COMP 122/L Lecture 27

Kyle Dewey

Outline

- Finite state machines

Finite State Machines

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Basic idea: computation is done via traversal of **states**, where the states are known ahead of time.

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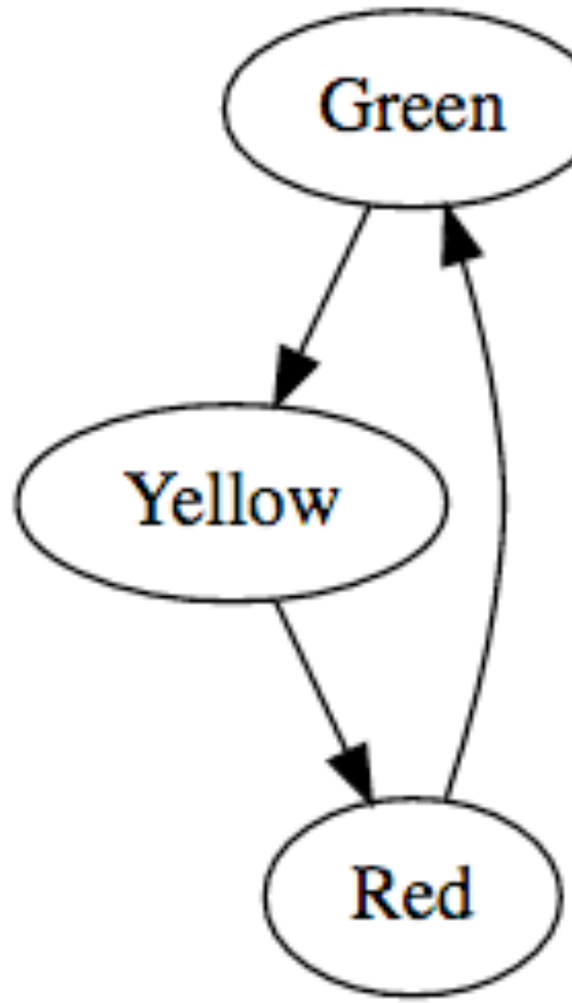
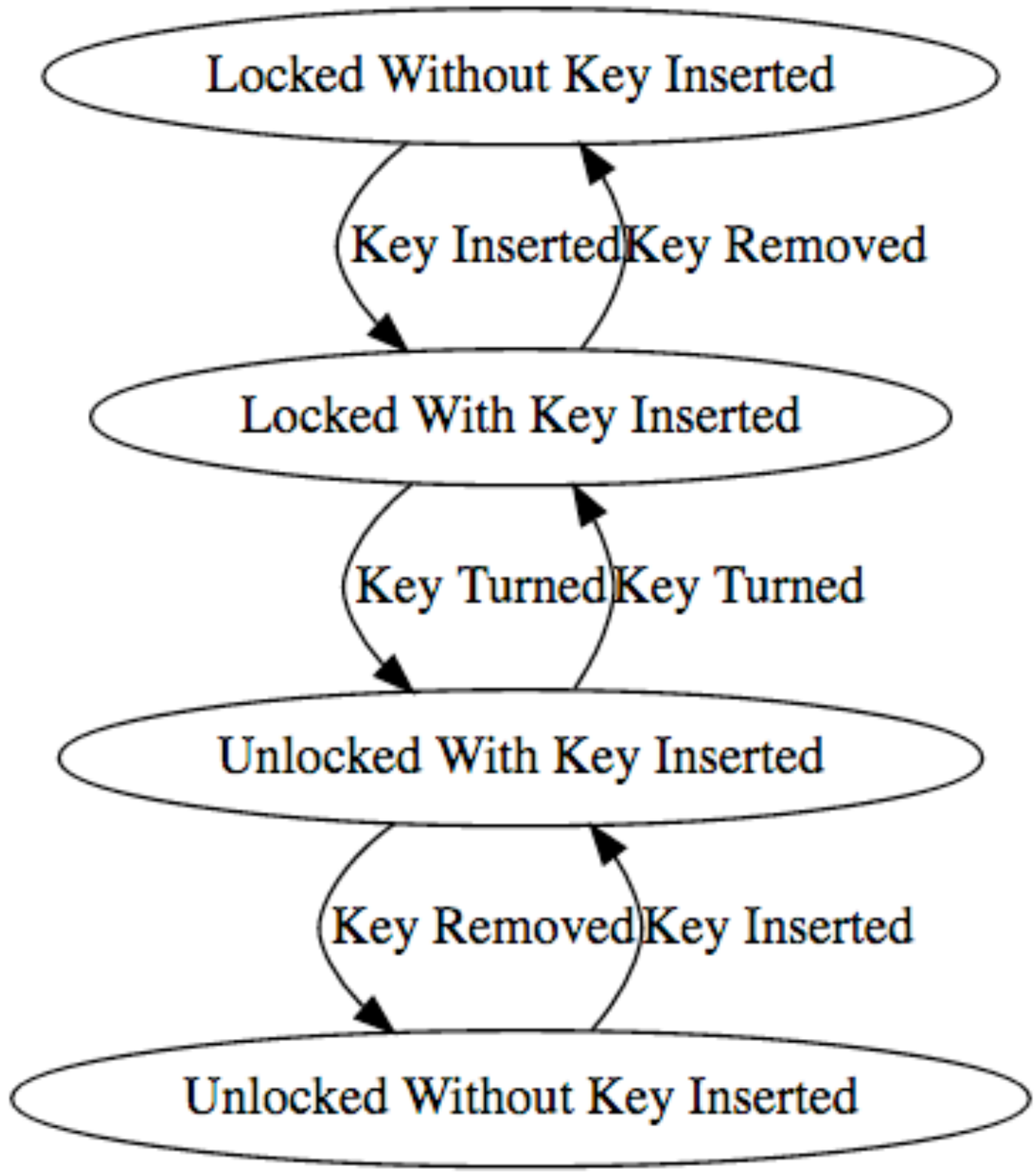
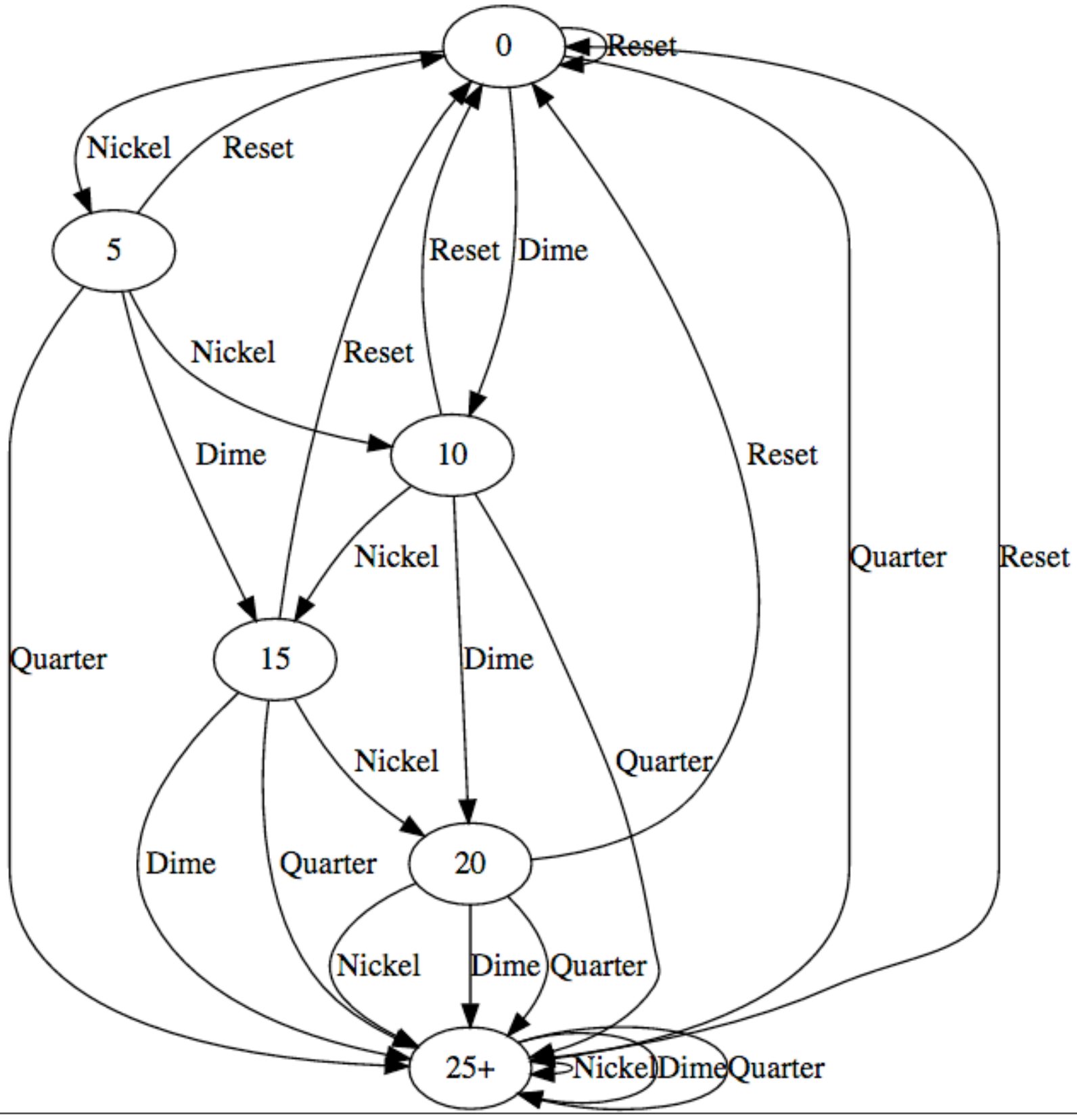


