Lecture #4: Verification of a Deterministic Finite Automaton

Assumptions

- Preliminary material for this lecture has been reviewed.

Questions for Review

You should be able to answer each of the following questions.

1. Precisely what are you trying to prove about a deterministic finite automaton in order to establish that it is "correct"?

2. What do you need to check, in order to confirm that you really *have* a valid "deterministic finite automaton" with the same alphabet as a given language?

3. What else must be checked in order to identify a subset of $\Sigma^\star$ with each of the states of your DFA?

4. What is the final thing that must be confirmed in order to establish that your DFA has a given language?

5. How (or why) is this easier to do, if your DFA was developed using the **design process** introduced in the previous lecture?

Objective

Let $\Sigma = \{a, b\}$ and let $L \subseteq \Sigma^\star$ be the following language:

$$L = \{w \in \Sigma^\star \mid \omega \text{ ends with } abb\}.$$

In the presentation for the previous lecture, a deterministic finite automaton $M = (Q, \Sigma, \delta, q_0, F)$ with the above alphabet Σ and the following transition diagram was designed.
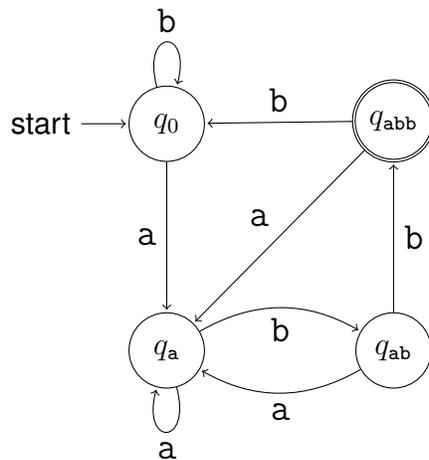
The goal for this Zoom demonstration will be to prove that $L(M) = L$.

One Attempt: Starting from Scratch

Another Attempt: Using Information from the Design Process

Breakout Session

It is possible that you learned in school that there are **eight** planets in the solar system: *Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus* and *Neptune*.

However, you might also have learned that there are **nine** planets — because you might also have been told that *Pluto* is a planet. Discovered in 1930 and considered to be a planet then, Pluto was "downgraded" by the International Astronomical Union, with its status changed from "planet" to "dwarf planet" in 2006, after a smaller dwarf planet that was more massive — *Eris* — was discovered in 2005.

Just to make matters more confusing, Eris was briefly considered to be a planet too — so that the solar system had nine planets, then ten, and then only eight.

Some people had an emotional reaction when they learned that a planet, which they had learned about in school, was not a planet any more.

Please discuss what you think the emotional reaction(s) might have been, and explain why.