

CS310

PDA \rightarrow CFG
Section 2.2 page 115

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Examples

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 - 2.18 (P)
 - 2.25 (P)
 - 2.22
 - 2.23
 - 2.27

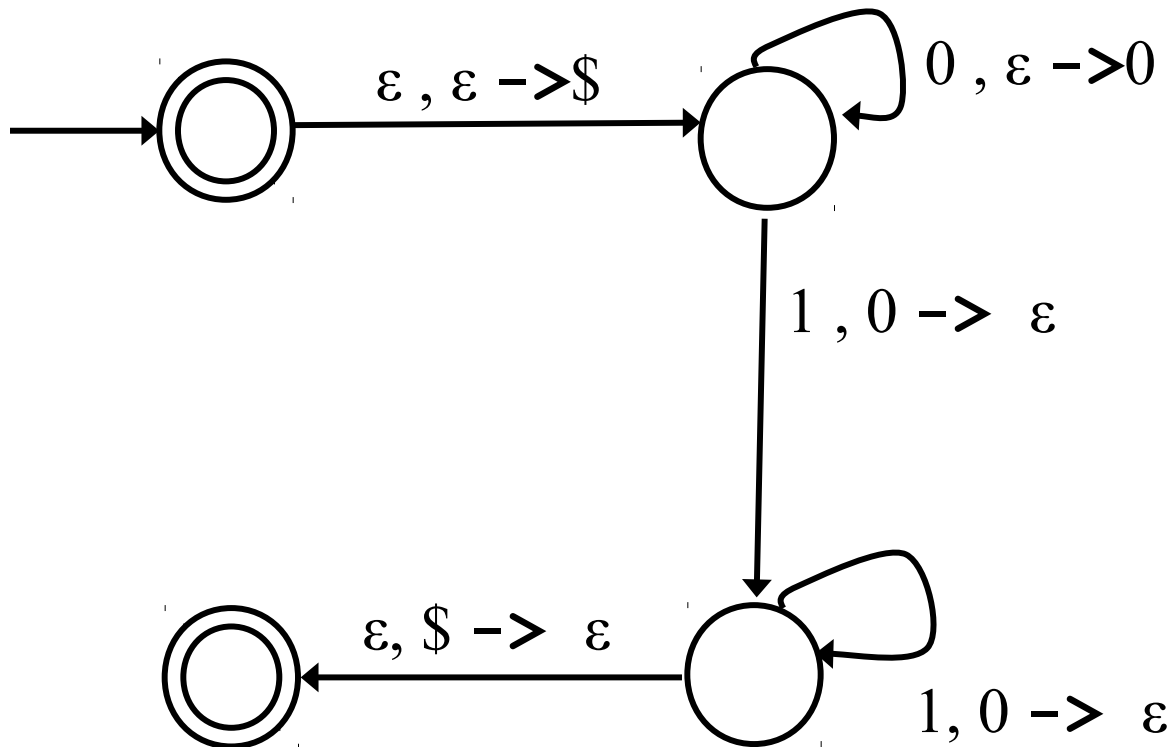
Quick Review

$a, b \rightarrow c$



Read a from input,
read b from stack,
push c onto stack to
take this transition

$a = \epsilon$, read no input
 $b = \epsilon$, don't pop
data from stack
 $c = \epsilon$, don't push
data onto stack



Example

- $L = \{ a^i b^j c^k \mid i, j, k \geq 0, i = j \text{ or } i = k \}$

Theorem

- A Language is context free if and only if there exists a PDA that recognizes it.
- Lemma:
 - If a language is context free, then some PDA recognizes it
 - Show: a CFG can be transformed into a PDA
- Lemma:
 - If a PDA recognizes a language, then it is context free
 - *Program a PDA to run a CFG*

Construct PDA from CFG p 116

- $L = \{a^n b b^n \mid n \geq 0\}$

CFG?

1) Place \$, start variable on stack

2) Repeat:

a) if variable A is on top of stack, use replacement rule $A (pop) \rightarrow w (push)$

b) if terminal on top, read input, compare. If match, repeat, else die

c) if \$ on top, enter accept, die if there's more input

Construct CFG from PDA

- p 119 – 122

Build the PDA

- $\{w \mid w = (10)^n \# (01)^n; n > 1\}$
 $\Sigma = \{0, 1, \#\}$
- Build the CFG from the PDA using the previous construction