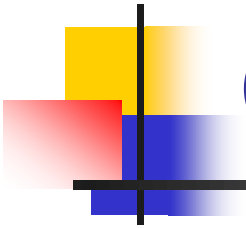
CSC 2204 Finite Automata Theory and Formal Languages

Department of Computer Science
SZABIST (Islamabad Campus)

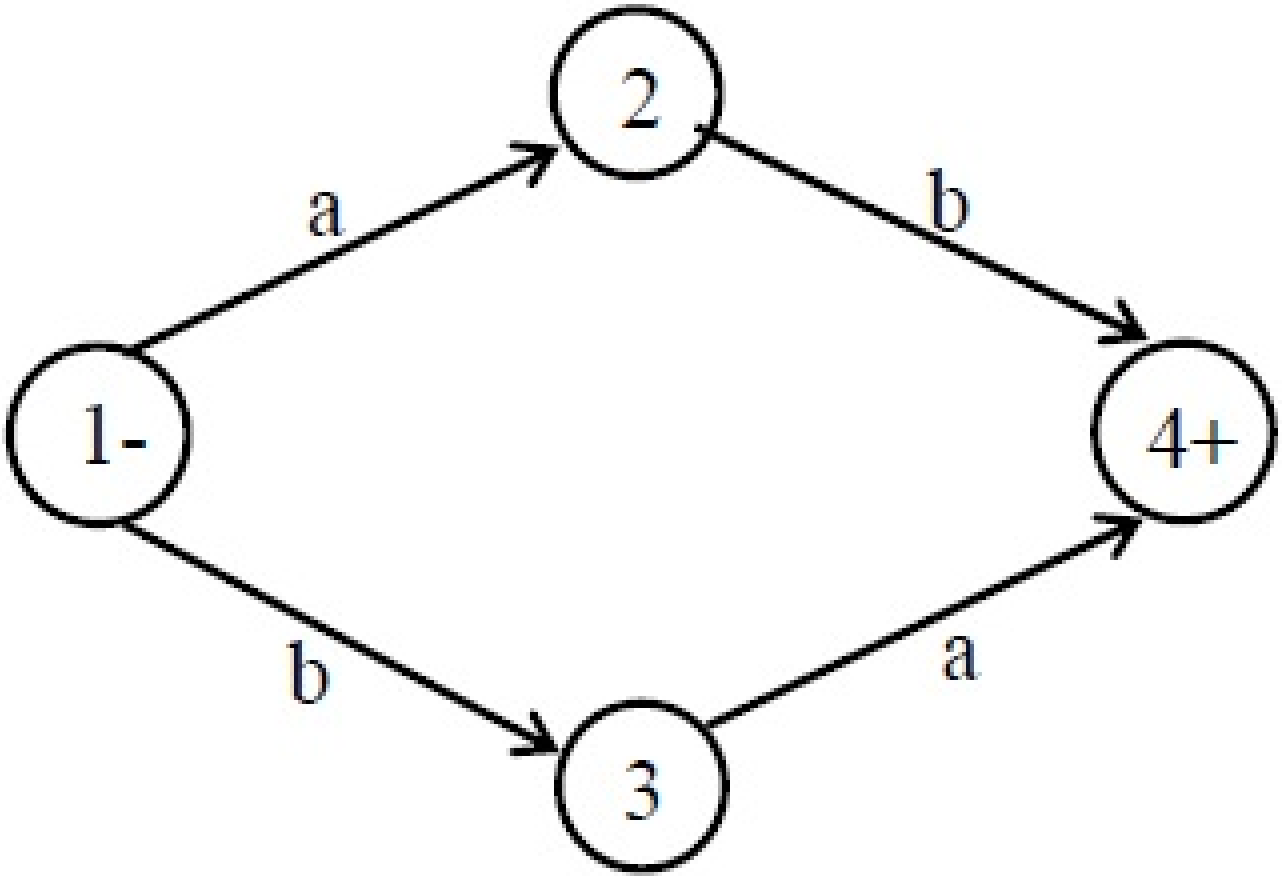
Week 4 (Lecture 1)



Converting NFA to DFA

- Method 1:
  - Since in an NFA, there may be more than one transition for a certain letter and there may not be any transition for certain letter, so starting from the initial state corresponding to the initial state of given NFA, the transition diagram of the corresponding FA, can be built introducing an empty state for a letter having no transition at certain state and a state corresponding to the combination of states, for a letter having more than one transitions.

