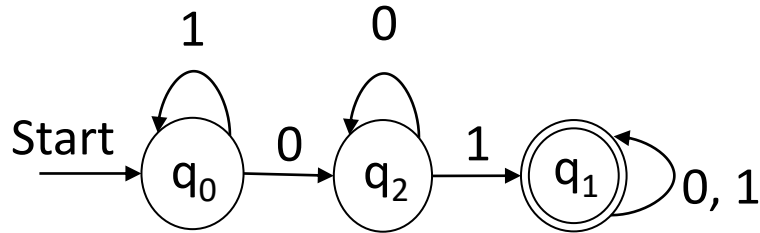# Theory of Computation

Recognition in DFAs
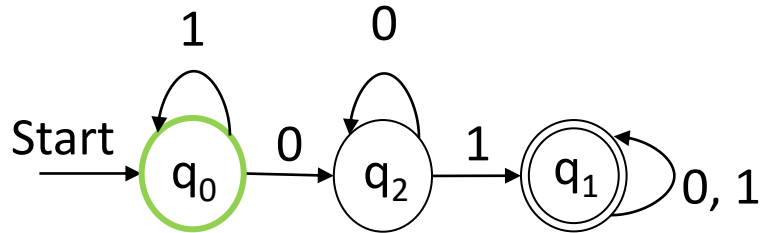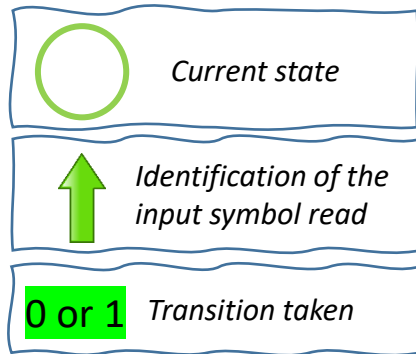
DFA – Recognizer of the binary strings that contain the substring 01

▶ Input: 1011

DFA – Recognizer of the binary strings that contain the substring 01

▶ Input: 1011

Current state

Identification of the input symbol read

0 or 1 Transition taken

$$q_0 \xrightarrow{0} q_2 \xrightarrow{1} q_1$$

1 0 1 1

DFA – Recognizer of the binary strings that contain the substring 01

▶ Input: 1011

◯ (green circle)	*Current state*
⬆ (green arrow)	*Identification of the input symbol read*
`0 or 1`	*Transition taken*

