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CISP - 440

Assignment 10

12/6/2018

Part 0 - State Machines.

Description:

The goal for this assignment is to demonstrate my knowledge on state machines. To do this, I am to perform a multitude of problems based on state machines. This includes, determining transition diagrams, initial states, output, input, and state sets.

Problem 2:
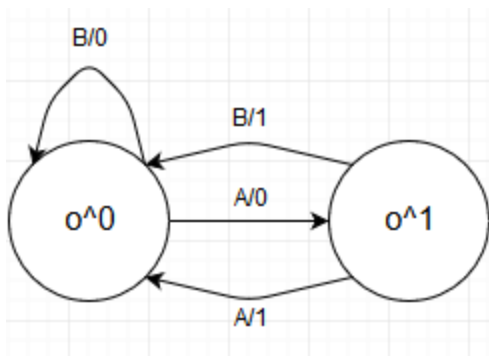
Draw the transition diagram of the finite-state machine.

Input = {a, b};
Output = {0, 1};
State = $\{o^0, o^1\}$;

S \ I	f		g	
	a	b	a	b
σ_0	σ_1	σ_0	0	0
σ_1	σ_0	σ_0	1	1

Transition Diagram:

Note: o^0 is the initial state.

Problem 5:
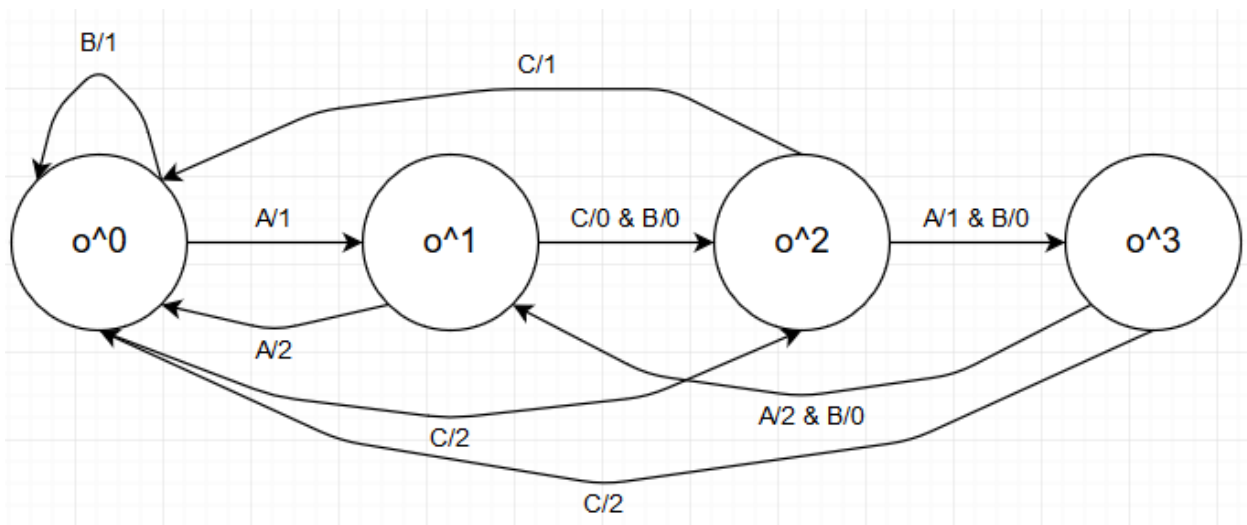
Draw the transition diagram of the finite-state machine.

Input = {a, b, c};
Output = {0, 1, 2};
State = $\{o^0, o^1, o^2, o^3\}$;

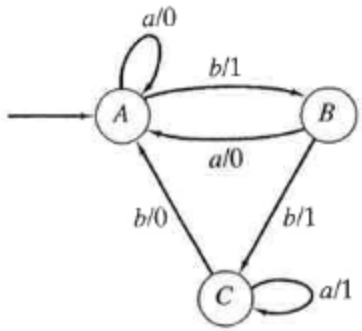| I / S	f			g		
	a	b	c	a	b	c
σ_0	σ_1	σ_0	σ_2	1	1	2
σ_1	σ_0	σ_2	σ_2	2	0	0
σ_2	σ_3	σ_3	σ_0	1	0	1
σ_3	σ_1	σ_1	σ_0	2	0	2

Transition Diagram:

Note: o^0 is the initial state.