Converting NFA to DFA



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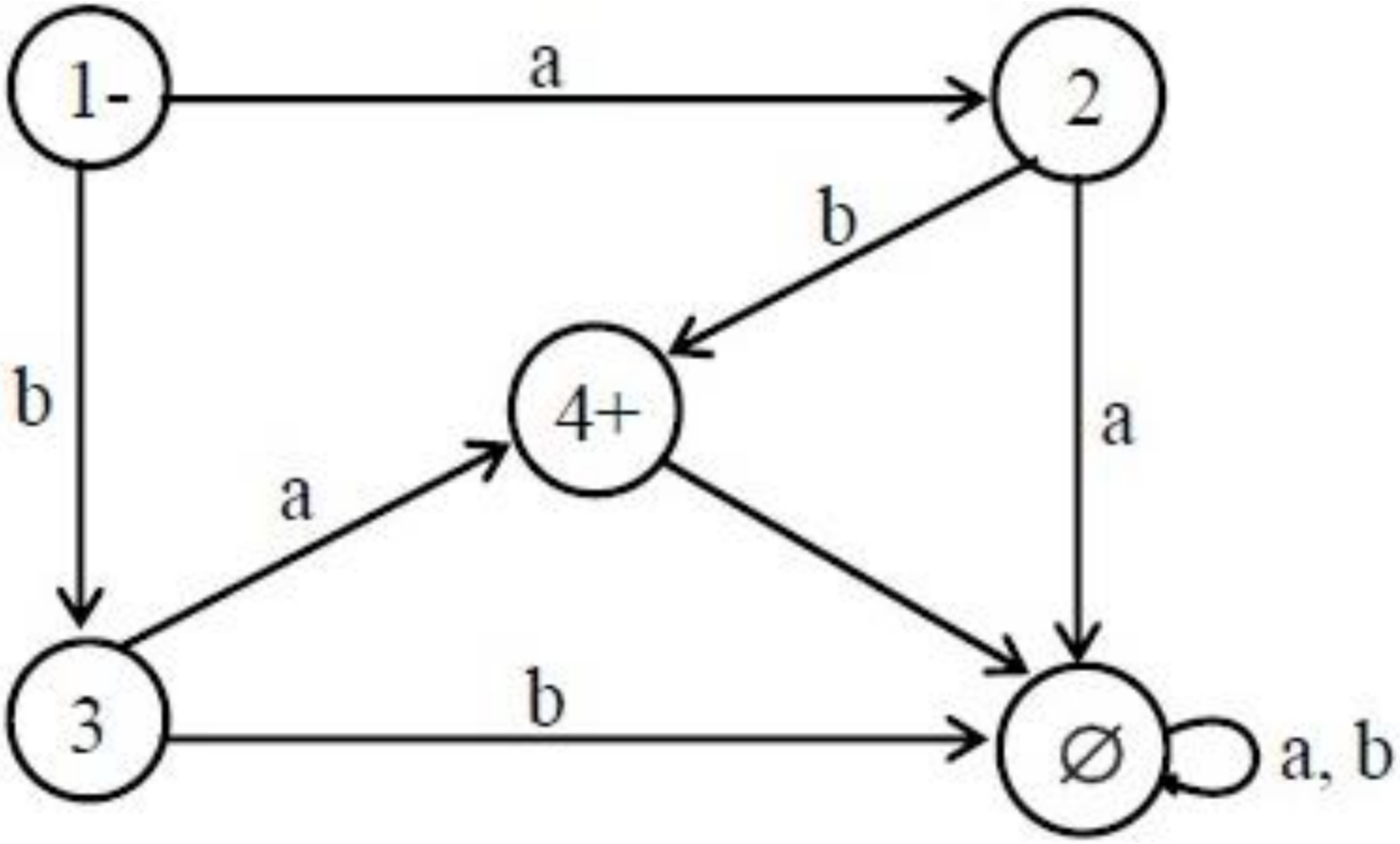