-Example: traffic light

Example: Lock and Key



Example: Counting Change



Significance

- Can encode many problems using finite state machines (FSMs)
- FSMs can be implemented with sequential circuits
- Internals of processors can be encoded with FSMs

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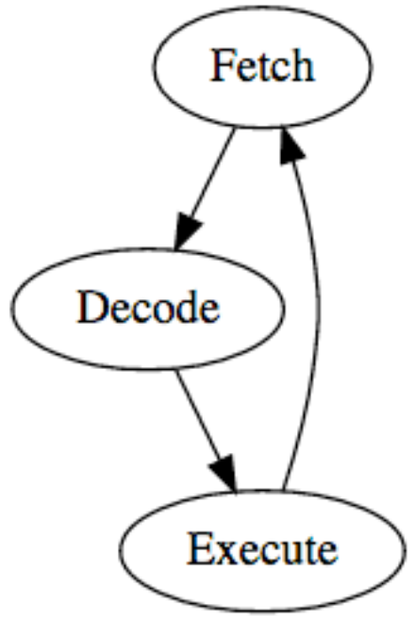

FSMs to Circuits

Step 1: Encode each state in binary

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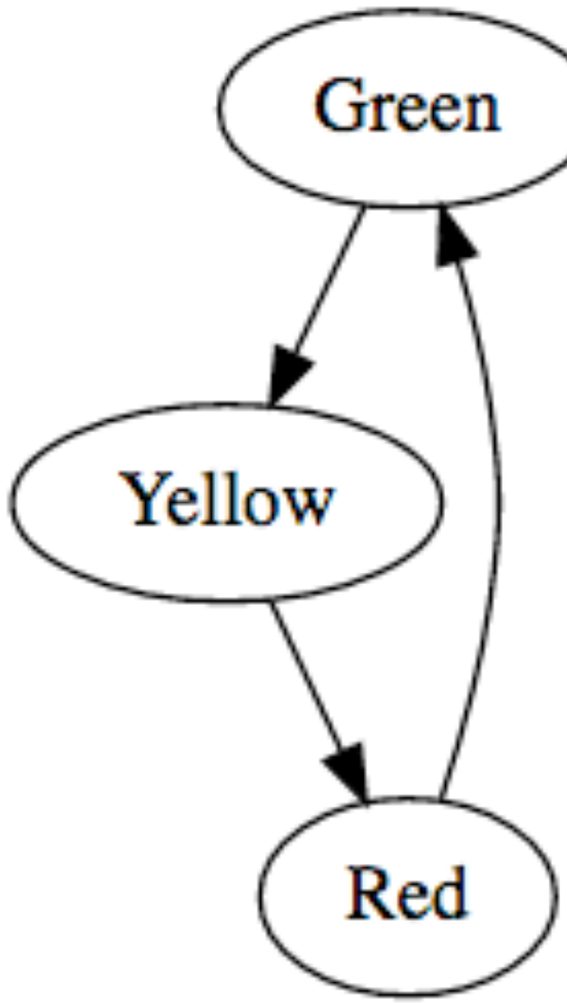

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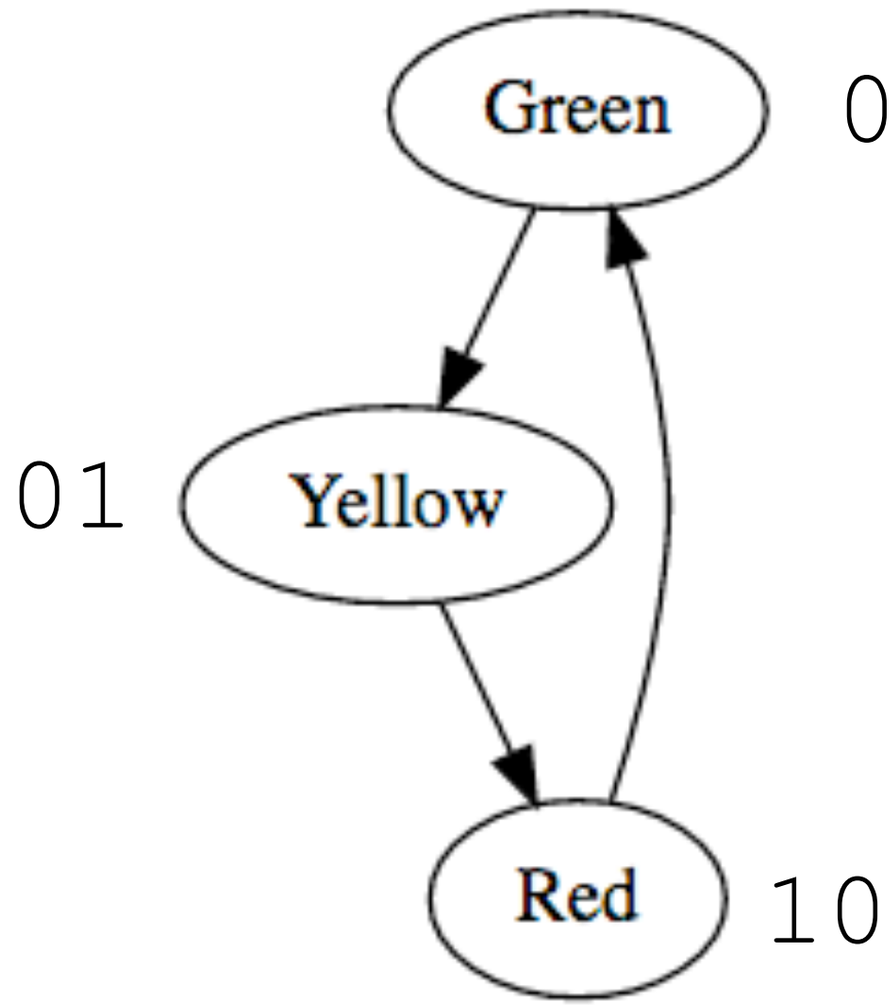

