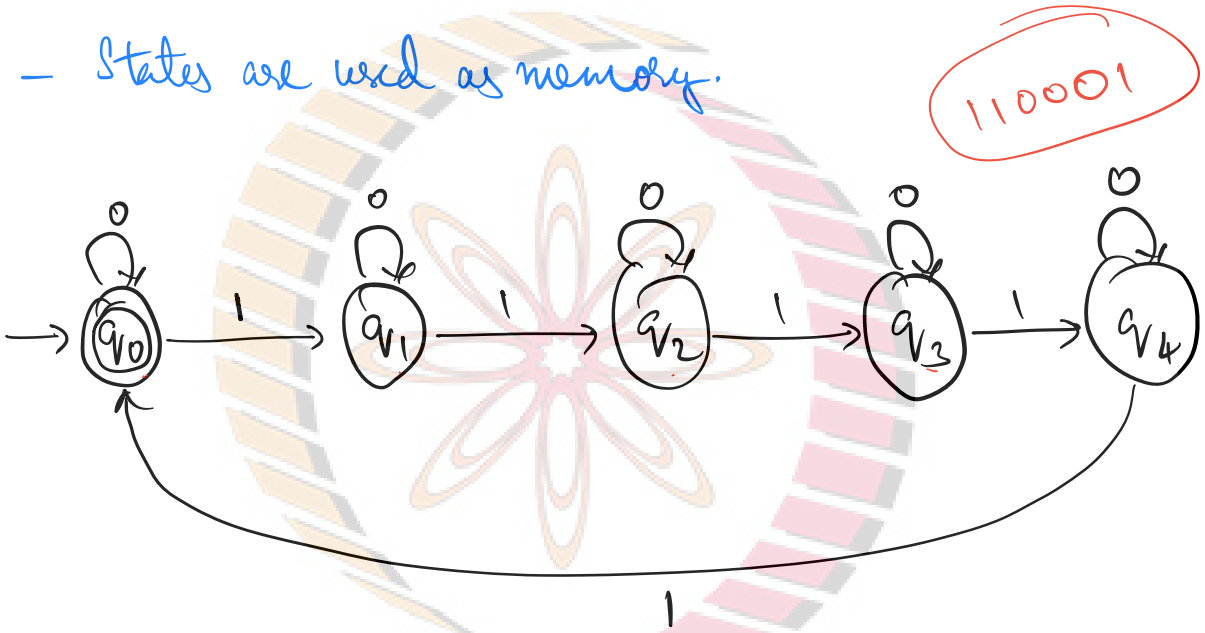
Significance of Regular languages.

- Simple, rudimentary computing devices — DFA's

  What can they compute?

- States are used as memory.



- Not all languages are regular.

  For example : $A = \{\varepsilon, 01, 0011, 000111, \ldots\}$

  This language A is not regular.

So want to understand what is regular, what is not, and more properties.

We already saw. Regular languages are closed under complement.

That is, A is regular $\Rightarrow$ A^c is regular.

Def 1.23 (Regular Operations): Let A and B be languages. The regular operations are union, concatenation and star, defined as follows:

(1) Union: $A \cup B = \{x \mid x \in A \text{ or } x \in B\}$

(2) Concatenation: $A \circ B = \{xy \mid x \in A, y \in B\}$

(3) Star: $A^* = \{x_1 x_2 \ldots x_k \mid k \geq 0 \text{ and } x_i \in A, \text{ for each } i\}$

We will see that regular languages are closed under regular operations.

Example 1.24: Let $\Sigma = \{a, b, c, \ldots x, y, z\}$

$A = \{good, bad\}$. and $B = \{boy, girl\}$.

$A \cup B = \{good, bad, boy, girl\}$

$A \circ B = \{goodboy, goodgirl, badboy, badgirl\}$

$A^* = \{\varepsilon, good, bad, goodgood, goodbad, badgood, badbad, goodgoodgood, badbadbad, \ldots\}$

Exercise: Work out B^*.