Theory of Computation 12-9-22

→ Deductive proof: (chapter 1)

if $x \geq 4$ then $2^x \geq x^2$

if $x = a^2+b^2+c^2+d^2$ → Deductive Proof

if then relation:

Proof about sets

" by contradiction

" by counterexample

→ proof about setn:

$A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

→ proof by contradiction:

if not c, then not H

→ proof by counter example:

All odd numbers are prime

কোন counter ex দিবে

যে statement not দিবে

There is no pair of integer a and b such that

$a \bmod b = b \bmod a$ $\left[\begin{matrix} a>b \\ a<b \end{matrix} \quad a=b\right]$

$a > b$

$a \bmod b = c = [0, b-1]$

$b \bmod a = b$

$b \bmod a > a \bmod b$

$a < b$

$b \bmod a = c \quad [0, a-1]$

$a \bmod b = a$

$a \bmod b > b \bmod a$

$a = b$

$a \bmod b = a \bmod a = 0$

$b \bmod a = 0$

∴ if $a \neq b$, then there is no pair of integer a and b such that

$a \bmod b = b \bmod a$

→ Inductive Proof: ✱

$S(n)$ → for integer 'n'.

Basis →

Inductive Step →

Basis: $n = \{0, 1\}$ $S(0)$ or 1

$S(1)$

Inductive Step:

$S(i)$, $i \geq 1$

if $S(n)$ then $S(n+1)$

If $x \geq 4$ then $2^x \geq x^2$

Basis: $x = 4$

$x^2 =$

Inductive Step:

$2^{x+1} \geq (x+1)^2$

for $n \geq 0$

$$\sum_{i=0}^{n} = \frac{n(n+1)(2n+1)}{6}$$

$n = 0$

$$\sum_{i=1}^{n} i^2 + (n+1)^2 = \frac{n(n+1)(2n+1)}{6} + (n+1)^2$$

$$= \frac{(n^2+n)(2n+1) + 6(n^2+2n+1)}{6}$$

$$= \frac{2n^3 + n^2 + 2n^2 + n + 6n^2 + 12n + 6}{6}$$

$$= \frac{2n^3 + 9n^2 + 13n + 6}{6}$$

if (d[u] + c < d[v])
 d[v] = d[u] + c .

CRT:

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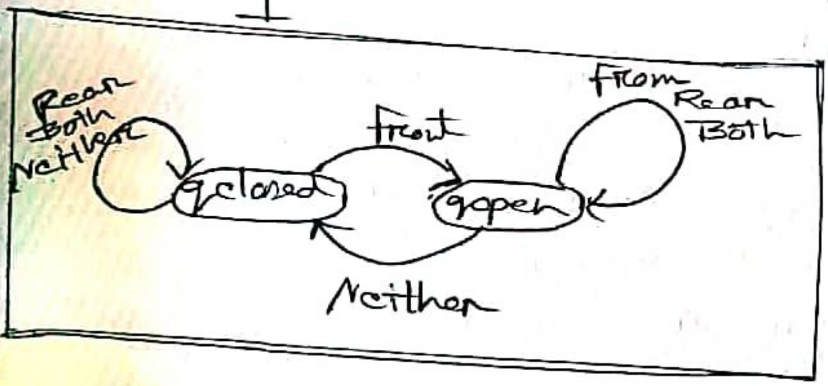
chapter 2

Front | Rear

	Front	Rear	Both	Neither
closed →	open	Closed	closed	closed
open →	open	Open	open	closed



	Front	Rear	Both	Neither
closed →	closed	open	closed	closed
open →	open	open	open	closed

Tabular form

→ A finite Automata is a 5 tuple

1. Q is a finite set of states
 Ex: {qopen, qclosed}

2. Σ is a set of alphabets
 {Front, Rear, Both, Neither}

3. Transition function
 $\delta : Q \times \Sigma \rightarrow Q$ (Domain: $Q \times \Sigma$, co-domain: Q)

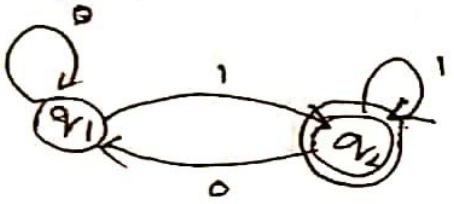
$Q \times \Sigma$
$= \{ (q, F), (q, R), (q_1, B), (q_1, N), (q_2, F), ------ \}$

4. Initial state $q_0 \in Q$ / $q_0 \in Q$
5. Final state/accept state
$F \subseteq Q$

$(Q, \Sigma, \delta, q_0, F)$

$(\underbrace{q_1, q_2}_{Q}), \{\underbrace{F, R, B, N}_{\Sigma}\}, \underbrace{\delta}_{\delta}, \underbrace{q_1}_{q_0}, \{\underbrace{q_1, q_2}_{F}\}$