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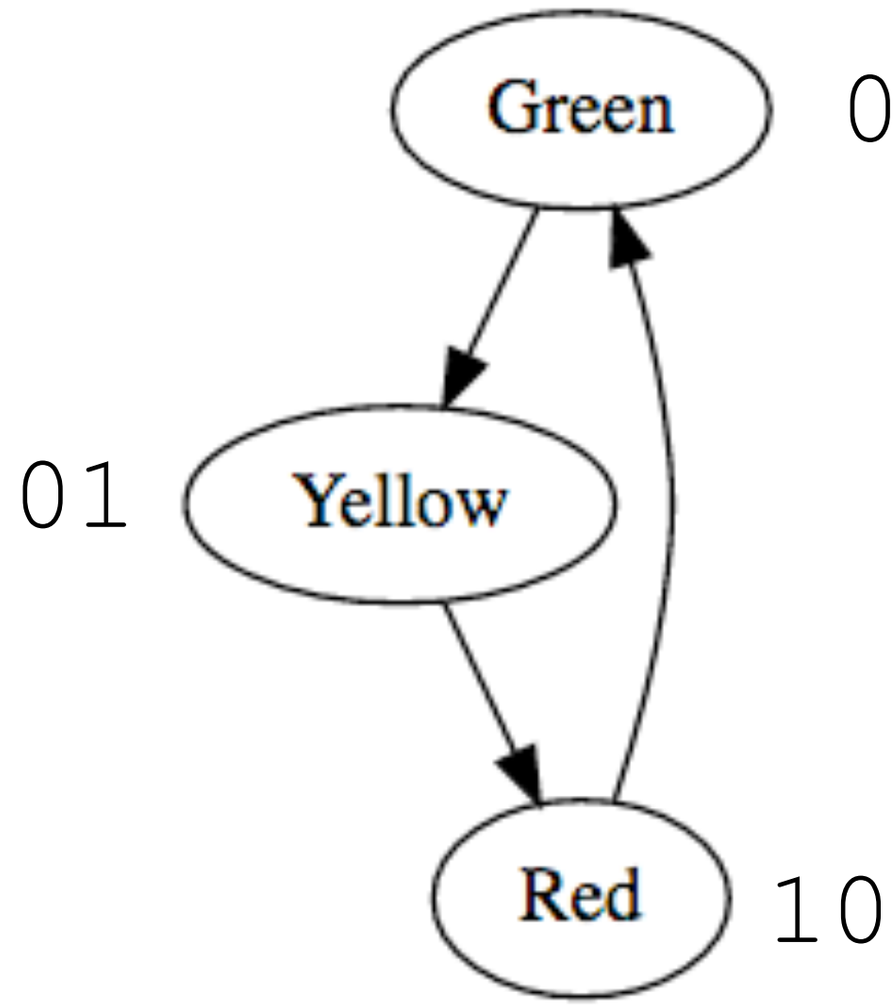

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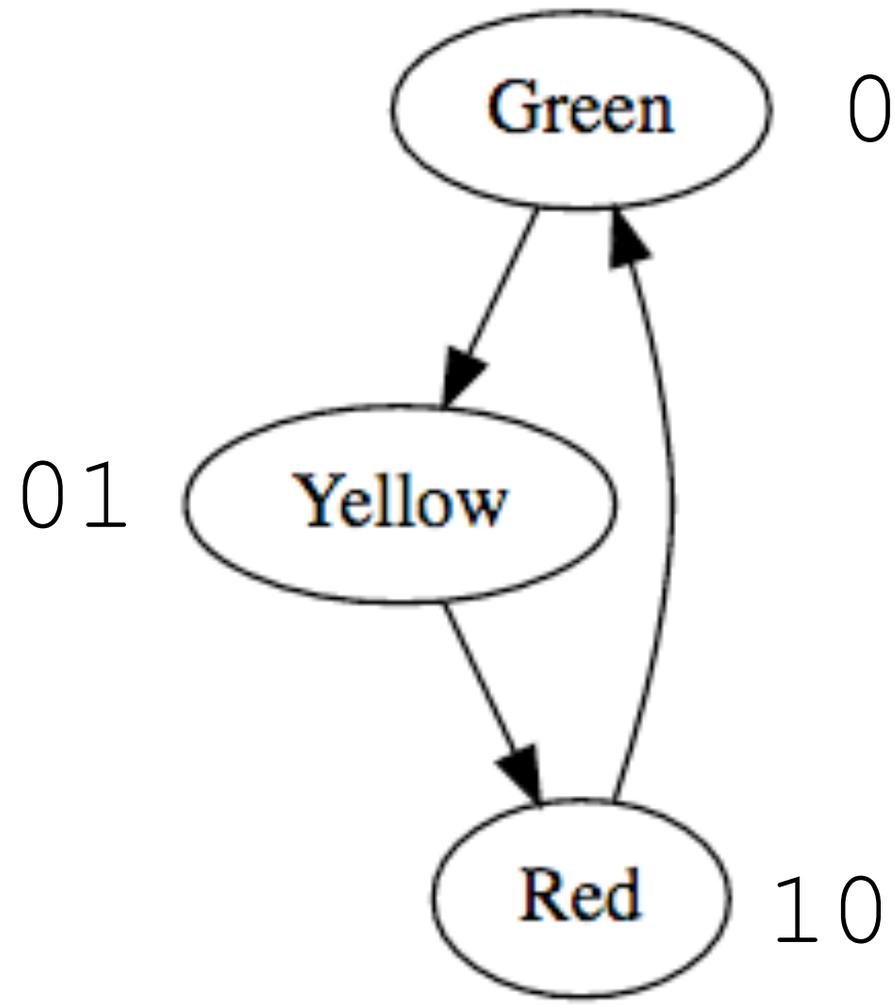