DFA – Recognizer of the binary strings that contain the substring 01

▶ Input: 1011

DFA – Recognizer of the binary strings that contain the substring 01
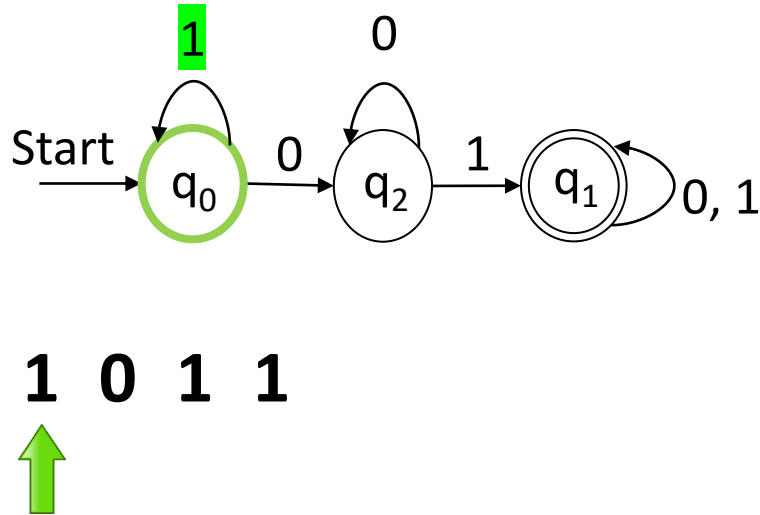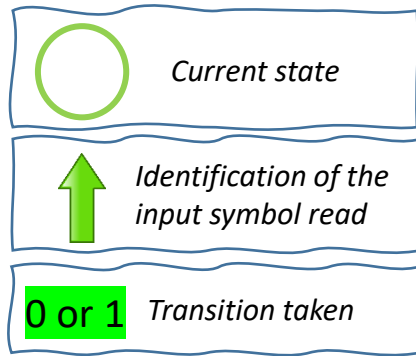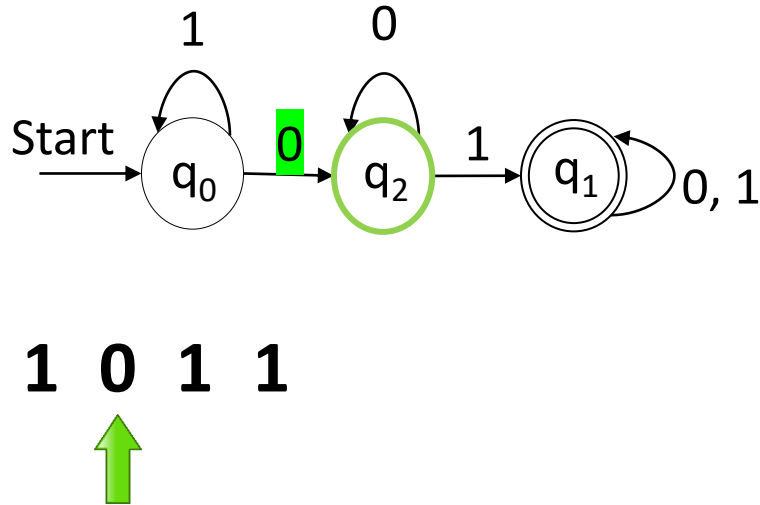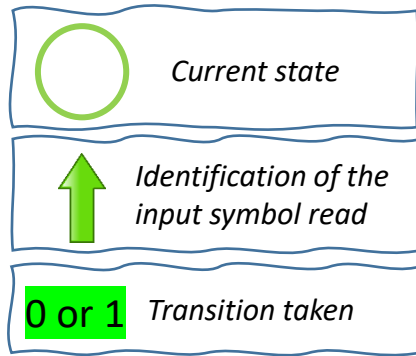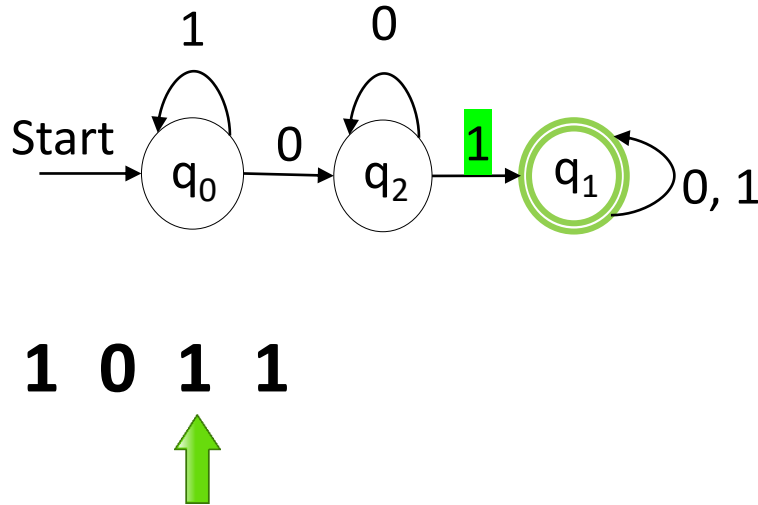
▶ Input: 1011