Problem 7:

Find the input set, output set, state set, and initial state. Write a table defining the next-state and output functions for each finite-state machine.

7.

Input = {a, b};
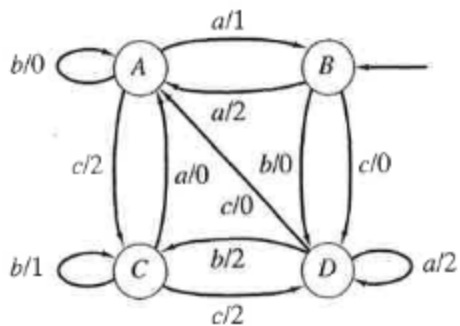Output = {0, 1};
State = {A, B, C};

Initial State = A

Table:

	F		G	
	a	**b**	**a**	**b**
A	A	B	0	1
B	A	C	0	1
C	C	A	1	0

Problem 10:

Find the input set, output set, state set, and initial state. Write a table defining the next-state and output functions for each finite-state machine.

10.

Input = {a, b, c};

3

Output = {0, 1, 2};
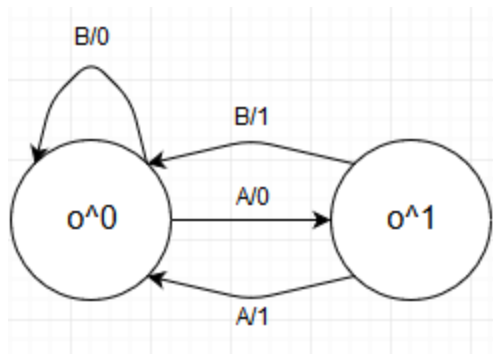State = {A, B, C, D};

Initial State = B

Table:

	F			G		
	a	**b**	**c**	**a**	**b**	**c**
A	B	A	C	1	0	2
B	A	D	D	2	0	0
C	A	C	D	0	1	2
D	D	C	A	2	2	0

Problem 12:

Find the output string for the given input string and finite-state machine.
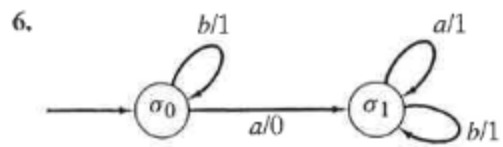
Input = abba

Finite-State Machine:

Output String = 0100

Problem 16:

Find the output string for the given input string and finite-state machine.
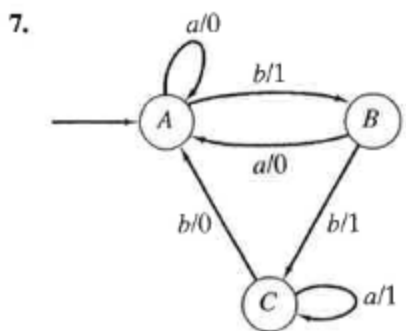
Input = aaa

Finite-State Machine:

6.

Output String = 011

Problem 17:

Find the output string for the given input string and finite-state machine.
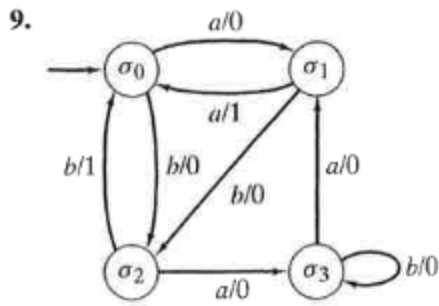
Input = aabbabaab

Finite-State Machine:

7.

Output String = 001110001

Problem 19:

Find the output string for the given input string and finite-state machine.