S1	S0	N1	N0
0	0	0	1
0	1	1	0
1	0	0	0
1	1	X	X

-

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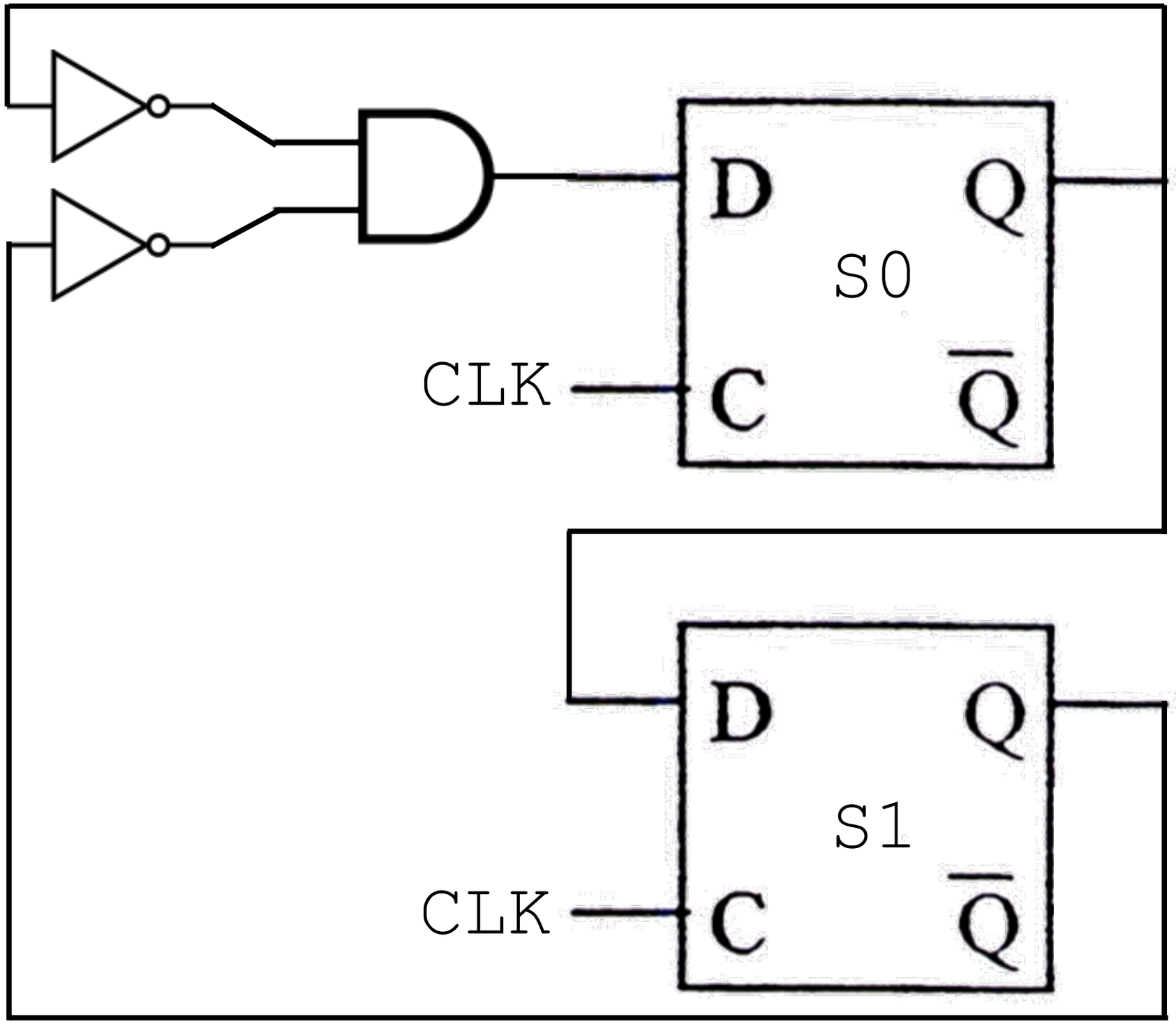

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Same process, but with more inputs in the truth table

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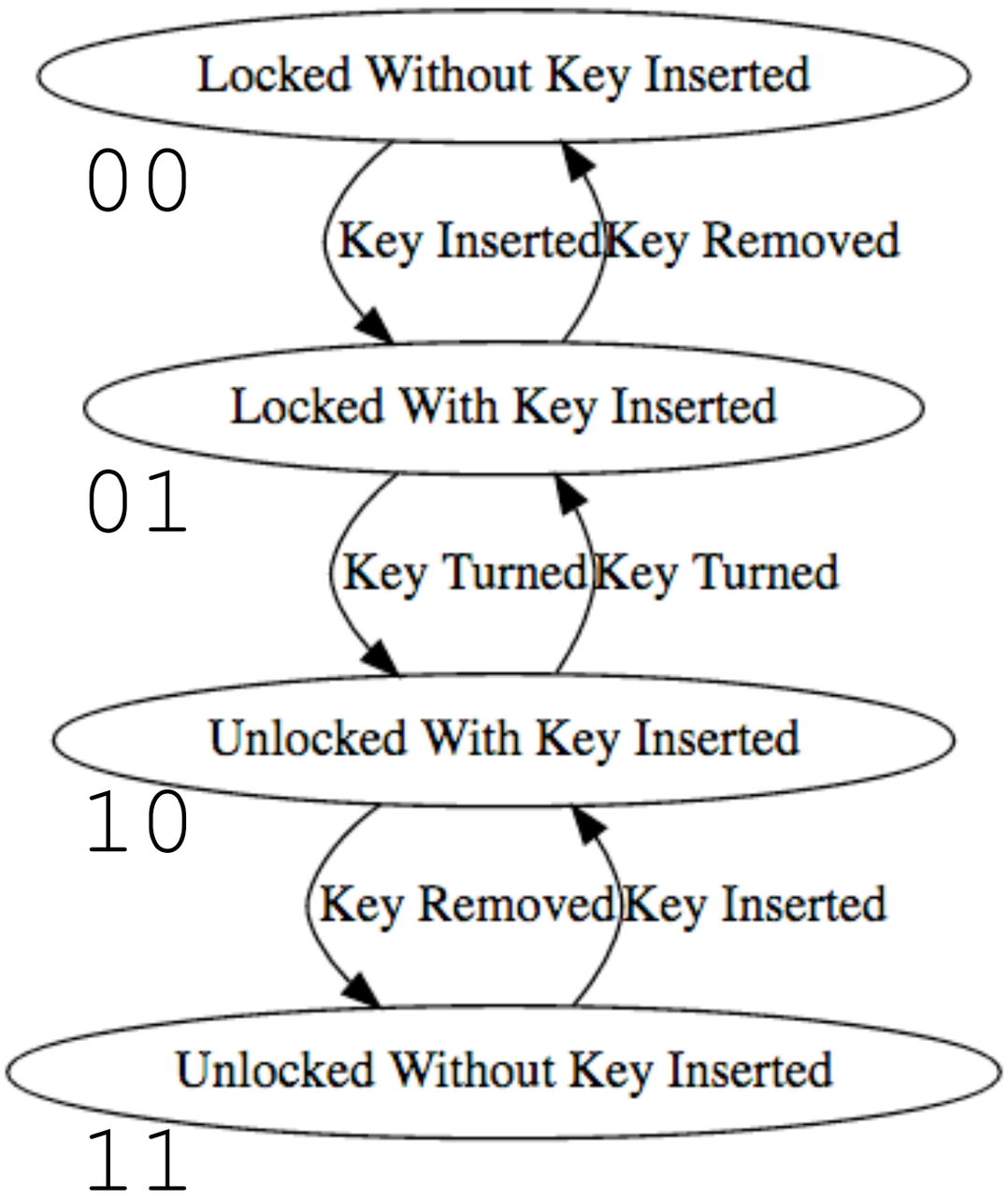

