More About DFAs and Regular Languages

CS712
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Theorem: The language recognized by a DFA is a regular language.

Proof: by deconstructing DFA to produce regular expressions

1. add new initial and final states

Actually could be multiple final states in the original DFA
2. \[ i \xrightarrow{X} y \xrightarrow{Y} j \Rightarrow i \xrightarrow{x/y} j \]
3. Now eliminating original states, one at a time

![Diagram]

When removing a state, must consider all pairs of states connected via the state being removed.
4. If state $s$ is connected to $F$
   then the regular expression recognized by the DFA.

If state $s$ is not connected to $F$
   then the DFA recognizes $\emptyset$. 
