

FINITE STATE AUTOMATA (CONT.)

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An Example

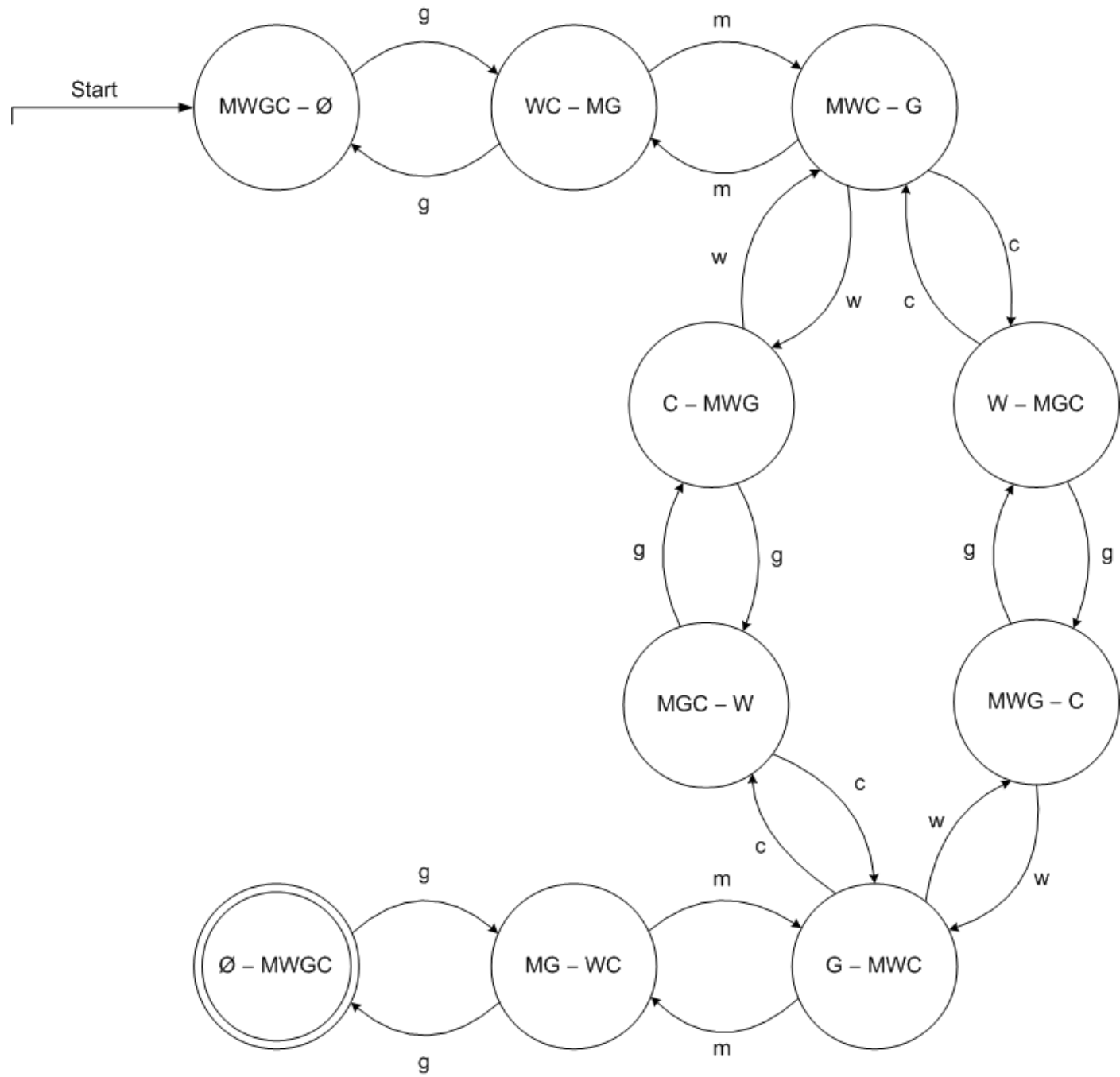
A man with a wolf, goat, and cabbage is on the left bank of a river. There is a boat large enough to carry the man and only one of the other three. The man and his entourage wish to cross to the right bank, and the man can ferry each across, one at a time.

However, if the man leaves the wolf and goat unattended on either shore, the wolf will surely eat the goat. Similarly, if the goat and cabbage are left unattended, the goat will eat the cabbage. Is it possible to cross the river without the goat or cabbage being eaten?

Solution

- States: 16 subsets of the man (M), wolf (W), goat (G), and cabbage (C).
 - *) states are labeled by hyphenated pairs (MW – GC)
 - *) such fatal states may never be entered by the system (GC – MW)
- Inputs: the actions the man takes. He may
 - *) cross alone (input ***m***)
 - *) with the wolf (input ***w***)
 - *) with the goat (input ***g***)
 - *) with the cabbage (input ***c***)
- Transition function is shown in the transition diagram

Solution – State Transition Diagram

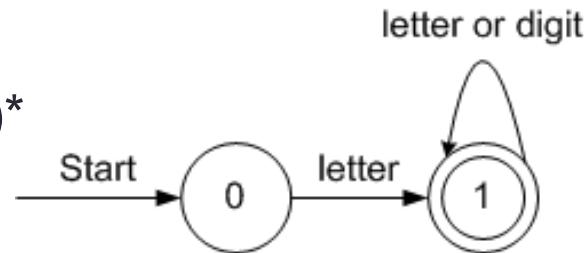


Applications

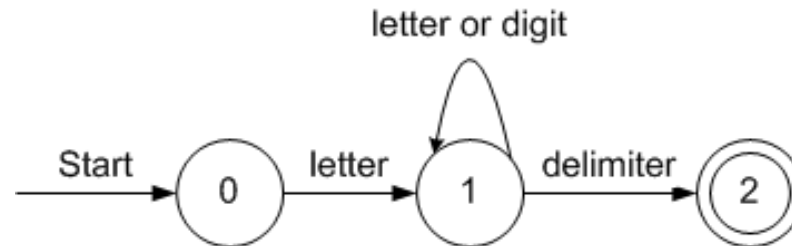
- Lexical analyzers

- Identifiers:

(letter)(letter + digit)*



within a text, we may set the delimiter as a token separator



- Keywords:

BEGIN, END, IF, THEN, ELSE, etc.

Source code example

```
status 0:      C ← GETCHAR()
                if LETTER(C) then
                    goto status 1
                else
                    FAIL()
                endif
status 1:      C ← GETCHAR()
                if LETTER(C) or DIGIT(C) then
                    goto status 1
                else
                    if DELIMITER(C) then
                        goto status 2
                    else
                        FAIL()
                    endif
                endif
status 2:      RETRACT()
                return(id, INSTALL())
```