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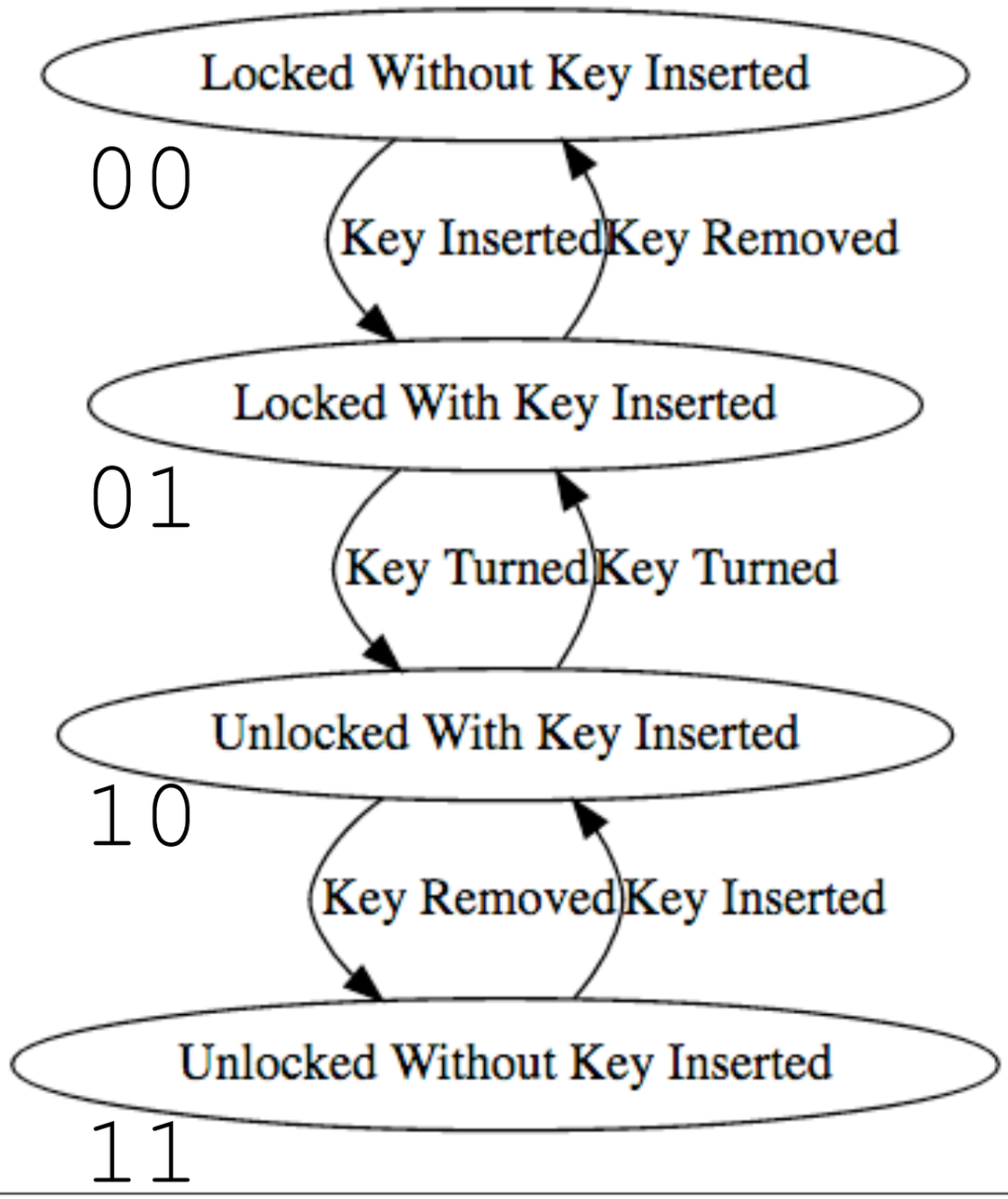

KI	KR	KT	S1	S0	N1	N0
0	0	0	0	0	0	0
. .	. .	. .	. .	. .	. .	. .
1	0	0	0	0	0	1
. .	. .	. .	. .	. .	. .	. .

