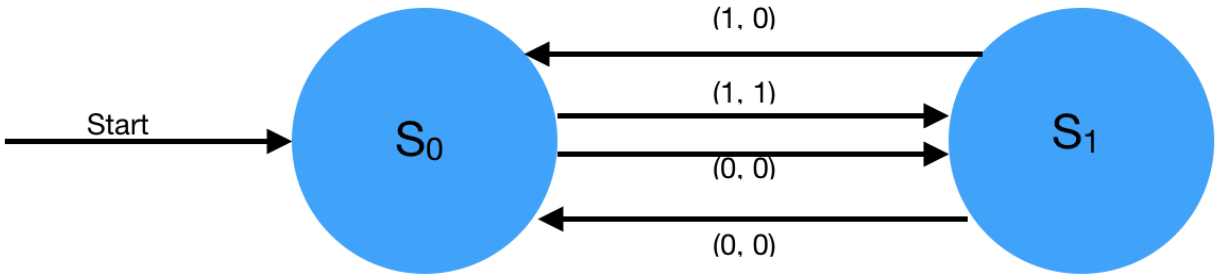
Rosen 13.2, Exercise 10:

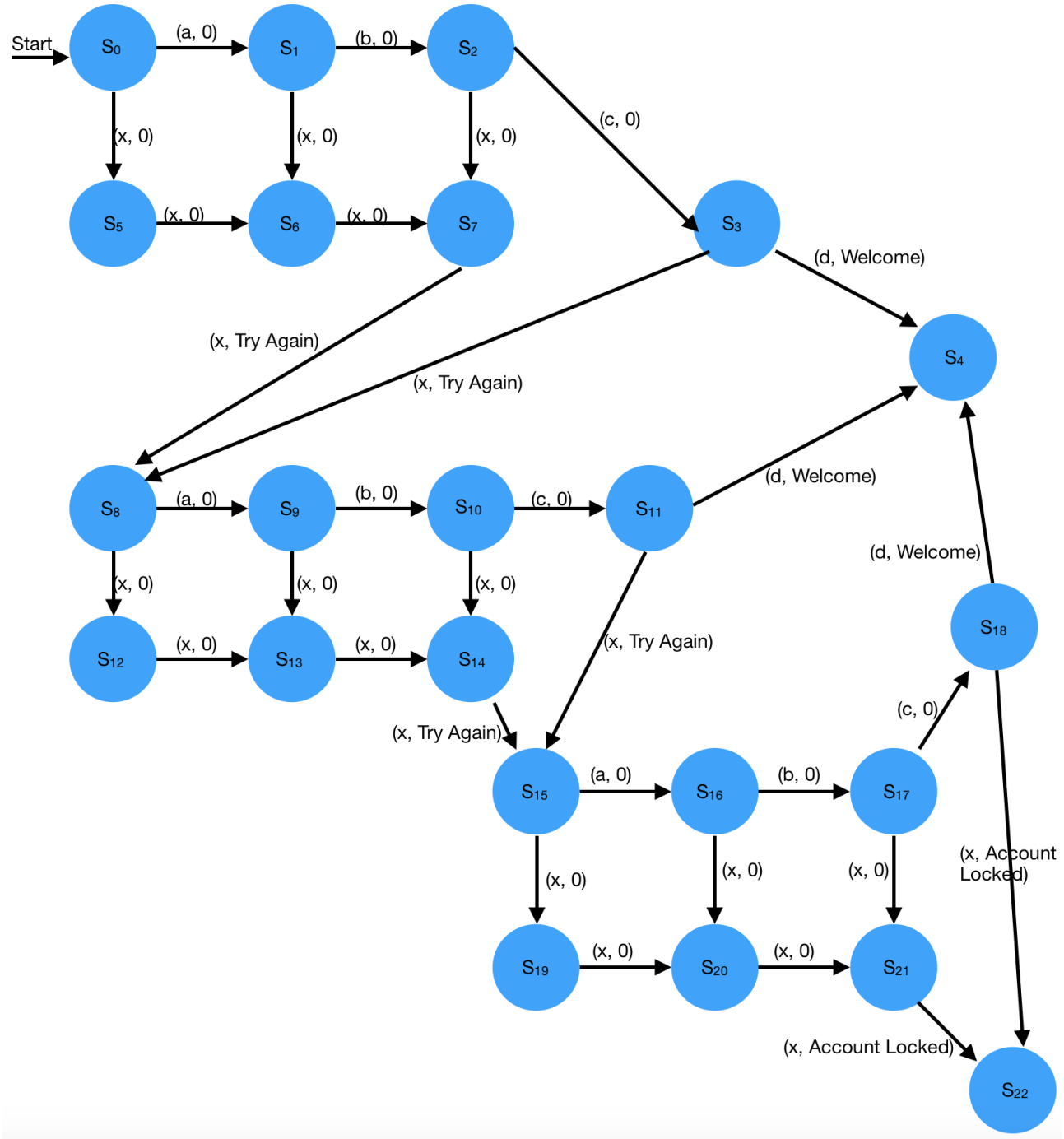
Construct a finite-state machine that changes every other bit, starting with the second bit, of an input string, and leaves the other bits unchanged.



