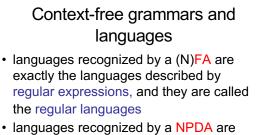


1

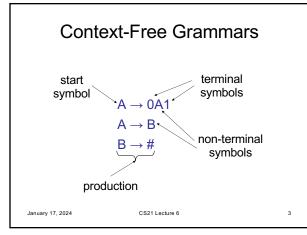


exactly the languages described by context-free grammars, and they are called the context-free languages

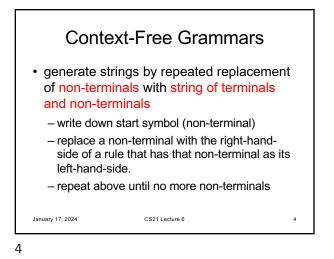
CS21 Lecture 6

January 17, 2024

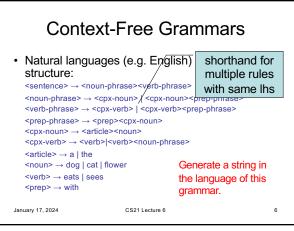
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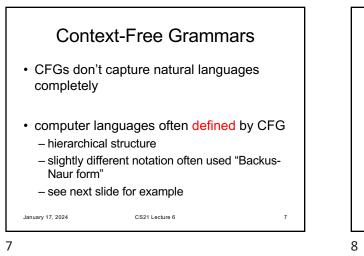
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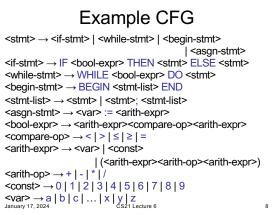


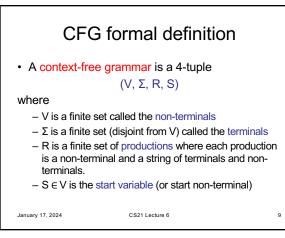
Context-Free Grammars Example: $A \Rightarrow 0A1 \Rightarrow 00A11 \Rightarrow$ $000A111 \Rightarrow 000B111 \Rightarrow$ 000#111• a derivation of the string 000#111 • a derivation of the string 000#111 • set of all strings generated in this way is the language of the grammar L(G) • called a Context-Free Language



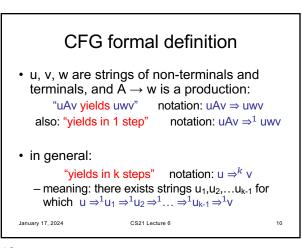




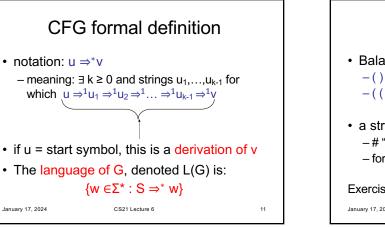


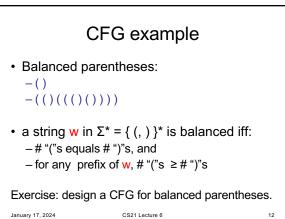


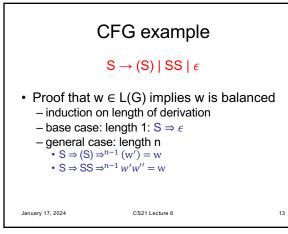












13

CFG example $S \rightarrow (S) | SS | \epsilon$ • Proof that w is balanced implies w $\in L(G)$ – induction on length of w – base case: length 0: w = ϵ – general case: length 0 – consider shortest prefix in language – if whole string then w = (w') and w' balanced – if proper prefix then w = w'w'' with w' and w'' balanced

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