FSMs with Outputs

Additional outputs in truth table.

Output on the corresponding state.

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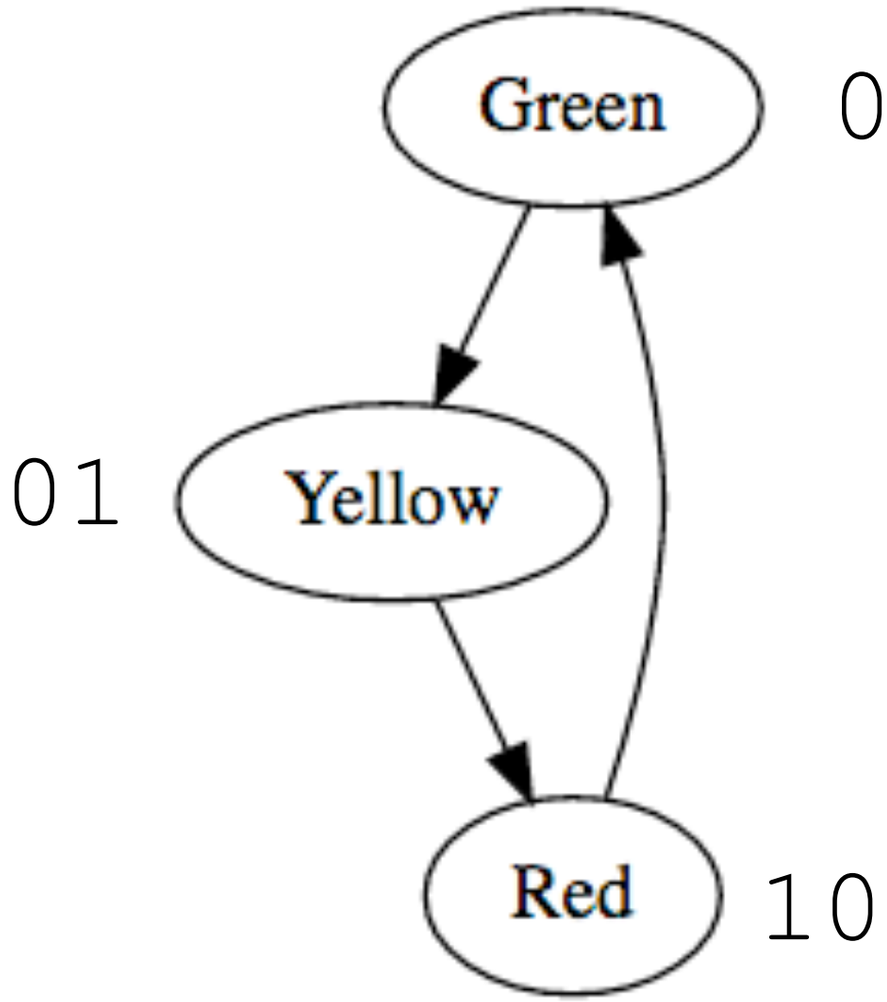

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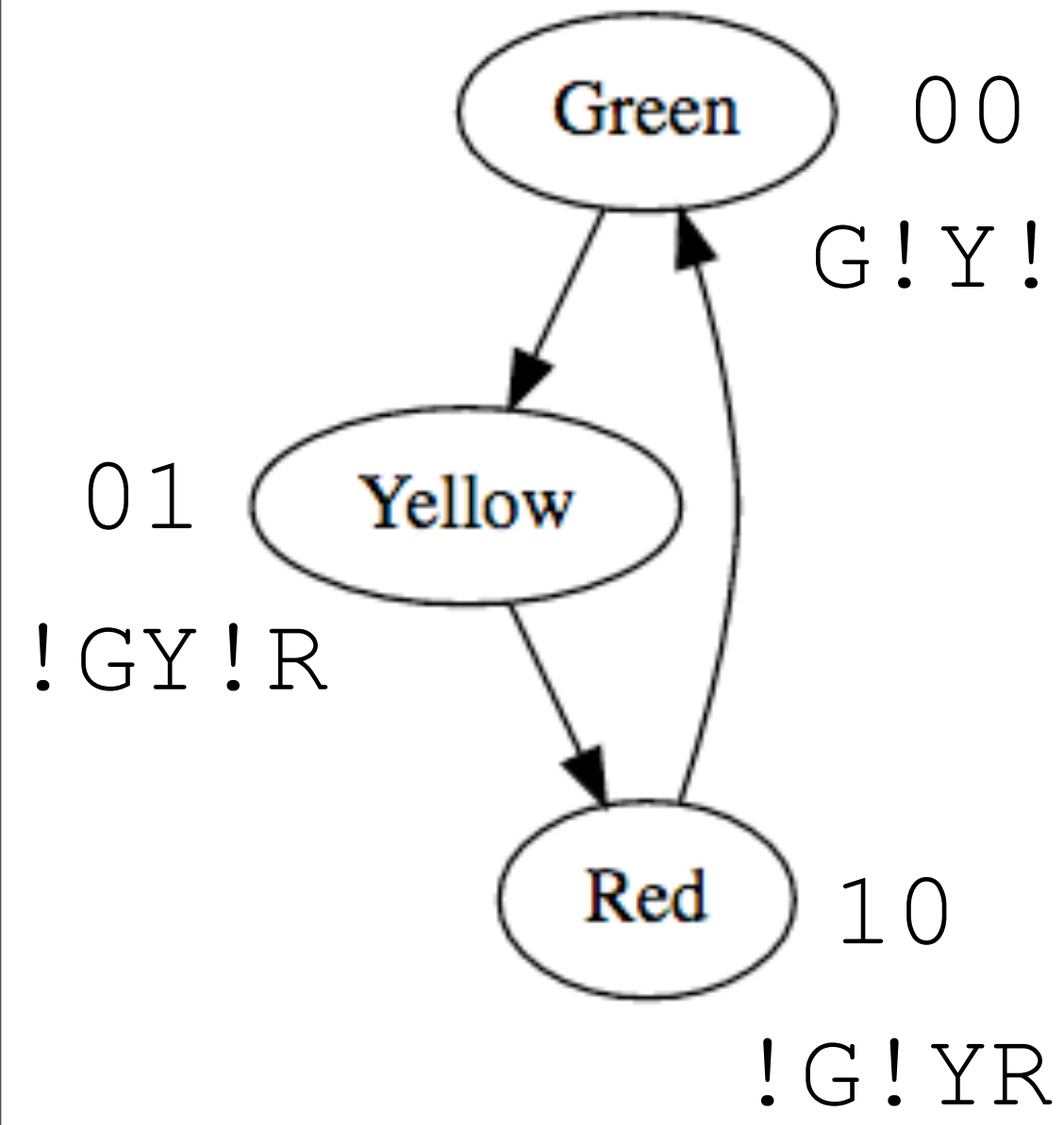

