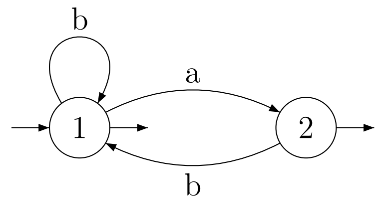
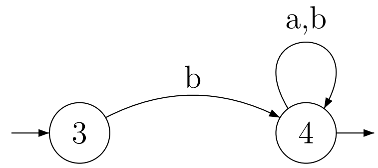
Here is one acceptor, A. The language of this acceptor $L(A)$ is equal to the set containing all and only those strings which do not have consecutive a symbols.



Here is another acceptor, B. The language of this acceptor $L(B)$ is equal to the set containing all and only those strings which begin with the b symbols.



Now we will compute the product using the definition.

$Q = \{(1,3),(1,4),(2,3),(2,4)\}$

$I = \{(1,3)\}$

$F = \{(1,4),(2,4)\}$

$\delta\big((1,3),b\big) = (1,4)$ since $\delta_A(1,b) = 1$ and $\delta_B(3,b) = 4$.

$\delta\big((1,4),b\big) = (1,4)$ since $\delta_A(1,b) = 1$ and $\delta_B(4,b) = 4$.

$\delta\big((2,3),b\big) = (1,4)$ since $\delta_A(2,b) = 1$ and $\delta_B(3,b) = 4$.

$\delta\big((2,4),b\big) = (1,4)$ since $\delta_A(2,b) = 1$ and $\delta_B(4,b) = 4$.

$\delta\big((1,3),a\big)$ does not exist because $\delta_B(3,a)$ does not exist.

$\delta\big((1,4),a\big) = (2,4)$ since $\delta_A(1,a) = 2$ and $\delta_B(4,a) = 4$.

$\delta\big((2,3),a\big)$ does not exist because neither $\delta_A(2,a)$ nor $\delta_B(3,a)$ exists.

$\delta\big((2,4),a\big)$ does not exist since $\delta_A(2,a)$ does not exist.

Pictorially, $A \times B$ looks like this. Note that $L(A \times B) = L(A) \cap L(B)$.

Is state (2,3) a useful state?