Input = bbababbabaaa

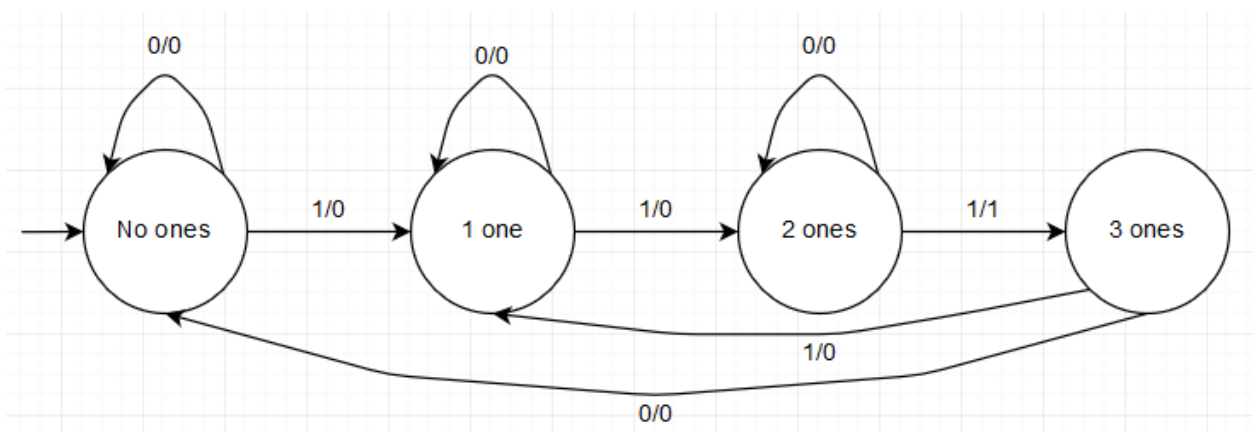**Finite-State Machine:**

9.

Output String = 010000000001

Problem 22:
Design a finite-state machine having the given properties. The input is always a bit string.

Properties:
Outputs 1 if k 1's have been input, where k is a multiple of 3; otherwise outputs 0.
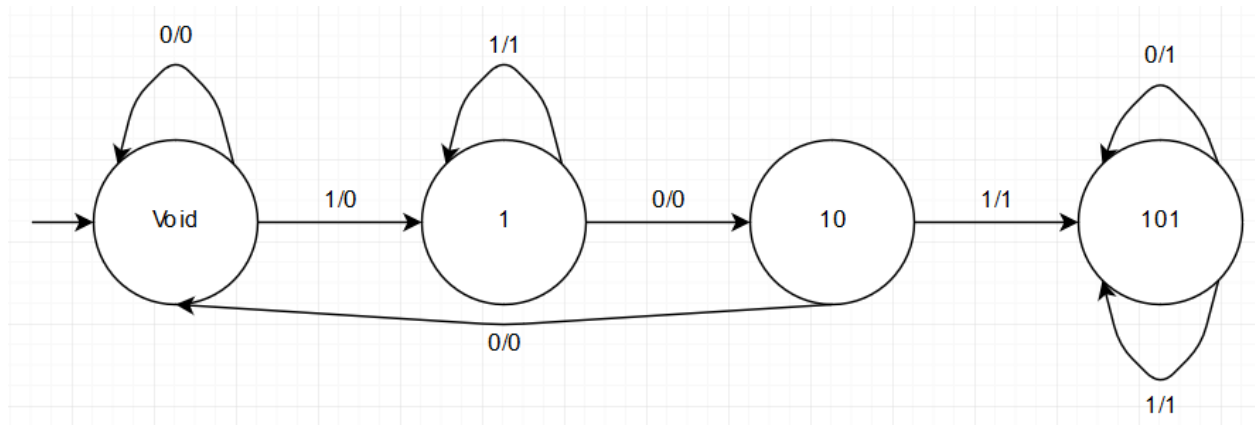
Finite-State Machine:

Problem 25:
Design a finite-state machine having the given properties. The input is always a bit string.

Properties:
Outputs 1 when it sees 101 and thereafter; otherwise, outputs 0.

**Finite-State Machine:**

Part 1 -Finite-State Automata.

