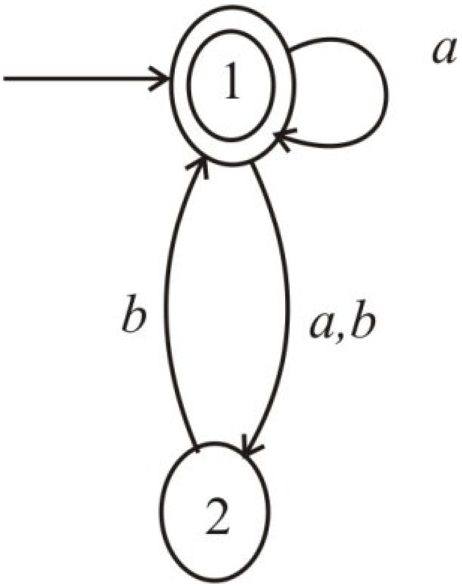
获得的答案 返回

a.

Consider the Non-deterministic Finite Automata,



By using Theorem 1.39, "*For every non-deterministic finite automata, there is an equivalent Deterministic finite automation*".

Constructing equivalent DFA for the given NFA:

1. $Q^1 = P(Q)$ where Q^1 is the subset of all sets of *Q*.

So, $Q^1 = \{\phi, \{1\}, \{2\}, \{1,2\}\}$

2. For an element *R* in Q^1 and *a* in set of alphabets $\sum$, Calculate $\delta^1(R,a) = \{q \in Q \mid q \in \delta(r,a) \text{ for some } r \in R\}$. Here, δ^1 performs the transition on *r* for some value of *a*.

$$\begin{aligned}
\delta^1(\phi,a) &= \delta(\phi,a) \\
&= \phi \\
\delta^1(\phi,b) &= \delta^1(\phi,b) \\
&= \phi \\
\delta^1(\{1\},a) &= \delta(1,a) \\
&= \{1,2\} \\
\delta^1(\{1\},b) &= \delta(1,b) \\
&= \{2\}
\end{aligned}$$

$$\begin{aligned}
\delta^1(\{2\},a) &= \delta(2,a) \\
&= \phi \\
\delta^1(\{2\},b) &= \delta(2,b) \\
&= \{1\} \\
\delta^1(\{1,2\},a) &= \delta(\{1,2\},a) \\
&= \delta(1,a) \cup \delta(2,a) \\
&= \{1,2\} \cup \phi \\
&= \{1,2\} \\
\delta^1(\{1,2\},b) &= \delta(\{1,2\},b) \\
&= \delta(1,b) \cup \delta(2,b) \\
&= \{2\} \cup \{1\} \\
&= \{1,2\}
\end{aligned}$$

3. $q_0' = \{q_0\}$ where q_0 is the start state in NFA.

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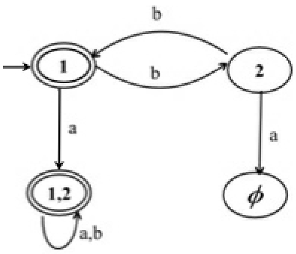
Here, q_0' ={1}.

