocol

## Literature

- Piotr Berman, Juan A. Garay [Asymptotically optimal distributed consensus. Proceedings of the 16th International Colloquium on Automata, Languages and Programming, p. 80-94, Springer-Verlag 1989.](#)

We model the **first** algorithm, i.e. [Phase Queen](#)

# Distributed Consensus

## Hints

- The state space of the model could be very large, instantiate your model with a single unreliable process and four reliable processes.
- Assuming that an unreliable process can only transmit arbitrary 0 or 1 values (and not any other value).
- Consider broadcasts as a feature of the medium and **not** of the protocol!