Theory of Computation
CS F351

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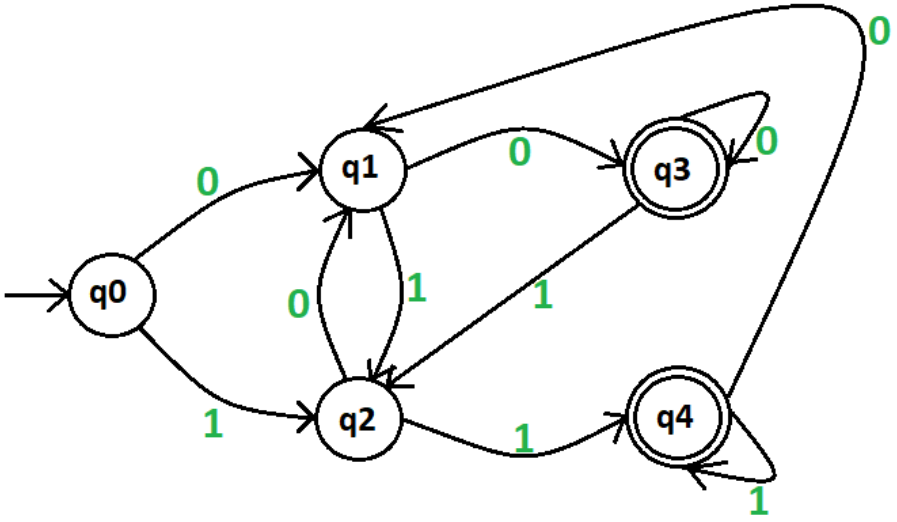
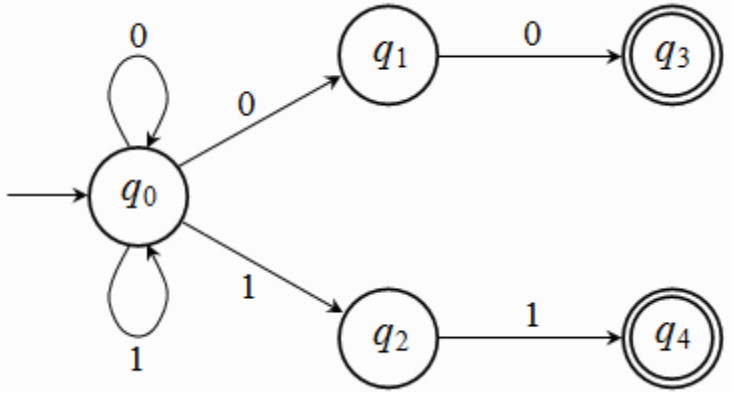
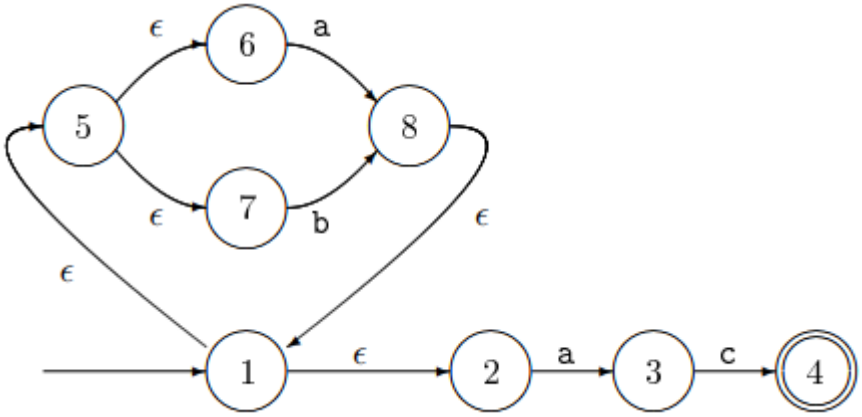
Lecture: 20