Rosen 13.2, Exercise 14:

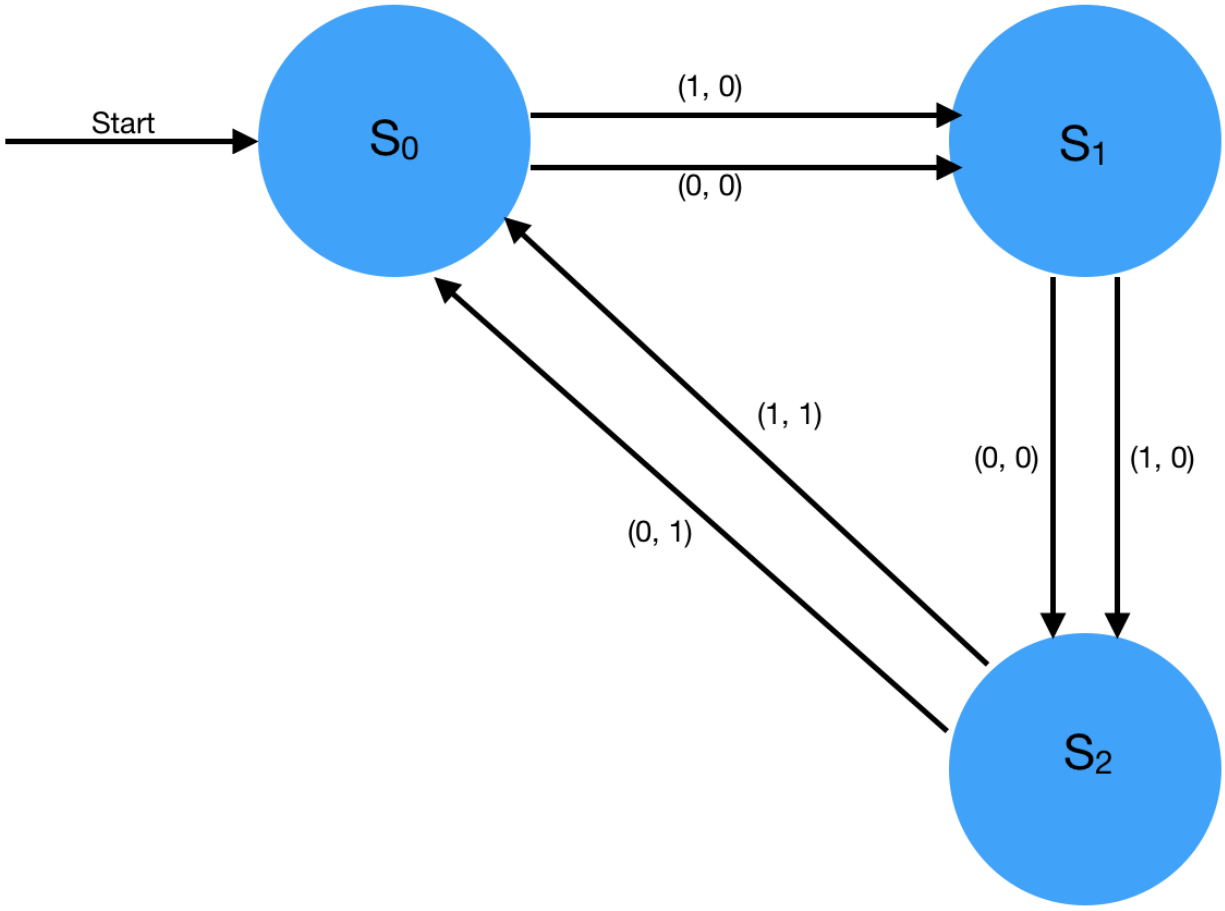
Construct a finite-state machine for entering a security code into an automatic teller machine (ATM) that implements these rules: A user enters a string of four digits, one digit at a time. If the user enters the correct four digits of the password, the ATM displays a welcome screen. When the user enters an incorrect string of four digits, the ATM displays a screen that informs the user that an incorrect password was entered. If a user enters the incorrect password three times, the account is locked.

