

i	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
$T \Rightarrow$	a	b	a	b	c	a	b	c	a	b	a	b	a	b	d

q	1	2	3	4	5
$p \Rightarrow$	a	b	a	b	d
next	0	0	1	2	0

KMP

$$P[a+1] = T[i]$$

$i++$ and $q++$

$$i = 5 \quad q = 4$$

$$P[u+1] \neq T[5]$$

$$d \neq c$$

$$\text{then } i = 5 \quad q = \text{next}(q)$$

$$q = 2$$

i	1	2	3	4	5	6	7	8	---	---	---
$T \Rightarrow$	a	b	a	b	c	a	b	c	---	---	---

q	1	2	3	4	5
$p \Rightarrow$	a	b	a	b	d
	0	0	1	2	0

$$P[a+1] \neq T[i]$$

$$P[2+1] = T[5]$$

$$a \neq c$$

$$i = 5 \quad q = \text{next}(q)$$

$$= 0$$

$$P[0+1] \neq T[5]$$

$$a \neq c$$

$$i=5 \quad a = next(a) \\ = 0$$

Again getting $a=0$
So we move i by 1
Position

$$Now \quad i=6 \quad a=0$$

$$T \Rightarrow \begin{array}{cccccccccccccccc} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 & 11 & 12 & 13 & 14 & 15 \\ a & b & a & b & c & a & b & c & a & b & a & b & a & b & d \end{array}$$

$\swarrow i$

$$P \Rightarrow \begin{array}{cccccc} 0 & 1 & 2 & 3 & 4 & 5 \\ a & b & a & b & a & \end{array}$$

$\searrow a$

$$\begin{array}{cccccc} 0 & 0 & 1 & 2 & 0 & \end{array}$$

$\Rightarrow$ matched pattern

again start matching

$$P[a+1] \equiv T[i]$$

$$P[1] \equiv T[6]$$

$$a = a \text{ matched so}$$

$$i=7 \quad a=1$$

$$P[a+1] \equiv T[i]$$

$$P[2] \equiv T[7]$$

$$b = b \text{ matched}$$

$$i=8 \quad a=2 \Rightarrow P[3] \equiv T[8]$$

$$a \neq c \text{ not match.}$$

So

$$i = 8 \quad a = \text{next}(a) \\ \Rightarrow 0$$

start matching

$$P[1] \cong T[8]$$

$a \neq c$ not matched so

move i by 1

$$i = 9 \quad a = 0$$

$$P[a+1] \cong T[i]$$

$$P[0] = T[9]$$

$a = a$ matched

$$i = 10 \quad a = 1$$

$$P[a+1] \cong T[i]$$

$$P[2] \cong T[10]$$

$b = b$ matched

$$\underline{i = 11 \quad a = 2}$$

$$P[2+1] \cong T[11]$$

$a = a$ matched

$$\underline{i = 12 \quad a = 3}$$

$$P[3+1] \cong T[12]$$

$b = b$ matched

$$i = 13 \quad a = 4$$

$$P[4+1] \cong T[13]$$

$d \neq a$ not matched

$$\text{So } i=13 \quad a_v = \text{next}(a_v) \\ = 2$$

$$P[2+1] \cong T[13] \\ a = a \quad \text{matched} \checkmark$$

$$i=14 \quad a_v = 3$$

$$P[3+1] \cong T[14] \\ b = b \quad \text{matched} \checkmark$$

$$i=15 \quad a_v = 4$$

$$P[4+1] \cong T[15] \\ d = d \quad \text{matched} \checkmark$$

$$i=16 \quad a_v = 5$$

$$P[5+1] \cong T[16] \quad \text{condition false}$$

π -table

$P =$

$q \Rightarrow 1$	2	3	4	5	6	7
a	b	a	b	a	c	a
$\pi \Rightarrow 0$	0	1	2	3	0	1

k

$$m = 7$$

$$\left. \begin{array}{l} \pi[1] \Rightarrow 0 \\ k = 0 \end{array} \right\} \text{initially}$$

for $q \Rightarrow 2$ to m

$$\left. \begin{array}{l} k = 0 \\ \pi[2] = 0 \end{array} \right\}$$

$$\left. \begin{array}{l} q = 3, k = 0 \\ \pi[3] = 1 \end{array} \right\}$$

$$\left. \begin{array}{l} q = 4, k = 1 \\ \pi[4] = 2 \end{array} \right\}$$

$$q = 5 \quad k = 2$$

$$\pi[5] = 3$$

$$q = 6 \quad k = 3$$

$$\pi[6] = 0$$

$$q = 7 \quad k = 1$$

$$\pi[7] = 1$$

COMPUTE-PREFIX-FUNCTION (P)

1. m length [P] // 'p' pattern to be matched
2. [1] 0
3. k 0
4. for q 2 to m
5. do while k > 0 and P[k+1] = P[q]
6. do k [k]
7. If P[k+1] = P[q]
8. then k k + 1
9. [q] k

String matching with Finite automata-

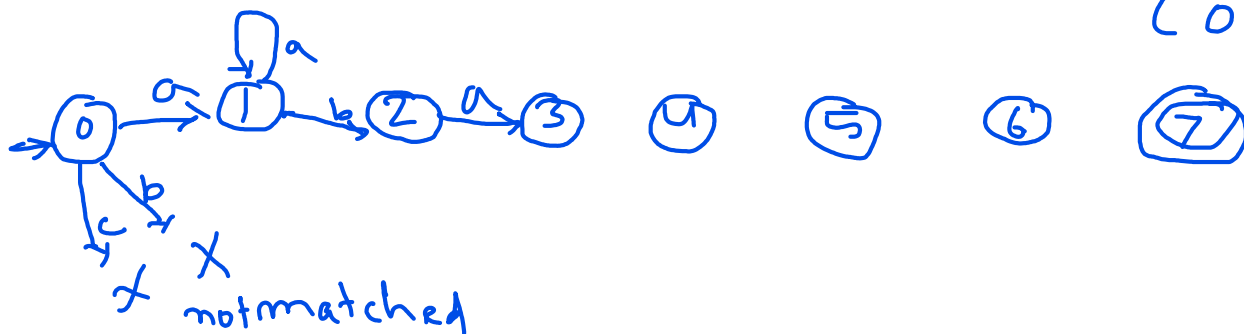
complexity $\Rightarrow O(n)$

P $\Rightarrow$ a b a b a c a

Text $\Rightarrow$ a b a b a b a c a b a

Step 1 - make FA for Pattern string

No. of char $\Rightarrow 7 \Rightarrow 7$ state
0 to 7



$\Sigma = \{a, b, c\}$

check all these
char with pattern
char if matched
change the state