Analyzing the Impact of Botnet Infection on Networked Systems using Timed Automata

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Why choose this Direction?

The Internet of Things (IoT)

- The rapid growth of IoT has led to a vulnerable networked infrastructure.

- The rivalry between vendors has resulted in a hastened device production.

- Typical IoT devices have low computational resources and are poorly secured.

Botnets in IoT

- In recent years, IoT Botnets have caused unprecedented impact on networked systems.
  - Mirai [September 2016]
  - Hajime [October 2016]
  - BrickerBot [April 2017]

- Research on IoT Botnets have progressed considerably in the last four years.

What is our Objective?

Modeling, Observation, Experimentation

- Modeling the precise behavior of entities within a botnet.

- Observe the dynamic behavior of entities in varying simulation scenarios.

- Perform experiments and analyze the data to get our answers to certain research questions.
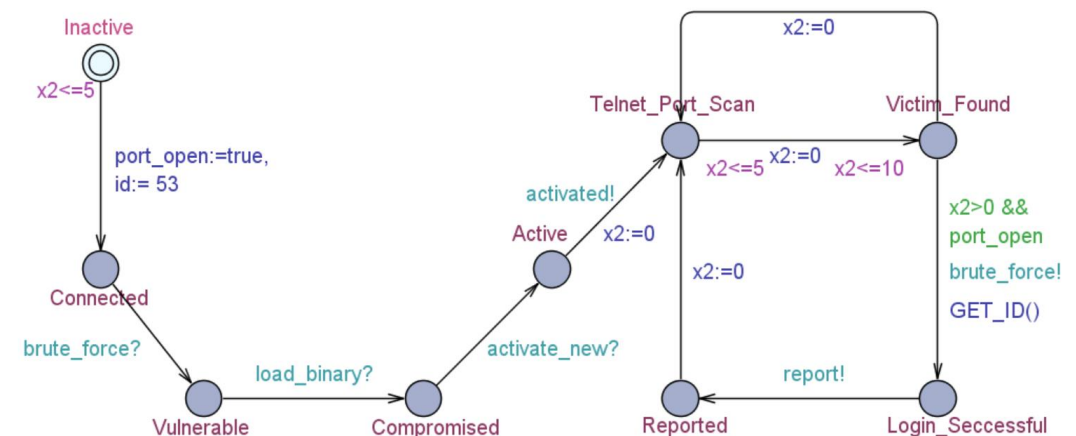
Modeling and Simulation

- Allow us to
  - Model networked systems and gather experimental data for analyses.
  - Reinforce our understanding of the topic through observations and experimentation.
  - Combine our strengths and learn from each other in a cooperative environment.

Modeling Formalism

- Timed Automata

Modeling Tool

- UPPAAL 4.1

How are we going to Proceed?

Phase 1: until Late October

- Extensive literature review.
- Learn and experiment with the capabilities of the simulation tool.
- Perform some initial experiments.
- Meet with the instructor.

Phase 2: until 1st Project Presentation

- Increase the model accuracy.
- Perform new/modified experiments.
- Start shaping the background and relevant literature part of the project report.
- Present current progress.

Phase 3: until Mid-Late November

- Start writing about our experimental method and results.
- Find graphical ways to present the experimental data for easier visualization.
- Complete the literature review
- Meet with the instructor.
- Extend the scope of the experiments if feasible.

Phase 4: until 2nd Project Presentation

- Focus almost exclusively on the writing.
- Finalize results and recommendations, if any.
- Present the results.

Final Phase: until Submission

- Perform final adjustments before submitting.

Thank You!