

CS331 Assignment 6

Dan Fraser

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1 Question 1: Grammar for $a^i b^j$

1.1 Context-Free Grammar

$$\begin{aligned} G &= (V, \Sigma, R, S) \\ V &= \{a, b, S, T\} \\ \Sigma &= \{a, b\} \\ S &= S \\ R &= \{(S, Tb), (T, aTb), (T, e), (T, s)\} \end{aligned}$$

1.2 Pushdown Automata

2 Question 2: Pushdown Automaton

2.1 Automaton Accepting *abaaba*

State	Unread Input	Stack	Transition Used
<i>q0</i>	<i>abaaba</i>	<i>e</i>	—
<i>q1</i>	<i>baaba</i>	<i>c</i>	T1
<i>q0</i>	<i>aaba</i>	<i>dc</i>	T4
<i>q1</i>	<i>aba</i>	<i>cdc</i>	T1
<i>q0</i>	<i>ba</i>	<i>dc</i>	T3
<i>q1</i>	<i>a</i>	<i>c</i>	T2
<i>q0</i>	<i>e</i>	<i>e</i>	T3

2.2 Context-Free Grammar

$$G = (V, \Sigma, R, S)$$

$$V = \{a, b, S, R, T\}$$

$$\Sigma = \{a, b\}$$

$$S = S$$

$$R = \{(S, aTa), (S, e), (T, aaTaa), (T, bRb), (T, e), (R, aRa), (R, T), (R, e)\}$$