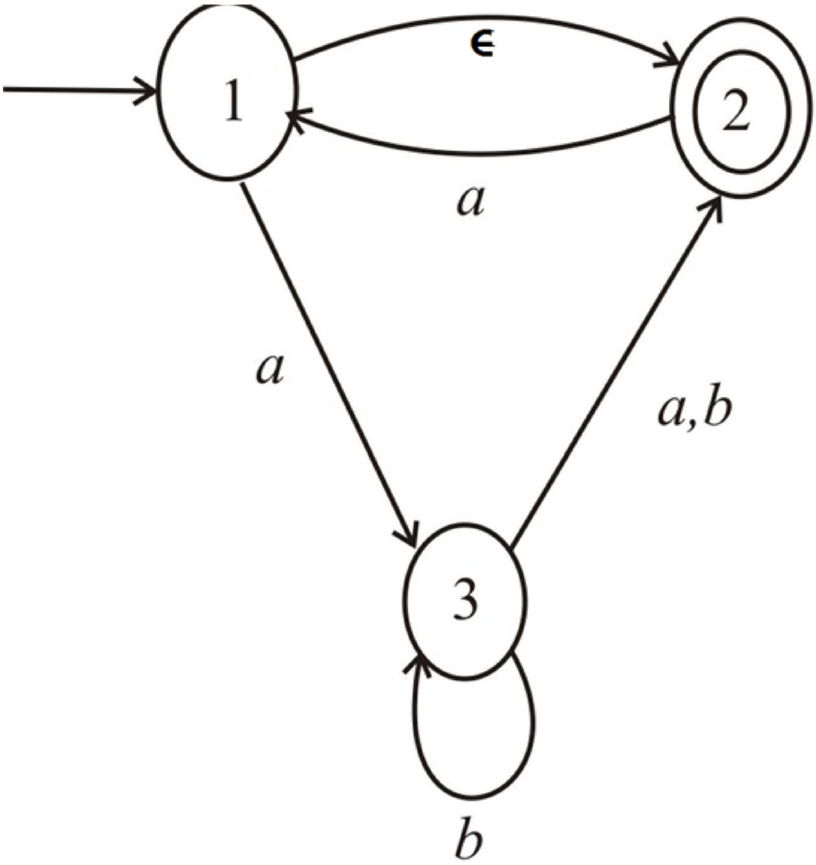
4. $F' = \{R \in Q' \mid R \text{ contains an accept state of NFA}\}$. The machine M accepts the possible states where the NFA is present in the accept state.

5. The state diagram for the equivalent DFA is as follows:



b.

Consider the Non-deterministic Finite Automata,



By using Theorem 1.39, "*For every non-deterministic finite automata, there is an equivalent Deterministic finite automation*".

Constructing equivalent DFA for the given NFA:

The initial state of DFA is 1 let x= (Q_x, ∑, δ_x, q_0, F_x).

1. $Q^1 = P(Q)$ where Q^1 is the subset of all sets of Q.

So, $Q^1 = \{\phi, \{1\}, \{2\}, \{3\}, \{1,2\}, \{1,3\}, \{2,3\}, \{1,2,3\}\}$

2. Considering $\in$ notations for each $R \subseteq Q$.

$E(R) = \{q \mid q \text{ can be reached from } R \text{ by traveling along or more } \in \text{ arrows}\}$

The collection of states reached from R by moving along the $\in$notations is,

$$E(\phi)=\phi$$
$$E(\{1\})=\{1,2\}$$
$$E(\{2\})=\{2\}$$
$$E(\{3\})=\{3\}$$
$$E(\{1,2\})=\{1,2\}$$
$$E(\{1,3\})=\{1,2,3\}$$
$$E(\{2,3\})=\{2,3\}$$
$$E(\{1,2,3\})=\{1,2,3\}$$

3. Calculate $\delta^1(R,a)=\{q\in Q \mid q\in\delta(r,a)\ for\, some\, r\in R\}$. Here, δ^1 performs the transition on *r* for some value of *a*.

$$\delta'(\phi,a)=\phi$$
$$\delta'(\phi,b)=\phi$$

$$\begin{aligned}\delta'(\{1\},a)&=E(\delta(1,a))\\&=E(\{3\})\\&=\{3\}\end{aligned}$$

$$\begin{aligned}\delta'(\{1\},b)&=E(\delta(1,b))\\&=E(\phi)\\&=\phi\end{aligned}$$

$$\begin{aligned}\delta'(\{2\},a)&=E(\delta(1,a))\\&=E(\{1\})\\&=\{1,2\}\end{aligned}$$

$$\begin{aligned}\delta'(\{2\},b)&=E(\delta(2,b))\\&=E(\phi)\\&=\phi\end{aligned}$$

$$\begin{aligned}\delta'(\{3\},a)&=E(\delta(3,a))\\&=E(\{2\})\\&=\{2\}\end{aligned}$$

$$\begin{aligned}\delta'(\{3\},b)&=E(\delta(3,b))\\&=E(\{2,3\})\\&=\{2,3\}\end{aligned}$$

$$\begin{aligned}\delta'(\{1,2\},a)&=E(\delta(1,a))\cup E(\delta(2,a))\\&=E(\{3\})\cup E(\{1\})\\&=\{3\}\cup\{1,2\}\\&=\{1,2,3\}\end{aligned}$$