Current state

Identification of the input symbol read

0 or 1   Transition taken

DFA – Recognizer of the binary strings that contain the substring 01
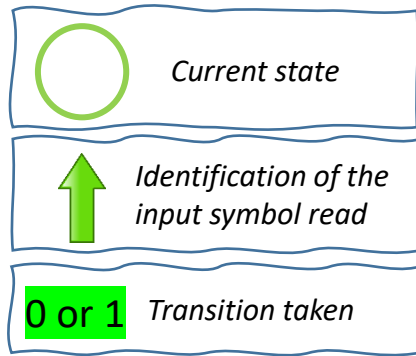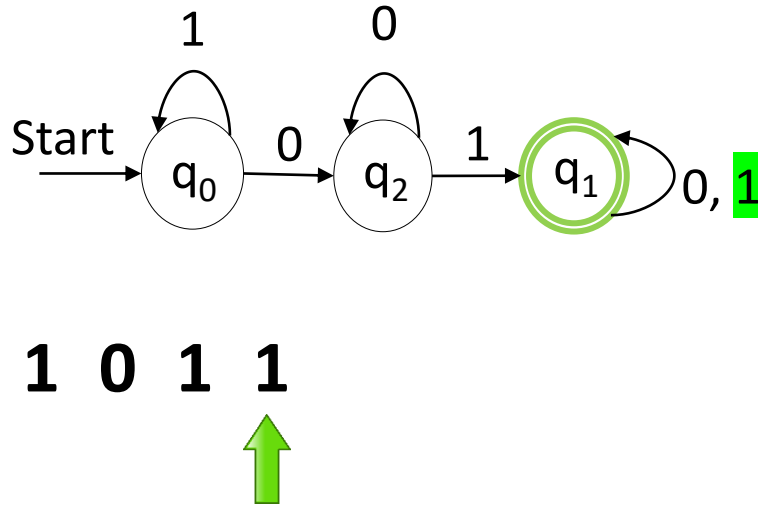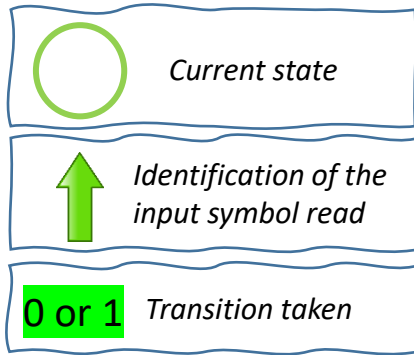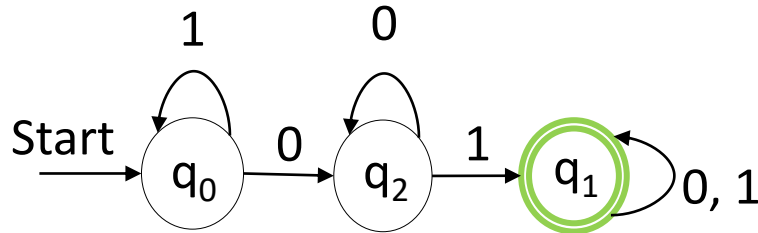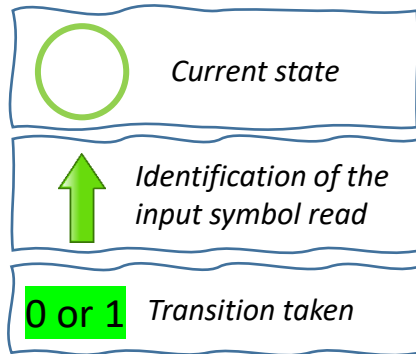
▶ Input: 1011

DFA – Recognizer of the binary strings that contain the substring 01
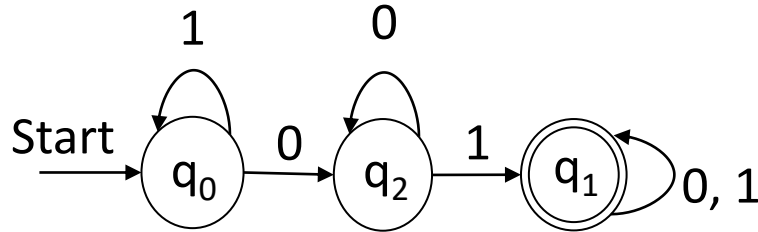
▶ Input: 1011

