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Assignment 1

1. A compiler is a program dedicated to translating traditional code into machine code. The noun is often used shorthand to describe the holistic process of converting HLLs to absolute code: (preprocessing, compiling, assembling, and loading/linking); however, it more directly refers to the parsing methods of specifically, code compilation: (lexical/syntax/semantic analysis, code generation/optimization, and target code generation).
2. A finite state automata is a set method that allows you to generate code within specific input guidelines. The two large groups of automata are DFAs and NFAs, which are known for having a deterministic and non-deterministic approach- respectively. This difference in approach is represented by the variable output as best shown in DFAs 1-to-1 mapping for edges and individual states; whereas NFAs are known for accepting more than one state per individual edge value.

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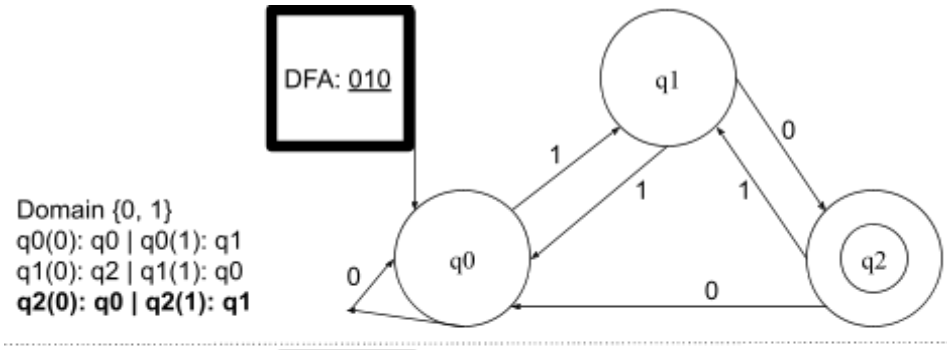
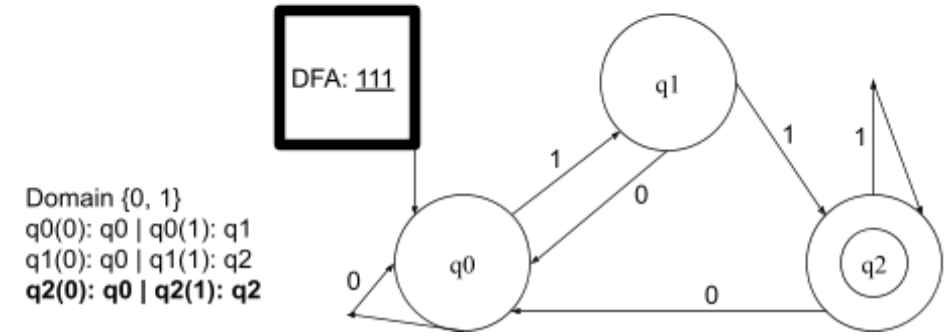
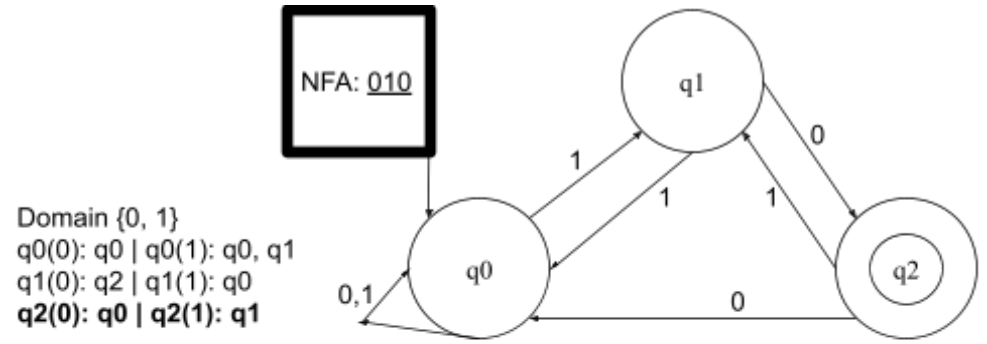
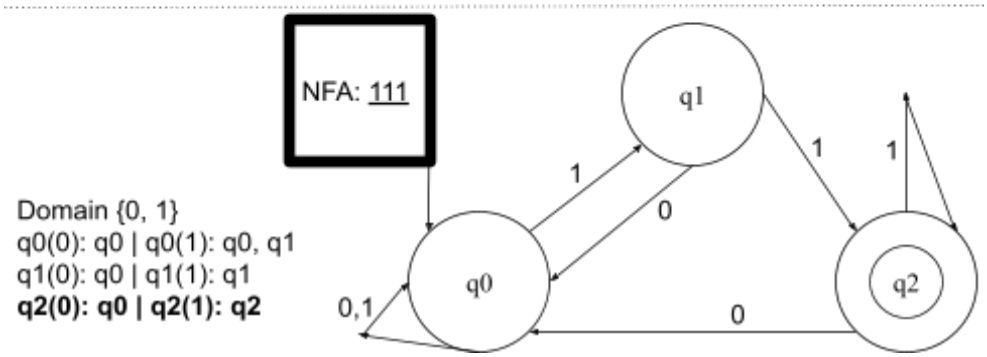
3. DFA and NFA for { target: 010, 111 }