Description:
The goal for this section of the assignment is to demonstrate my knowledge on state machines with regards to finite-state automata. In this type of state machine there can only be 2 possible outputs, those being 0 or 1. When an accepting state is reached a 1 is output. When a state that is not accepted is reached a 0 is output.
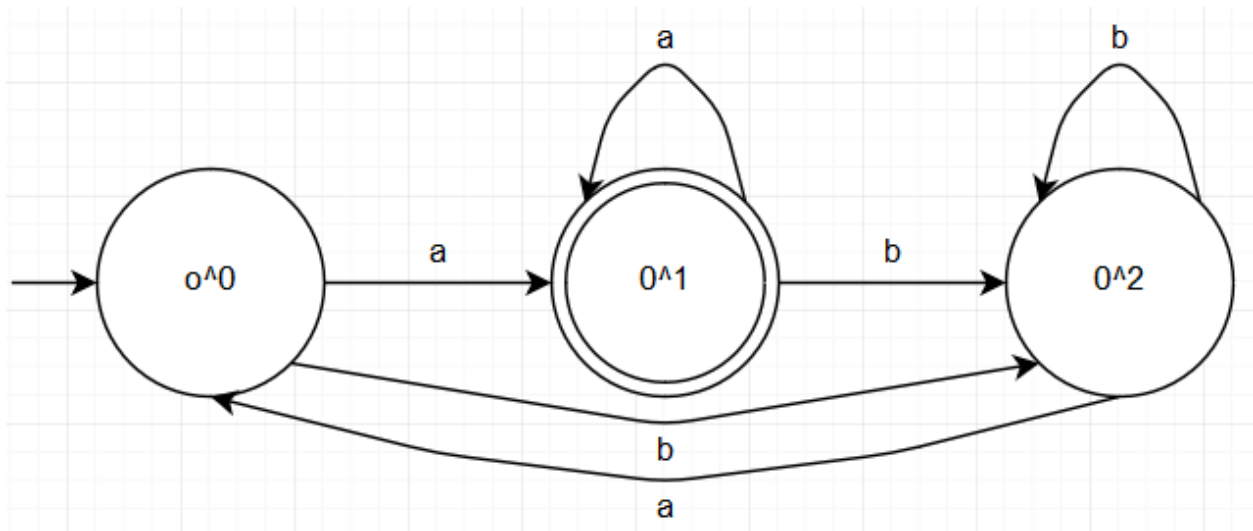
Problem 2:
Show that each finite-state machine is a finite-state automaton. Redraw the transition diagram as the diagram of a finite-state automaton.

Transition Diagram:

2.
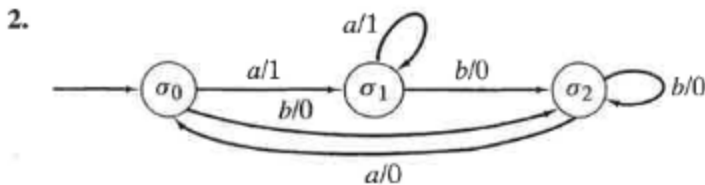
This is a finite-state automaton since an accept state always receives 1, and a non-accept state always receives 0.
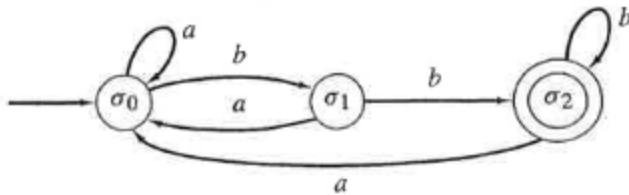
Automaton Diagram:

Problem 15:

Determine whether the given string is accepted by the given finite-state automaton.

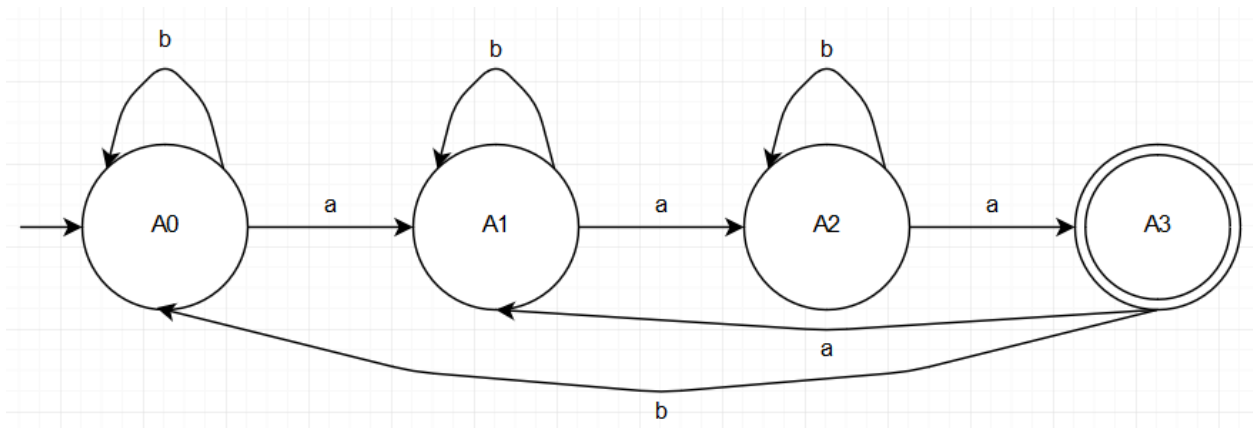String = aabaabb

Automaton:

The string is accepted

Problem 26:

Draw the transition diagram of a finite-state automaton that accepts the given set of strings over {a, b}.

