

39 Lecture - CS402

Important Subjective

1. **What is a PDA and how does it relate to a CFG?**

Answer: A PDA (Pushdown Automaton) is a type of automaton that can recognize languages generated by CFGs (Context-Free Grammars). The stack in a PDA allows it to keep track of nonterminals in the input string as it reads them, which is a necessary component for recognizing languages generated by CFGs.

What are the components of a PDA?

Answer: A PDA consists of a finite set of states, an input tape, a stack, and a transition function. The stack allows the PDA to keep track of nonterminals in the input string as it reads them. The transition function is based on the current state, the symbol on the input tape, and the symbol at the top of the stack.

What is the difference between a deterministic PDA and a non-deterministic PDA?

Answer: A deterministic PDA (DPDA) is a PDA where for every state and input symbol, there is at most one possible transition. A non-deterministic PDA (NPDA) is a PDA where for every state and input symbol, there may be multiple possible transitions.

How does a PDA accept a string?

Answer: A PDA can accept a string if it reaches an accepting state with an empty stack.

Can a PDA recognize all languages?

Answer: No, a PDA can only recognize languages that are generated by a CFG.

Can a regular language be recognized by a PDA?

Answer: Yes, because every regular language can also be generated by a CFG, which can then be recognized by a PDA.

What is the role of the stack in a PDA?

Answer: The stack in a PDA allows it to keep track of nonterminals in the input string as it reads them, which is a necessary component for recognizing languages generated by CFGs.

What is the difference between a PDA and a Turing machine?

Answer: A PDA has a stack and a finite set of states, while a Turing machine has an infinite tape and an infinite number of states. A Turing machine is more powerful than a PDA in terms of the languages it can recognize.

Can a PDA recognize the complement of a context-free language?

Answer: No, the complement of a context-free language is not necessarily context-free, so a PDA may not be able to recognize it.

Can a PDA recognize the language $\{0^n1^n2^n\}$?

Answer: No, the language $\{0^n1^n2^n\}$ is not context-free, so it cannot be recognized by a PDA.