

CSC236 Worksheet 8 Solution

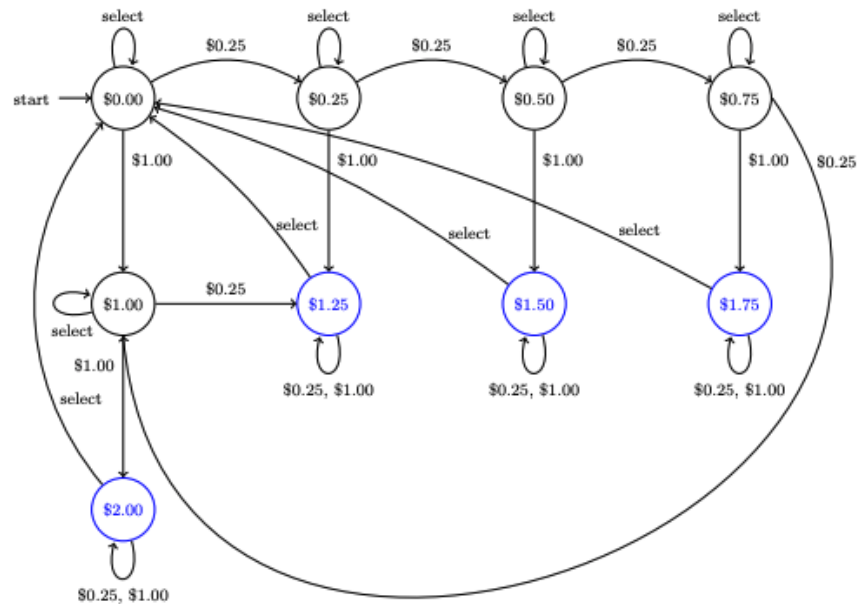
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Question 1

Notes:

- **Deterministic Finite State Automaton (DFSA):** is a mathematical method of machine which, given any input string x , **accepts** or **rejects** x .
- Applications of DFSA
 1. Vending Machine



2. Protocol analysis
3. Text parsing
4. Video game character behavior

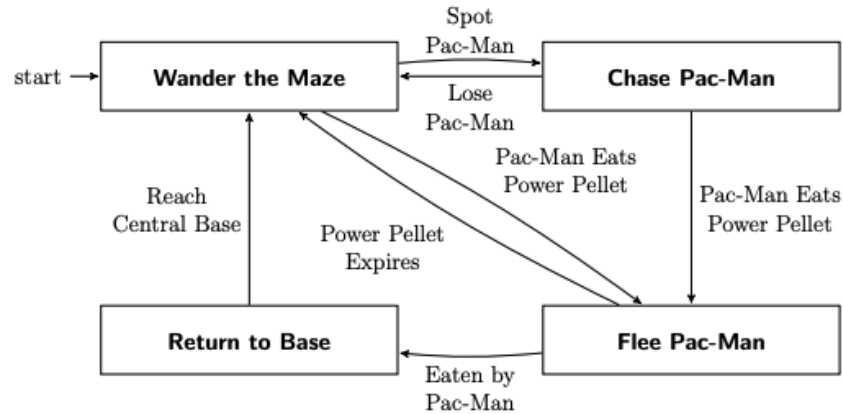
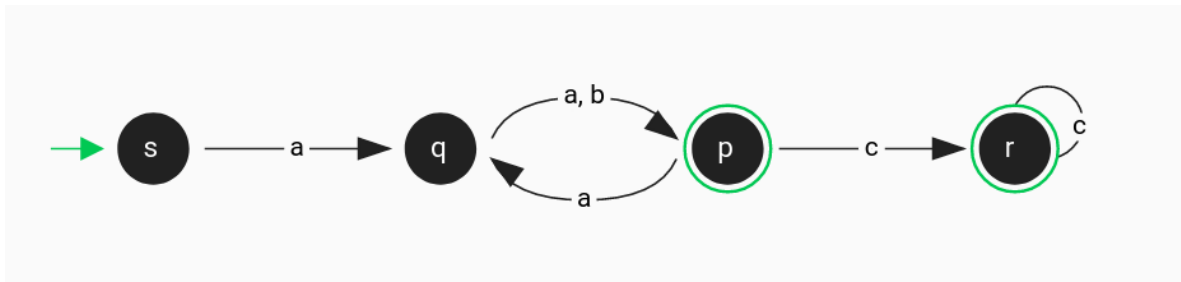


Figure 3: Behavior of a Pac-Man Ghost

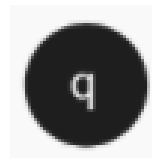
5. Security Analysis
6. CPU control units (**)
7. Natural Language Processing (**)
8. Speech Recognition (**)

• Definitions and Syntax



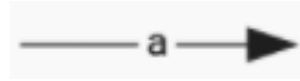
– *DFSA* M is a quintuple $M = (Q, \Sigma, q_0, F, \delta)$, where

- * Q : a finite set of **states**.
 - Represents status of system
 - Is represented by a black circle, i.e. s,q



- i.e. automatic sliding door at walmart has two states: either close or open
- i.e. traffic light has three states: red, yellow, green

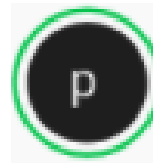
- * Σ : a finite non-empty alphabet
 - is set of symbols in each transition, i.e. a, b, c



- * $q_0 \in Q$: the start or initial state
- * $\delta : Q \times \sigma \rightarrow Q$: a transition function
 - is a connection between two states.
 - is represented by an arrow