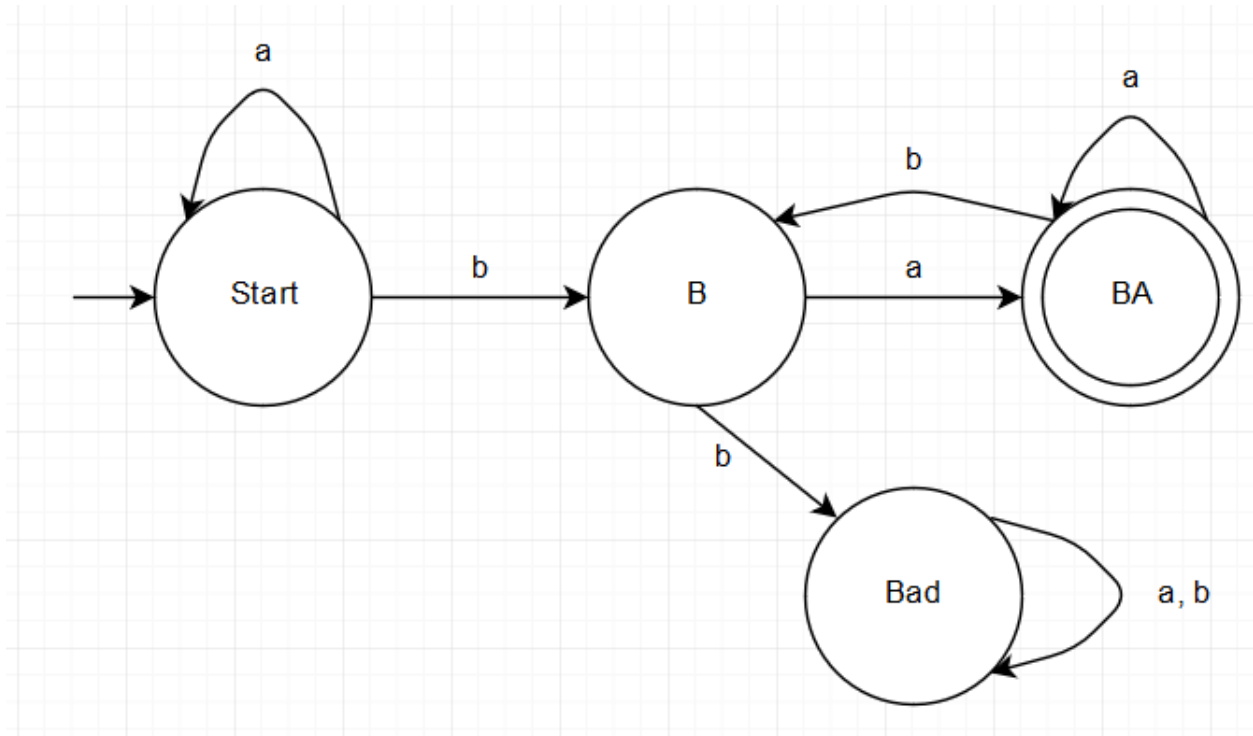**Property:**

Contains m a's, Where m is a multiple of 3

Automaton:

Problem 29:

Draw the transition diagram of a finite-state automaton that accepts the given set of strings over {a, b}.

Property:
Every b is followed by a.

Automaton:

Problem 37:

Note: I had difficulty understanding the concept of this problem. I failed to find a solution.

Conclusion

This assignment was straight forward. I actually originally learned about state machines when I took ENGR 303. Much of this was review for me. However, on problem 37 I encountered great difficulty. I found it hard to understand what they were asking for and had no idea of how to proceed. Still, I do believe that I understand the concept of state machines/automaton reasonably well. Looking forward to what comes next!