DFA: Deterministic finite Automata



→ 11001 : Ac : $1(q_1) \to 1(q_2) \to 0(q_1) \to 0(q_1) \to 1(q_2)$
[String যখন শেষ তখন finite state]

$M \quad L(M) = A$

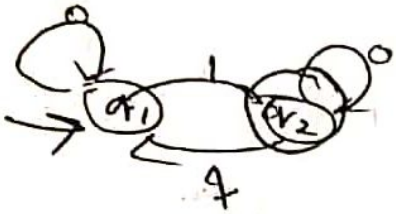
→ 0010 : W : $0(q_1) \to 0(q_1) \to 1(q_2) \to 0(q_1)$
[String যখন শেষ তখন finite state ও না]

$M = (Q, \Sigma, \delta, q_0, F)$

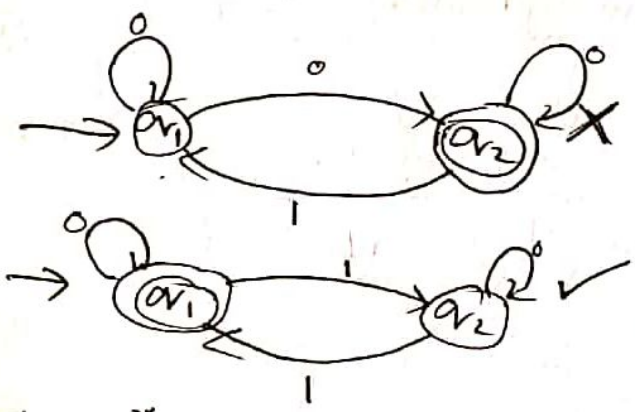
$M \quad L(M) = A = \{w \mid w \text{ is the set of strings that ends with } 1\}$

exm : automata দেওয়া থাকবে, তাদের regular language বের করতে হ

$M = L(M) = A = \{w | w$ contains odd number of 1$\}$

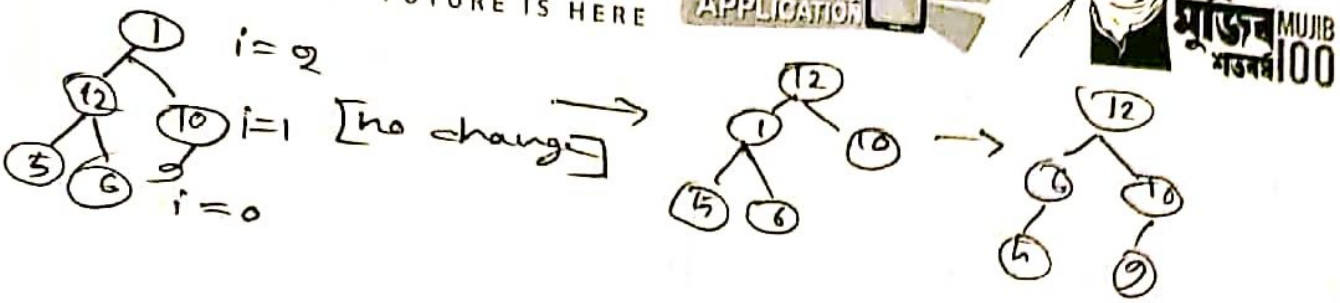


$M = L(M) = A = \{w | w$ contains only even number of 1$\}$



Input $\Sigma^* = \{0, 1, 01, 11, 110, 111, 1111, 0000 \ldots\}$

$L(M) = A = \{w | w$ is the string, that contains the substring $001\}$



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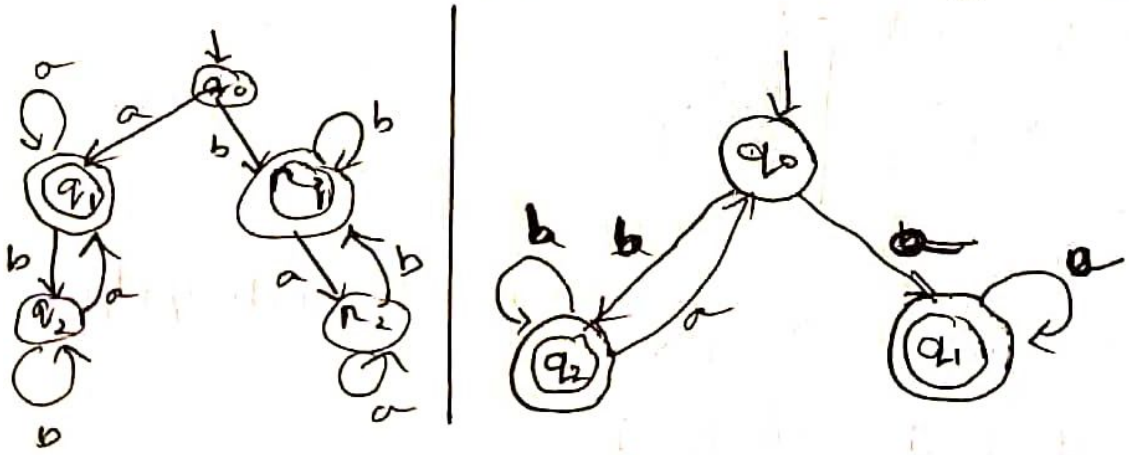
[H.W]