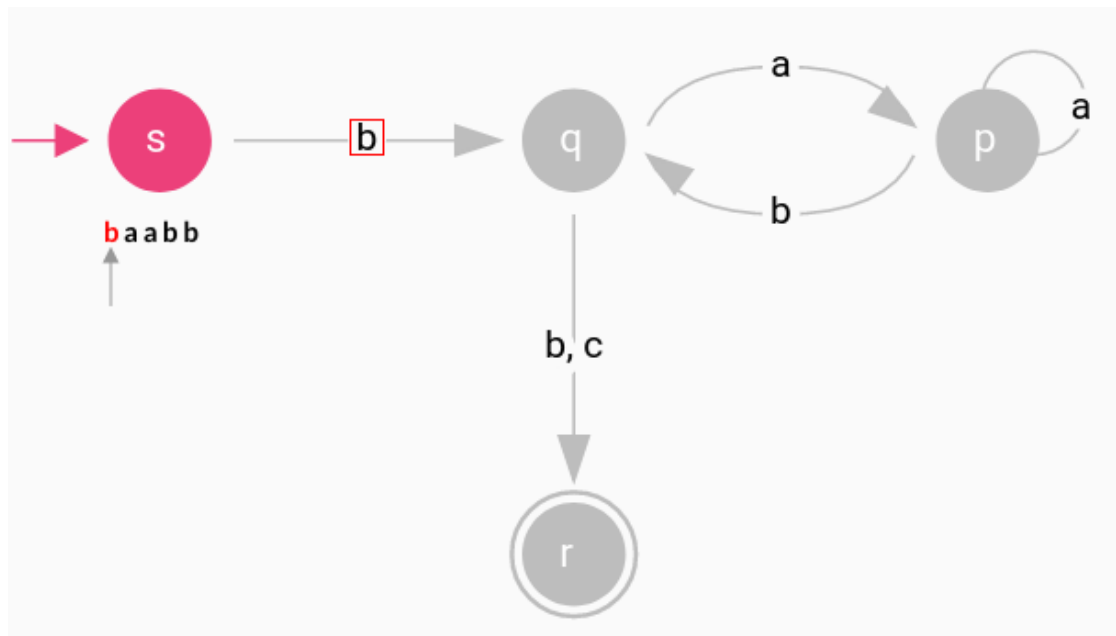


- * $F \subseteq Q$: the set of accepting or final states
 - Is represented by a double circle

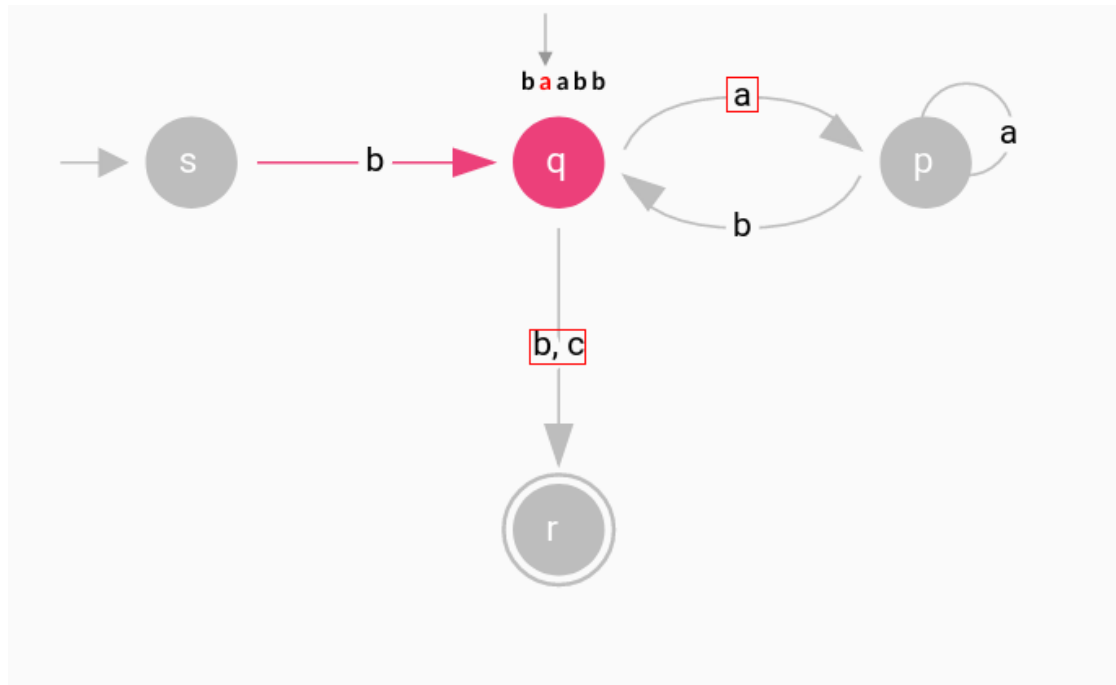


- Multiple accepting states may exist
- Purpose: When processing ends, the output is either *accept* or *reject*

• Simple Example



1. First symbol of the input **baabb** is **b** and the current state is **s**.
2. Ask, is there any exiting transition from **s** that contains the symbol **b**?
3. The answer is yes, so move to **q**



1. Next symbol of the input **baabb** is **a** and the current state is q .
2. Ask, is there any exiting transition from q that contains the symbol **a** or **b,c**?
3. The answer is yes, and it's **a**. So move to p