Assume the correct password is $a\ b\ c\ d$.
On the other hand, x will represent an incorrect answer.



Rosen 13.2, Exercise 16:

Construct a finite-state machine that gives an output of 1 if the number of input symbols read so far is divisible by 3 and an output of 0 otherwise.

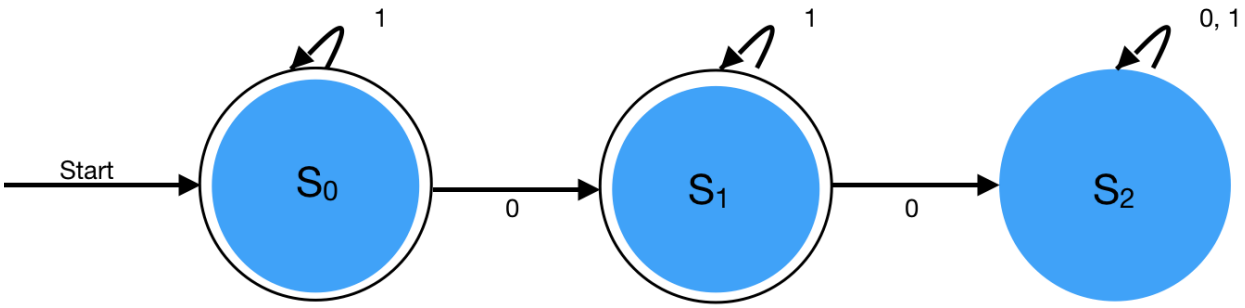


Rosen 13.3, Exercise 40(c):

Use Exercise 39 and finite-state automata constructed in Example 6 to find deterministic finite-state automata that recognize each of these sets.

c) the set of bit strings that contain at most one 0 (that is, that do not contain at least two 0s)

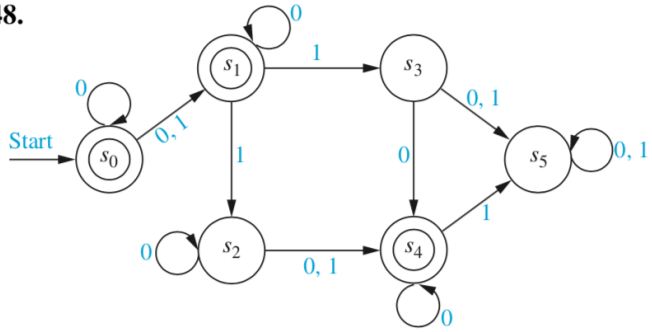
Final States = S_0, S_1
Non-final States = S_2



Rosen 13.3, Exercise 48:

In Exercises 48 find the language recognized by the given nondeterministic finite-state automaton.

48.



State	0	1
s_0	s_0,s_1	s_1
s_1	s_1	s_2, s_3
s_2	s_2,s_4	s_4
s_3	s_4,s_5	s_5
s_4	s_4	s_5
s_5	s_5	s_5

The finite states are s_0, s_1 and s_4

Options include:
Staying and looping at s_0 or moving to s_1 using input of 0.
0^n

Looping or not looping at s_0 before using input of 1 to move to s_1 and looping or not looping at s_1.
0^n10^m

Looping or not looping at s_0 before using input of 1 to move to s_1 and looping or not looping at s_1. Following which, using 1 to go to either s_2 or s_3. If at s_2 possibly loop a few times before using 0 from either s_2 or s_3 to reach s_4 and looping or not looping at s_4.
$0^n10^m10^x$
Note: $x \geq 1$

Looping or not looping at s_0 before using input of 1 to move to s_1 and looping or not looping at s_1. Following which, using 1 to go to s_2. Can possibly loop a few times before using 1 to reach s_4 and looping or not looping at s_4.
$0^n10^m10^p10^q$

$L(M) = \{0^n, 0^n10^m, 0^n10^m10^x, 0^n10^m10^p10^q \mid n, m, p, q \geq 0, x \geq 1\}$

Rosen 13.3, Exercise 54:

Find a deterministic finite-state automaton that recognizes the same language as the nondeterministic finite-state automaton in Exercise 47.