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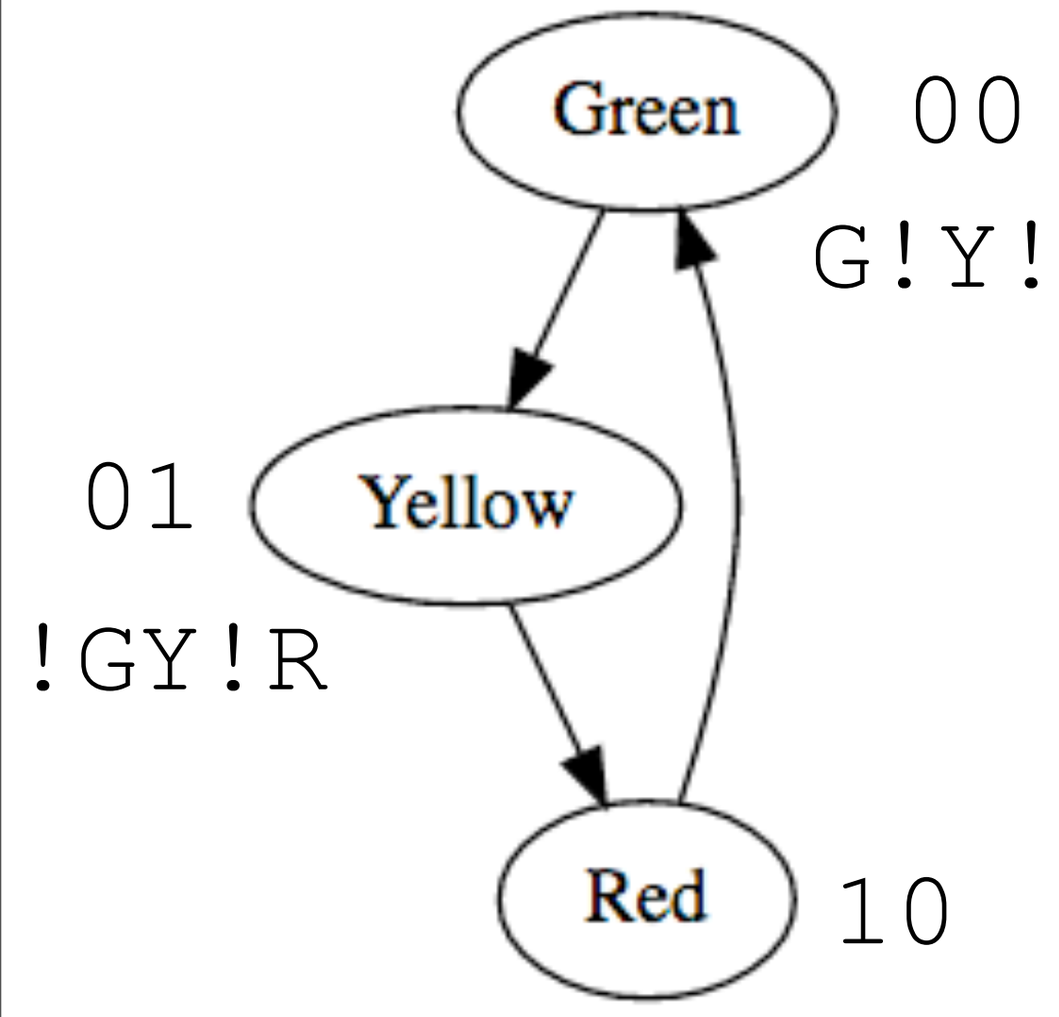

S1	S0	N1	N0	G	Y	R
0	0	0	1	1	0	0
0	1	1	0	0	1	0
1	0	0	0	0	0	1
1	1	X	X	X	X	X