

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

Algorithm

```
P10  flag[i]:=1
P11  wait until  $\forall j, \text{flag}[j] < 3$ 
P20  flag[i]:=3
P21  if  $\exists j, \text{flag}[j] = 1$  {
      flag[i]:=2
P22  wait until  $\exists j, \text{flag}[j] = 4$ 
      }
P30  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   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!