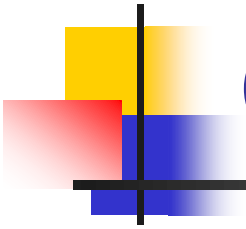

Converting NFA to DFA

- Language L = {bb,bbb} defined over ∑ = {a,b}.

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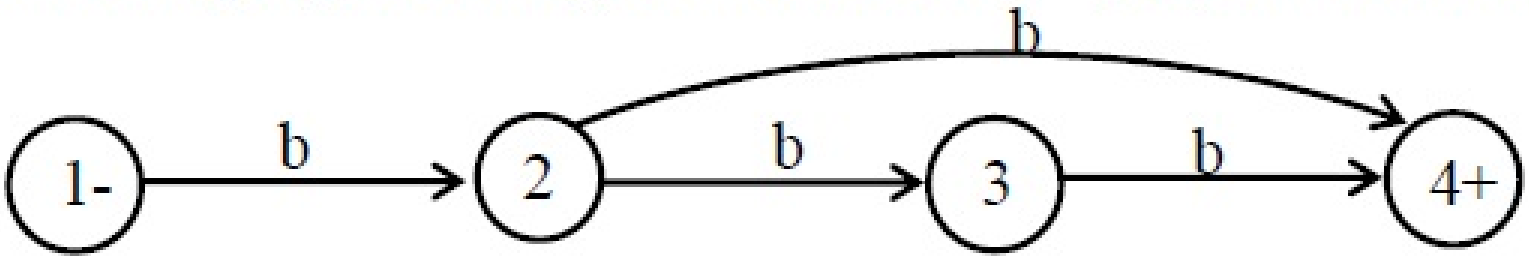

