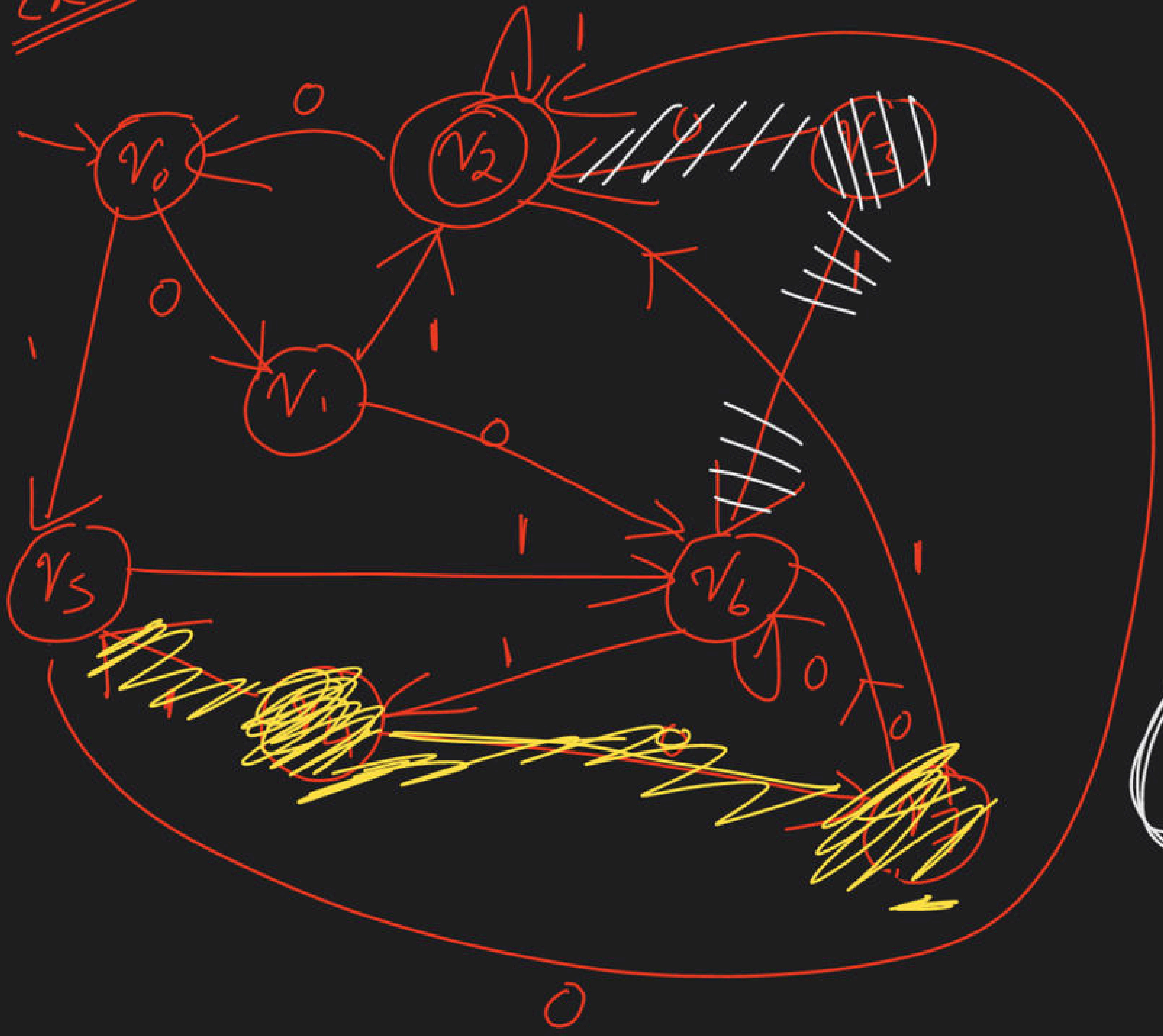
Doubt Clearing Session

Complete Course on Theory of Computation

Subbarao Lingamgunta • Lesson 20 • Mar 1, 2022

ex



DFA ?

$\pi_0 = (q_2)\ (q_0, q_1, q_4, q_5, q_6, q_7)$

$\pi_1 = (q_2)\ (q_0, q_4, q_6)\ (q_1, q_7)(q_5)$

$\pi_2 = (q_2)\ (q_5)\ (q_1, q_7)$
$(q_0, q_4)\ (q_6)$

$\pi_3 = (q_2)\ (q_5)\ (q_6)\ (q_1, q_7)\ (q_0, q_4)$

$\Downarrow \qquad \Downarrow$

$q_1 \qquad q_0$

5 - states.

Table Filling method ✓

Myhill - Anilnirode ✓ , P. L ✓

Special class

Finite Automata to Regular Expression

① Arden's method (standard).

② State Elimination method (Non-standard)

Arden's Method

1. We can't apply this method for ε-NFA

2. If P & Q are 2 R.E & P not contain ε then the equation $\boxed{R = Q + RP \Rightarrow R = QP^*}$ can be uniquely written as

3. If P contain ε then we have infinite number of solutions.

ex Give R.E for the following FA (DFA, NFA)

① Unreachable states from start state delete.

② Dead states delete becz they don't participate in Language.

