Improving rippled: Leveraging passive model inference techniques to test large decentralized systems

Research Project (CSE3000) By Sengim Karayalcin
Supervised by Stefanie Roos & Satwik Prabhu Kumble /25-6-2020

1. PROBLEM

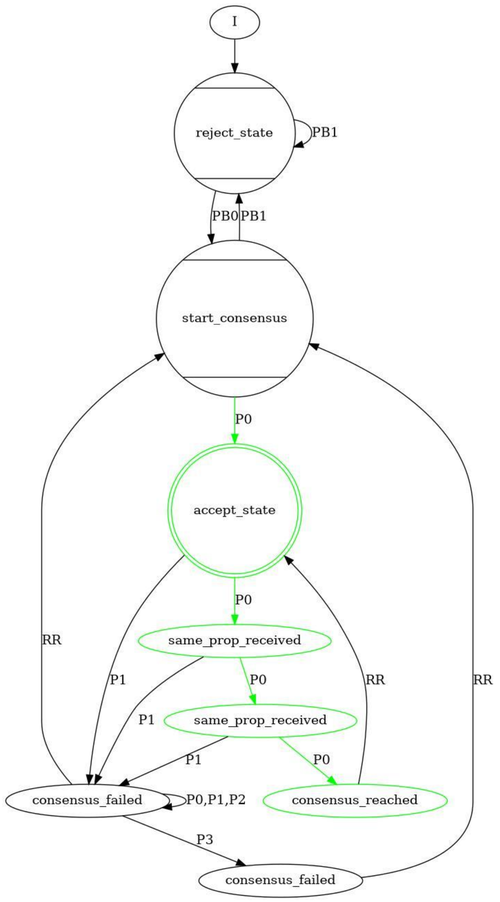
- Decentralized networks and blockchains are massively popular
- Testing these systems is complex
- Testing should be done using only network traffic

2. SOLUTION

- Test systems using passive model inference tools
- Generate state machine for node in network
- Compare empirical machine to theoretical version

3. MODEL INFERENCE

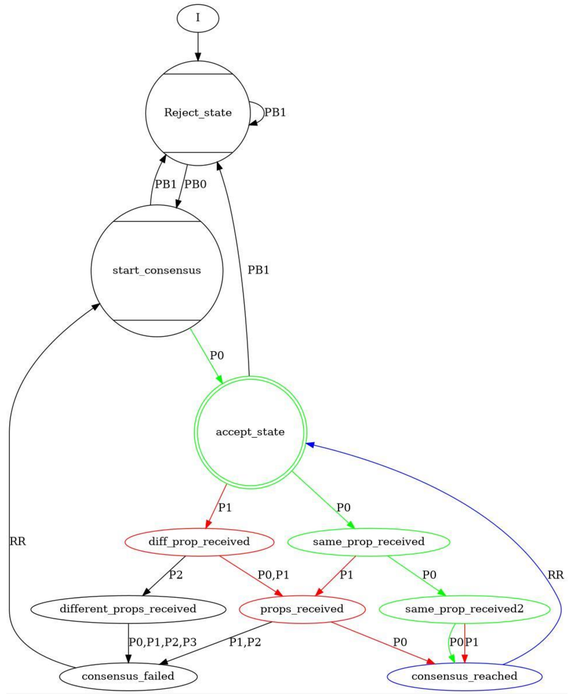
- Generate state machine from traces of program execution
- Passive inference: only learn from traces
- Active inference: learner can query machine while learning



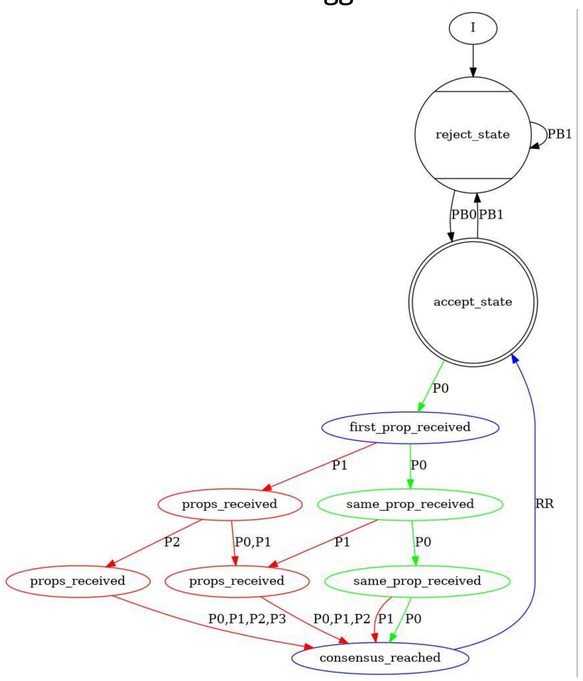
Model of correct node

RESULTS

- Simulated different bugged and non-bugged nodes
- Bugs visible in model as paths that should not exist



Model of first bugged node



Model of second bugged node

4. RIPPLE

- Fast global money transfer system
- Decentralized trust based blockchain
- Home of XRP cryptocurrency

5. LIMITATIONS

- Types of bug detectable limited
- Generating model requires knowledge of system
- Practical implementation might be more complex
- Real world bugs harder to spot

6. FUTURE WORK

- Try method on live network
- Test active model inference for modeling
- Test method for larger network

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