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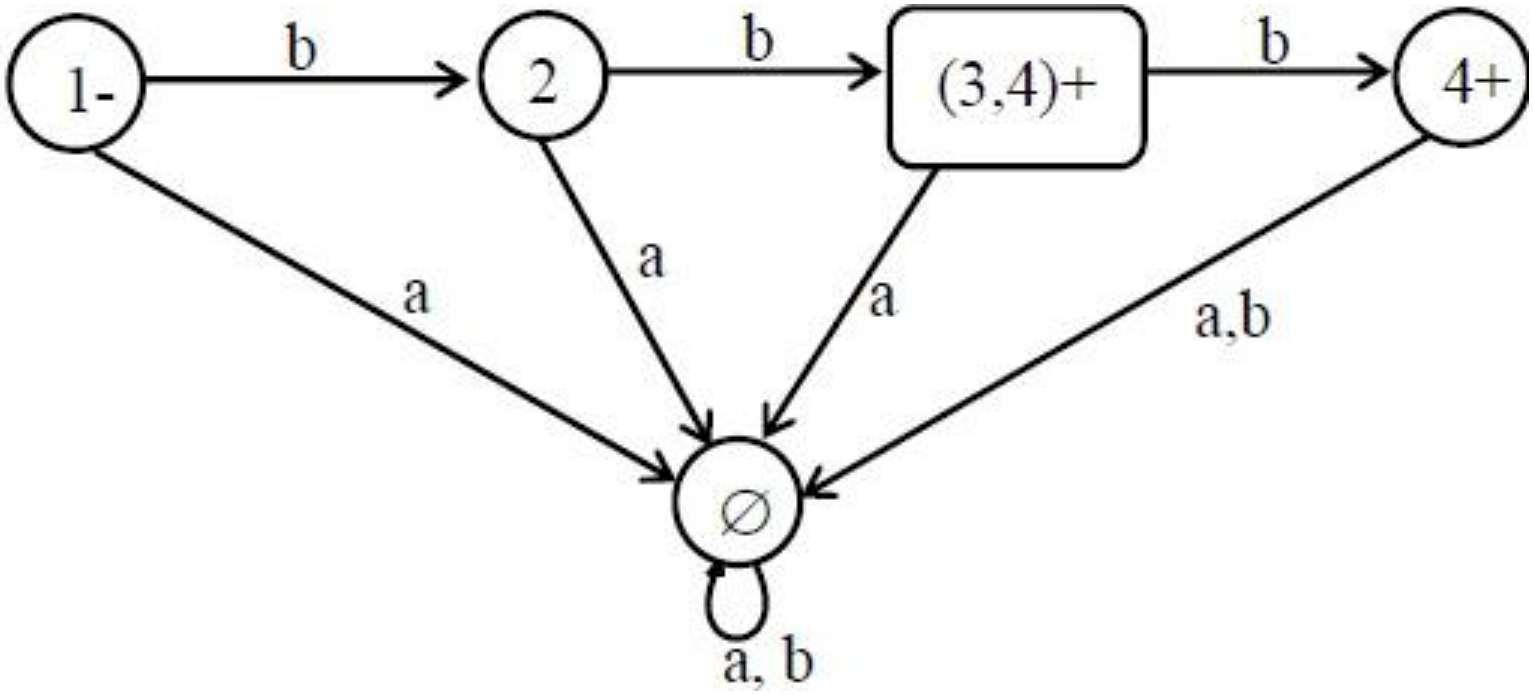
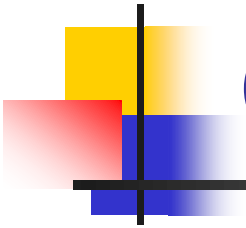
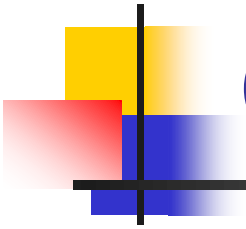




Converting NFA to DFA

- Method 2:
  - In an NFA, there may be more than one transition for a certain letter and there may not be any transition for certain letter, so starting from the initial state corresponding to the initial state of given NFA, the transition table along with new labels of states, of the corresponding FA, can be built introducing an empty state for a letter having no transition at certain state and a state corresponding to the combination of states, for a letter having more than one transitions



Converting NFA to DFA

- Language L defined over ∑ = {a,b} accepting words containing bb.

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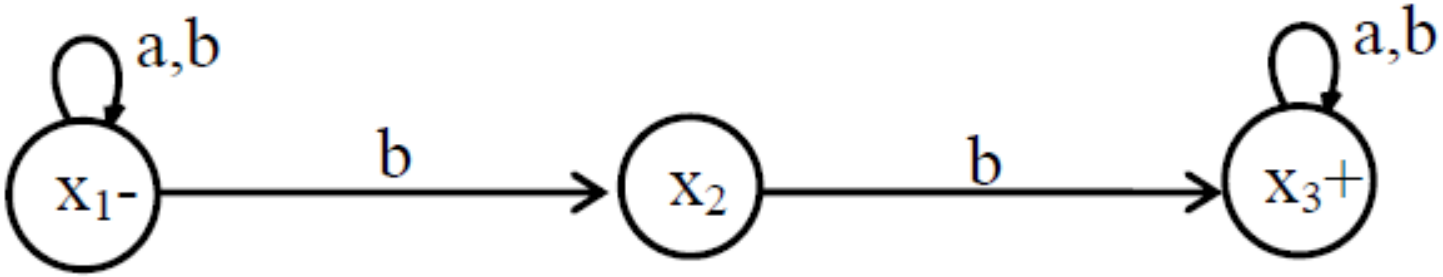