ab , bb , bbaa → bbaabbaa...

abababab... bbbb...

aba
bab

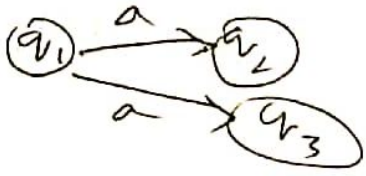
→ a_b, aa, bb_bab [1st & last symbol same]



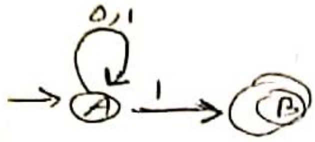
L = {set of all strings over (0,1) that ends with 1}

Q → start Q × Σ → q_n

Σ → alphabets

NFA : 

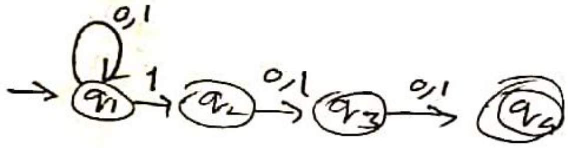
NFA :

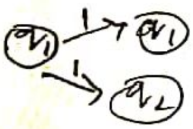


	0	1
A	A	{A, B}
B	φ	φ

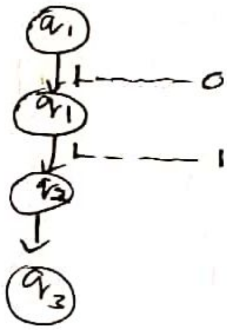
DFA : $Q \times \Sigma \rightarrow q_k$

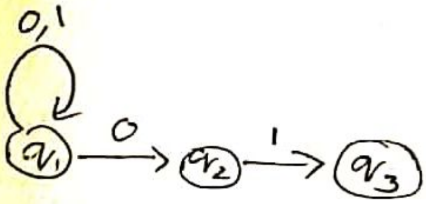
NFA : $Q \times \Sigma \rightarrow Q$



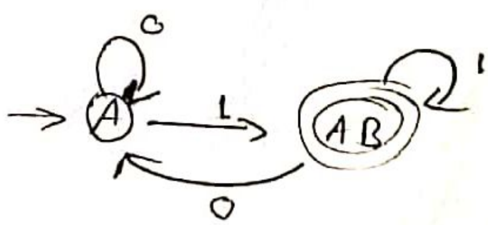


DFA





	0	1
A	A	AB
AB	A	AB



	a	b
A	A,B	c
B	A	B
C	ϕ	A,B

	0	1
A	AB	C
AB	AB	BC
BC	A	AB
C	D	AB

	0	1
A	A	AB
B	C	C
C	ϕ	ϕ

OS

11.10.22

Operating System Concept

Chapter-3 :

→ Processes
process concept

→ process state (Diagram)

→ Process Control Block (pcb)

Radix Sort
Bucket Sort
> দাগ আওতাতেই হবে

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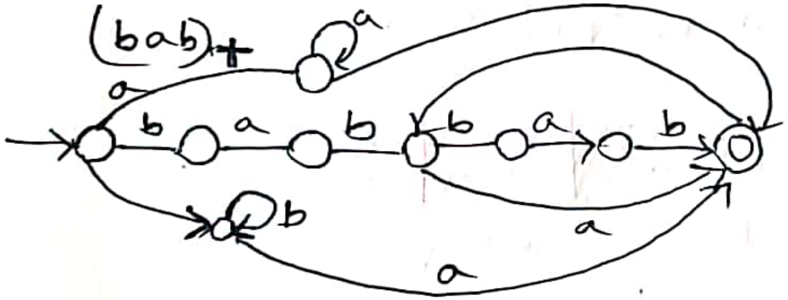
a +
b +
(bab)+



★ Regular Expression (Sir এর slide [বই না])

Numerical — 17.10.22

1. ODE
3. NI, ND
2. SLE

We have newton's forward formula:

$\ldots u(u-1) \Delta^2 \ldots \; u(u-1)(u-2)\,\Delta^3 y_0 + \ldots$