Deterministic Machines





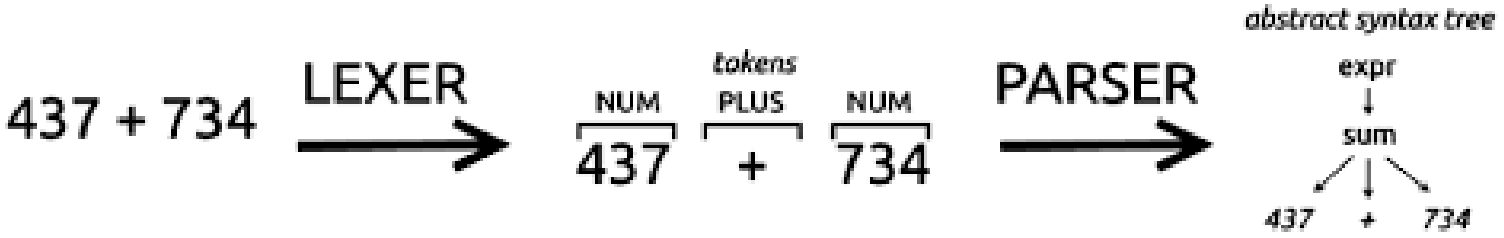


Deterministic PDA

- CFG's are used extensively in modelling the syntax of programming languages.

1. E→I // Expression is an identifier
2. E→E+E // Add two expressions
3. E→E*E // Multiply two expressions
4. E→(E) // Add parenthesis
5. I→ L // Identifier is a Letter
6. I→ ID // Identifier + Digit
7. I→ IL // Identifier + Letter
8. D → 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 // Digits
9. L → a | b | c | … A | B | … Z // Letters

What is a Parser?



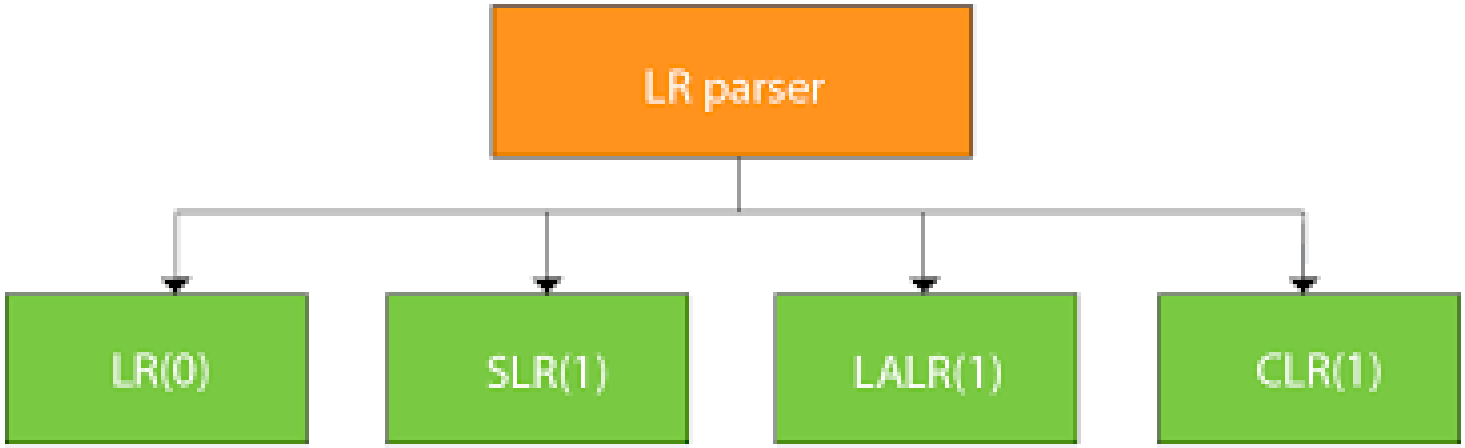


Fig: Types of LR parser

What is a Parser?

- The idea of most successful parsers are rooted in the idea of Push Down Automaton.
- However, a PDA is not of immediate practical use in parsing, because it is a non-deterministic device.

So, can we always make PDA operate deterministically ??

What is a deterministic PDA?

Deterministic PDA

Consistent Strings:

Two strings are consistent if first is a prefix of second, or vice versa.

Compatible Transitions:

Two transitions $(p, a, \beta)(q, \gamma)$ and $(p, a_1, \beta_1)(q_1, \gamma_1)$ are compatible if a and a_1 are consistent, and β and β_1 are also consistent.

Deterministic PDA:

A PDA is deterministic if it has no two distinct compatible transitions.

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What are deterministic CFL's ?

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Recommendations