Converting NFA to DFA

Old States	New States after reading	
	a	b
$z_1 \equiv x_1$	$x_1 \equiv z_1$	$(x_1, x_2) \equiv z_2$

Converting NFA to DFA

Old States	New States after reading	
	a	b
$z_1 \equiv x_1$	$x_1 \equiv z_1$	$(x_1,x_2) \equiv z_2$
$z_2 \equiv (x_1,x_2)$	$(x_1, \varnothing) \equiv x_1 \equiv z_1$	$(x_1, x_2, x_3) \equiv z_3$

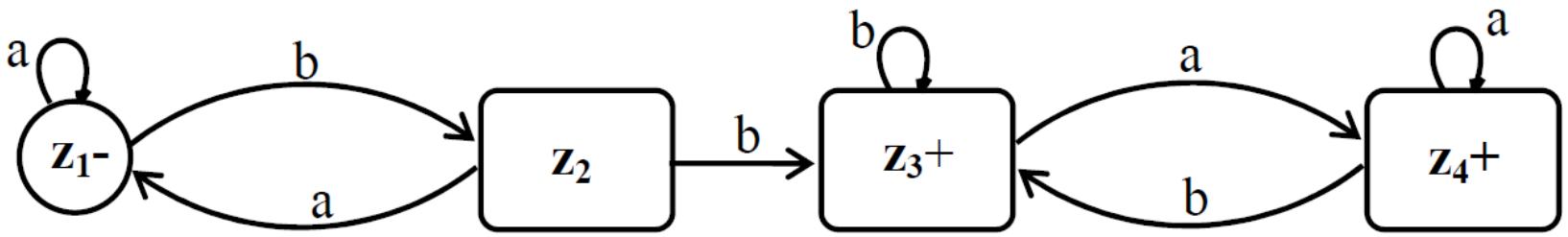
Converting NFA to DFA

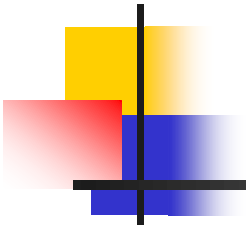
Old States	New States after reading	
	a	b
$z_1 \text{-} \equiv x_1$	$x_1 \equiv z_1$	$(x_1, x_2) \equiv z_2$
$z_2 \equiv (x_1, x_2)$	$(x_1, \varnothing) \equiv x_1 \equiv z_1$	$(x_1, x_2, x_3) \equiv z_3$
$z_3 + \equiv (x_1, x_2, x_3)$	$(x_1, x_3) \equiv z_4$	$(x_1, x_2, x_3) \equiv z_3$

Converting NFA to DFA

Old States	New States after reading	
	a	b
z_1-≡x_1	$x_1 \equiv z_1$	$(x_1,x_2) \equiv z_2$
$z_2 \equiv (x_1,x_2)$	$(x_1, \varnothing) \equiv x_1 \equiv z_1$	$(x_1, x_2, x_3) \equiv z_3$
z_3+≡(x_1,x_2,x_3)	$(x_1,x_3) \equiv z_4$	$(x_1, x_2, x_3) \equiv z_3$
z_4+≡ (x_1,x_3)	$(x_1,x_3) \equiv z_4$	$(x_1, x_2, x_3) \equiv z_3$

Converting NFA to DFA





Exercises

- Language L defined over ∑ = {a,b} accepting words containing aa.
- Language L defined over ∑ = {a,b} accepting words ending in a.
- Language L defined over ∑ = {a,b} accepting words starting with a.
- Language L defined over ∑ = {a,b} accepting words starting and ending in same letters.