Parallel Simulation of 2-DFAs

- Suppose $A = (Q, \Sigma, \delta, q_0, F)$ and $A' = (Q', \Sigma, \delta', q_0', F')$ are two DFAs.
- Construct another DFA as:
  $A'' = (Q \times Q', \Sigma, \delta'', (q_0, q_0'), F'')$,
  where $\delta''((q, q'), a) = (\delta(q, a), \delta'(q', a))$, and F'' depends on the need.
- The above DFA A'' simulates the two DFAs A and A' in parallel. Note that alphabet Σ is same for all the three DFAs.

Parallel Simulation of 2-DFAs

- If we take $F'' = F \times F'$, then the new DFA A'' accepts the intersection of the languages accepted by A and A'.
- If we take $F'' = F \times Q' \cup Q \times F'$, then the new DFA A'' accepts the union of the languages accepted by A and A'.
- By taking other appropriate F'', one can build the DFA for other boolean combination of languages accepted by A and A'.