$$\begin{aligned}\delta'(\{1,2\},b)&=E(\delta(1,b))\cup E(\delta(2,b))\\&=E(\{\phi\})\cup E(\{\phi\})\\&=\phi\cup\phi\\&=\phi\end{aligned}$$

$$\begin{aligned}\delta'(\{1,3\},a)&=E(\delta(1,a))\cup E(\delta(3,a))\\&=E(\{3\})\cup E(\{2\})\\&=\{3\}\cup\{2\}\\&=\{3\}\cup\{2\}\\&=\{2,3\}\end{aligned}$$

$$\delta'(\{1,3\},b) = E(\delta(1,b)) \cup E(\delta(3,b))$$
$$= E(\{\phi\}) \cup E(\{2,3\})$$
$$= \phi \cup \{2,3\}$$
$$= \{2,3\}$$

$$\delta'(\{2,3\},a) = E(\delta(2,a)) \cup E(\delta(3,a))$$
$$= E(\{1\}) \cup E(\{2\})$$
$$= \{1,2\} \cup \{2\}$$
$$= \{1,2\}$$

$$\delta'(\{2,3\},b) = E(\delta(2,b)) \cup E(\delta(3,b))$$
$$= E(\phi) \cup E(\{2,3\})$$
$$= \phi \cup \{2,3\}$$
$$= \{2,3\}$$

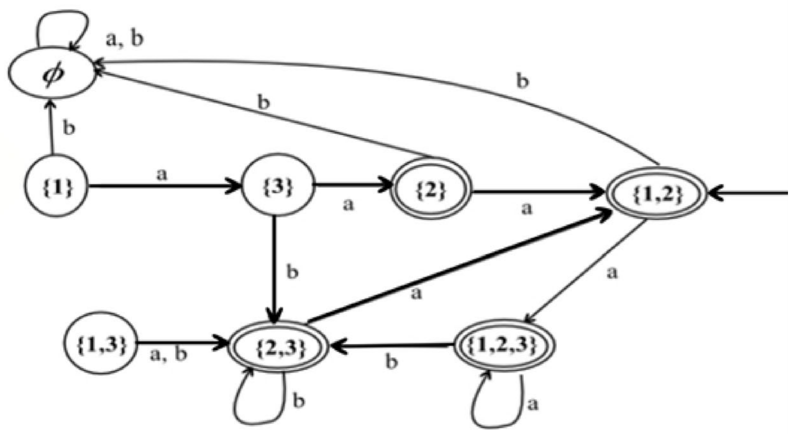
$$\delta'(\{1,2,3\},a) = E(\delta(1,a)) \cup E(\delta(2,a)) \cup E(\delta(3,a))$$
$$= E(\{3\}) \cup E(\{1\}) \cup E(\{2\})$$
$$= \{3\} \cup \{1,2\} \cup \{2\}$$
$$= \{1,2,3\}$$

$$\delta'(\{1,2,3\},b) = E(\delta(1,b)) \cup E(\delta(2,b)) \cup E(\delta(3,b))$$
$$= E(\phi) \cup E(\phi) \cup E(\{2,3\})$$
$$= \phi \cup \phi \cup \{2,3\}$$
$$= \{2,3\}$$

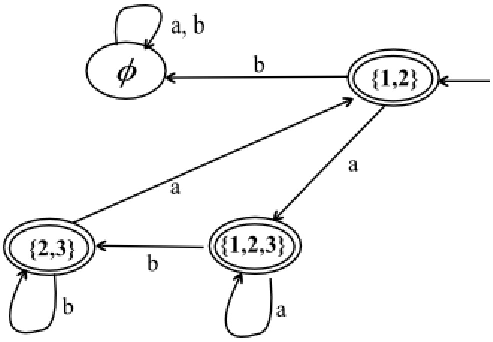
4. Changing q_0' to $E(q_0)$ the start state becomes,

$$q_0^1 = E(q_0)$$
$$q_0^1 = E(\{1\})$$
$$q_0^1 = \{1,2\}$$

5. The state diagram for the equivalent DFA is as follows:



Simplifying the machine by eliminating no arrow points. Here {1},{2},{1,3} and {3} do not contain any incoming arrows. Thus, the simplified machine is:



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