# 2DFA: Two-way deterministic finite state automata

## Examples

Let $\Sigma = \{a, b\}$ and $L$ be a regular language.

$L_1 = \{w \in \Sigma^* \mid \text{second letter from the end if } a\}$.

$L_2 = \{w \in \Sigma^* \mid w \cdot w \in L\}$

$L_2 = \{w \in \Sigma^* \mid w^{\leq |w|} \in L\}$

# Acceptance by 2DFA

## Definition

Let $A$ be a 2DFA.

A word $w$ is said to be accepted by $A$ if $A$ reaches $q_{\text{acc}}$ on $w$.

A word $w$ is said to be rejected by $A$ if $A$ reaches $q_{\text{rej}}$ on $w$.

$A$ is said to recognize a language $L$ if $\forall w \in L$, $A$ reaches $q_{\text{acc}}$.

2DFA may loop forever if $w \notin L$ or may enter $q_{\text{rej}}$.