Current state

Identification of the input symbol read

0 or 1 *Transition taken*

Start $\rightarrow$ q_0 $\xrightarrow{0}$ q_2 $\xrightarrow{1}$ q_1 with self-loops: q_0 on 1, q_2 on 0, q_1 on $0, 1$

1 0 1 1

Input fully processed and DFA is in a final state $\Longrightarrow$ **ACCEPT**!

DFA – Recognizer of the binary strings that contain the substring 01

▶ Input: 10

Current state

Identification of the input symbol read

0 or 1 Transition taken

DFA – Recognizer of the binary strings that contain the substring 01

▶ Input: 10

DFA – Recognizer of the binary strings that contain the substring 01

▶ Input: 10
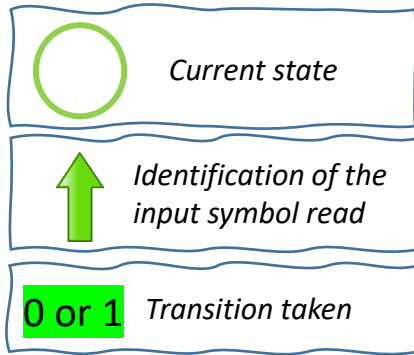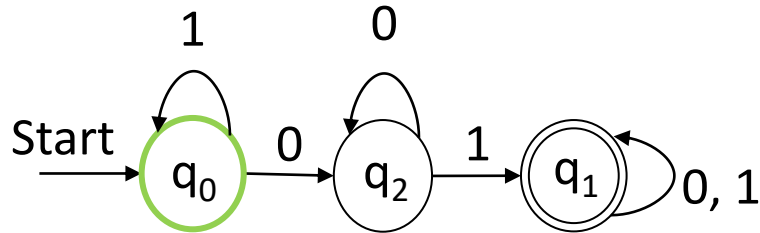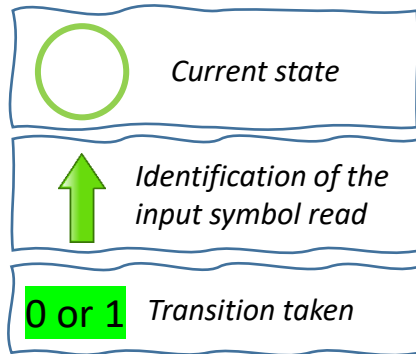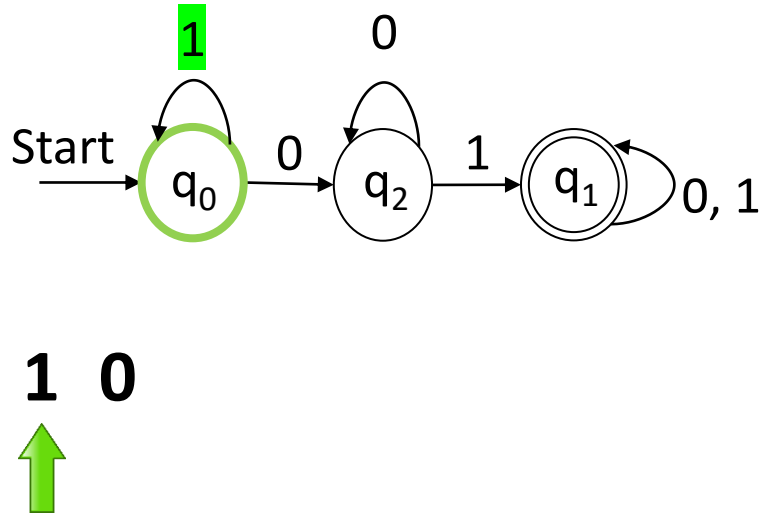
DFA – Recognizer of the binary strings that contain the substring 01