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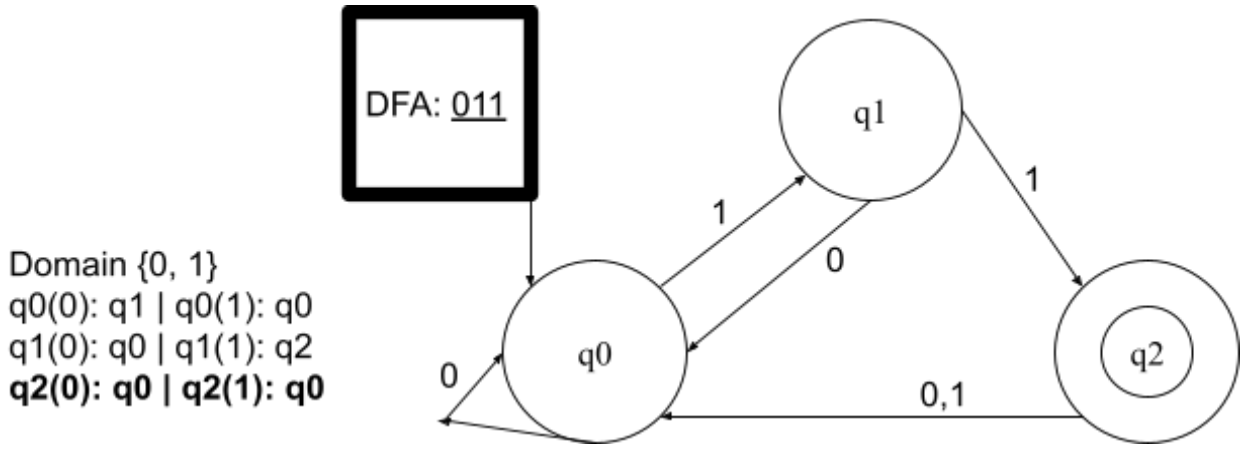
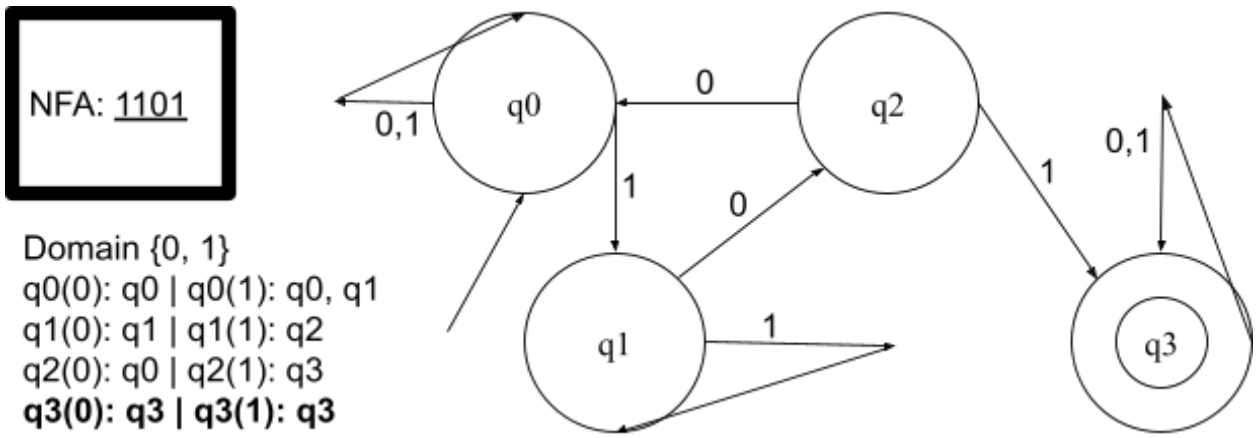
4. DFA; Domain {0,1} {target: 011}



5. Regular Expressions are series' of expressions that describe language acceptance cases. They first express a domain, and then an expression that uses articles to clarify an acceptance case.

6. NFA {target: 1101}



7. In the shown FSA, there are 3 tuples, each representing a state and their associated transitions (q0, q1, and q2). Input strings with substring `11` will be accepted by the shown FSA. (I thought originally it would be strings that include two 1s but because there's no third loop I chose to write it as shown above).

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8. As a minimal finite automaton, to accept the string 101011, would require 6 unique states.
9. The core difference between a deterministic and non-deterministic approach is that a deterministic has a 1-to-1 functional mapping for each state-input case; whereas, non-deterministic approaches have ambiguous input-output mappings that would require further clarification for implementation.

   NFA {domain: 0,1 }

   a0(0): a1, a2 | a0(1): a2

   a1(0): a2 | a1(1): a3

   a2(0): a2 | a2(1): a3

   a3(0): ∅ | **a3(1):** ∅

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10. Diagram for the NFA shown: