In automata theory, a nondeterministic finite automaton (NFA) or nondeterministic finite state machine is a finite state machine where from each state and a given input symbol the automaton may jump into several possible next states. This distinguishes it from the deterministic finite automaton (DFA), where the next possible state is uniquely determined. Although the DFA and NFA have distinct definitions, a NFA can be translated to equivalent DFA using powerset construction, i.e., the constructed DFA and the NFA recognize the same formal language. Both types of automata recognize only regular languages. NFAs were introduced in 1959 by Michael O. Rabinand Dana Scott, [1] who also showed their equivalence to DFAs.

In the theory of computation and Automata theory, the powerset construction or subset construction is a standard method for converting a nondeterministic finite automaton (NFA) into a deterministic finite automaton (DFA) which recognizes the same formal language. It is important in theory because it establishes that NFAs, despite their additional flexibility, are unable to recognize any language that cannot be recognized by some DFA. It is also important in practice for converting easier-to-construct NFAs into more efficiently executable DFAs. However, if the NFA has n states, the resulting DFA may have up to 2n states, an exponentially larger number, which sometimes makes the construction impractical for large NFAs.

The construction, sometimes called the Rabin–Scott powerset construction (or subset construction) to distinguish it from similar constructions for other types of automata, was first published by M. O. Rabin and Dana Scott in 1959.