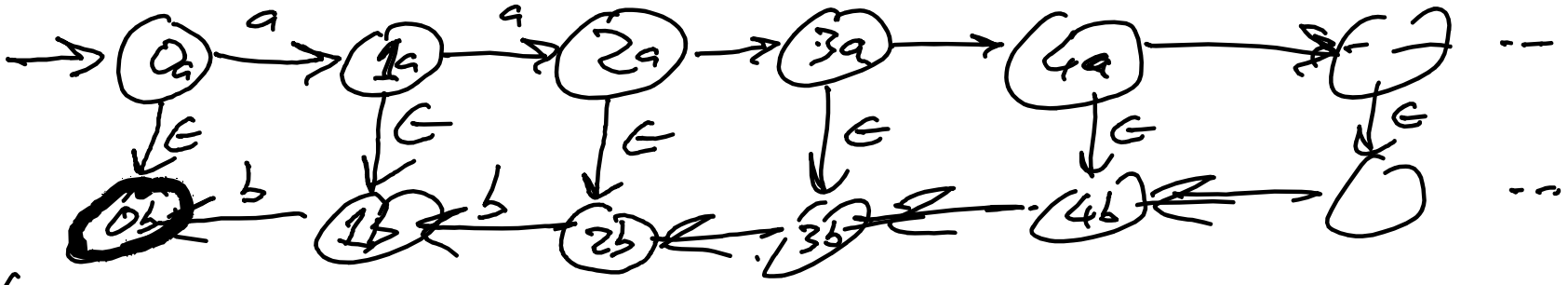
Lecture 9

$L = \{a^n b^n : n \geq 0\}$.

Fictional infinite state NFA:



(Motivates PDA in lecture slides)

Context-free grammar:

$S \to \varepsilon \mid aSb$

Random generation:

Why could we not write?

$S \to \varepsilon \mid aAbB$

$A \to \varepsilon \mid aA$

$B \to \varepsilon \mid bB$

No "context" links them

$L = \{ a^n b^m : n \geq m \geq 0 \}$

$S \rightarrow$ "Some As" "Matching"

"Some As" $\rightarrow \epsilon$ | a "Some As"

"Matching" $\rightarrow \epsilon$ | a "Matching" b

Example context-free grammar

$S \rightarrow aXbY$
$X \rightarrow cSd$
$X \rightarrow g$
$Y \rightarrow bY$
$Y \rightarrow a$

Example word generation

$S \rightarrow aXbY$
$\rightarrow aXbbY$
$\rightarrow acSdbbY$
$\rightarrow acSdbba$
$\rightarrow acaXbYdbba$
$\rightarrow acagbYdbba$
$\rightarrow acagbadbba$

Derivation tree

Non-terminal symbols found during in-order traversal of derivation tree