▶ Input: 11

DFA – Recognizer of the binary strings that contain the substring 01
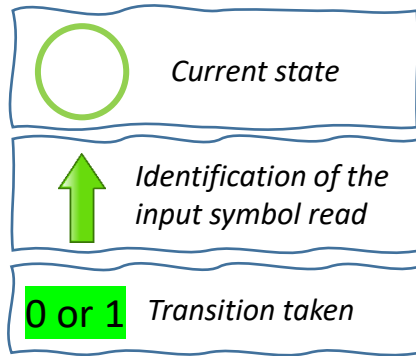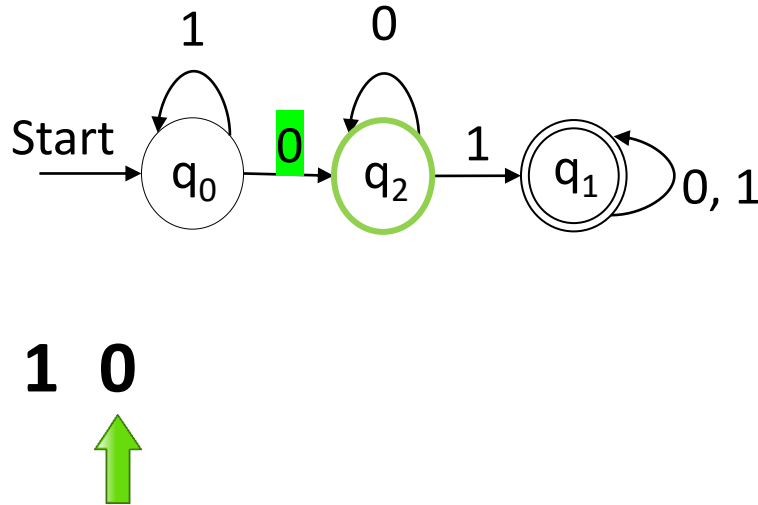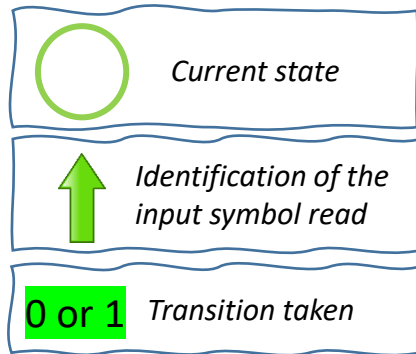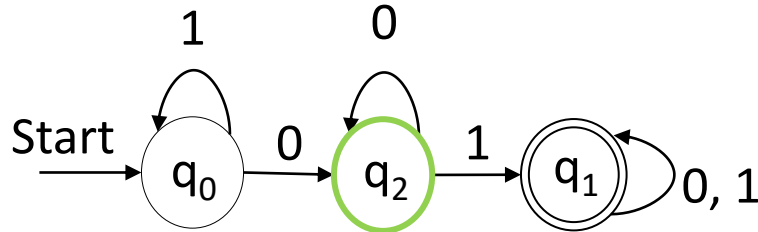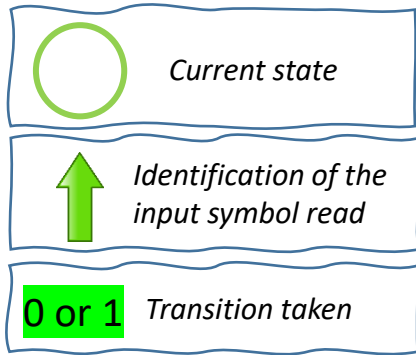
▶ Input: 11

Current state

Identification of the input symbol read

0 or 1 Transition taken

Start → q₀ (1 loop) →0→ q₂ (0 loop) →1→ q₁ (0,1 loop)

1 0

Input fully processed and DFA is not in a final state ⟹ REJECT