ε, ab, abab, baba, abba, baab

$\Rightarrow (ab+ba)^*$

① write state equation for every state.

$q_2 = q_1 \cdot a \rightarrow (1)$ $\quad q_3 = q_1 \cdot b \rightarrow (2)$

$q_1 = q_2 b + q_3 \cdot a + \epsilon \rightarrow (3)$

$\Rightarrow$ becz of start state.

$$r_1 = r_2 \cdot b + r_3 \cdot a + \epsilon$$

$$= r_1 \cdot ab + r_1 \cdot ba + \epsilon \Longrightarrow (4) \text{ by subst in } (3)$$

(1) & (2)

$$\boxed{r_1 = r_1(ab+ba) + \epsilon}$$

$$r_1 = \epsilon + r_1(ab+ba)$$

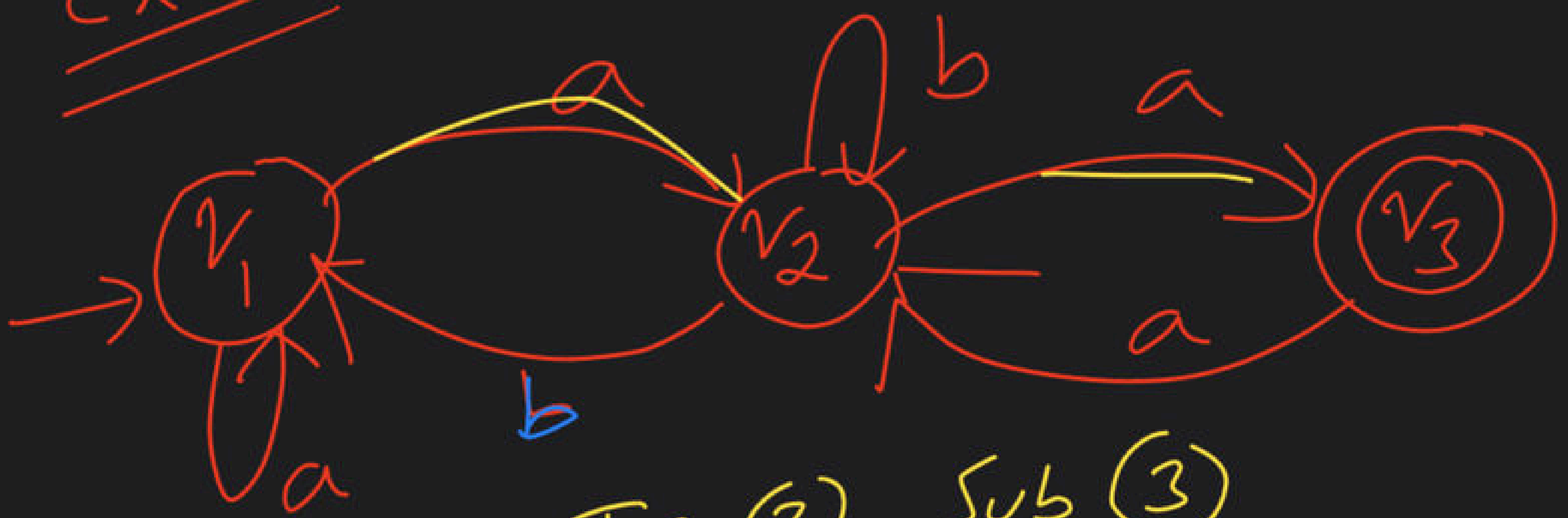
$$R = Q + RP$$

$$R = QP^*$$

$$r_1 = \epsilon \cdot (ab+ba)^* \Longrightarrow (ab+ba)^* \text{ (or) } \left((ab)^*(ba)^*\right)^*$$

$$\left((ba)^*(ab)^*\right)^*$$

ex



$$r_1 = \epsilon + r_2 \cdot b + r_1 \cdot a \longrightarrow (1)$$

$$r_2 = r_1 \cdot a + r_2 \cdot b + r_3 \cdot a \longrightarrow (2)$$

$$r_3 = r_2 \cdot a \longrightarrow (3)$$

In (2) sub (3)

$$r_2 = r_1 \cdot a + r_2 \cdot b + r_2 \cdot aa$$

$$\underbrace{r_2}_{R} = \underbrace{r_1 \cdot a}_{Q} + \underbrace{r_2}_{R}\underbrace{(b+aa)}_{P}$$

$$r_2 = r_1 \cdot a(b+aa)^* \Longrightarrow (4)$$

In (1) sub (4)

$$r_1 = \epsilon + r_1 \cdot a + r_1 a(b+aa)^* b$$

$$= \epsilon + r_1(a + a(b+aa)^* b) \Longrightarrow$$

$$r_1 = \epsilon \cdot [a + a(b+aa)^* b]^*$$

$$= [a + a(b+aa)^* b]^* \Longrightarrow (5)$$

In (4) sub (5)

$$r_2 = [a+a(b+aa)^* b]^* a(b+aa)^* \Longrightarrow (6)$$

In (3) sub (6)

$$r_3 = r_2 \cdot a$$

$$= \left\{a + a(b+aa)^* b\right\} a\,(b+aa)^* \cdot a$$

Thank you

Dedicate Hate