An Exploration of Finite State Automata

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August 2022

1 Traffic Light

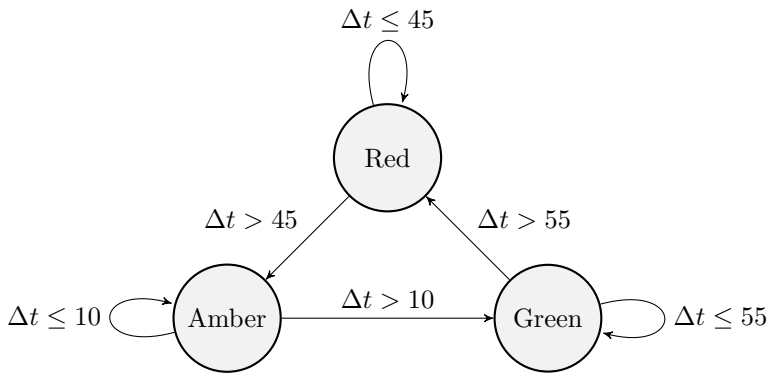

Figure 1: Graph showing the finite state automata where Δt represents the number of ticks, or seconds, since the last state change.

2 Decimal Parser

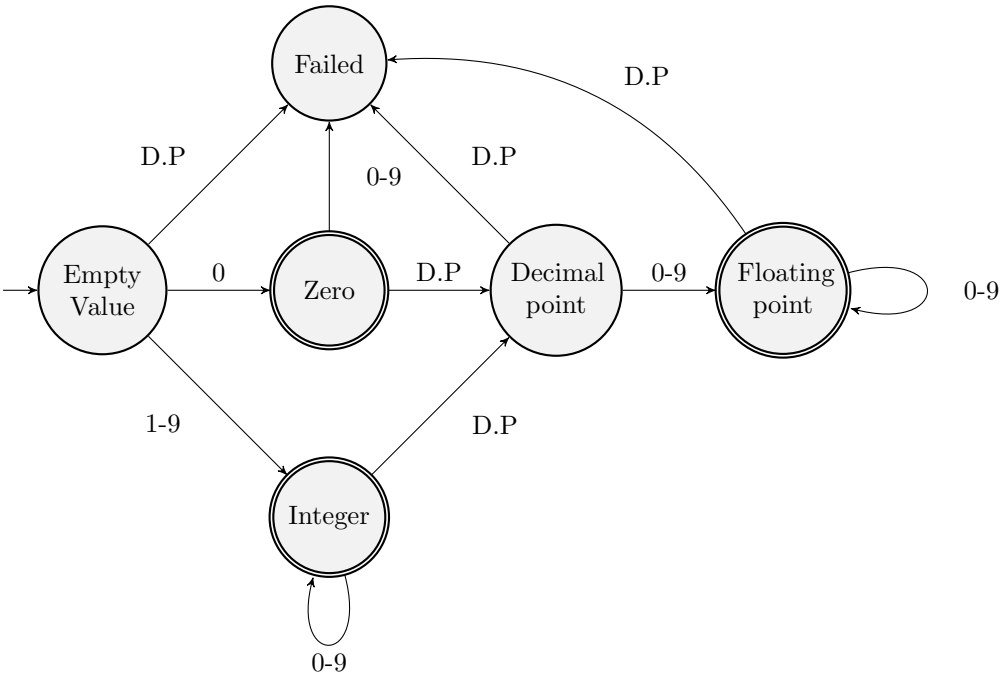

Figure 2: A finite state machine that parses a number from a string one character at a time. The state machine ends when the final character is reached. The parse is considered a success if the ending position is on an accepting node. Any undefined behaviour, such as encountering a character not in {'0', '1', '2', '3', '4', '5', '6', '7', '8', '9','.'}, is automatically assumed to be a fail.

3 Letters to Digits and vice versa converter

3.1 Rules

R_0: S → STRING

R_1: STRING → DIGIT STRING

R_2: STRING → LETTER STRING

R_3: STRING → DIGIT

R_4: STRING → LETTER

R_5: DIGIT → LETTER

R_6: LETTER → DIGIT

R_7: DIGIT → 0

R_8: DIGIT → 1

R_9: DIGIT → 2

R_{10}: DIGIT → 3

R_{11}: DIGIT → 4

R_{12}: DIGIT → 5

R_{13}: DIGIT → 6

R_{14}: DIGIT → 7

R_{15}: DIGIT → 8

R_{16}: DIGIT → 9

R_{17}: LETTER → A

R_{18}: LETTER → B

R_{19}: LETTER → C

R_{20}: LETTER → D

R_{21}: LETTER → E

R_{22}: LETTER → F

R_{23}: LETTER → G

R_{24}: LETTER → H

R_{25}: LETTER → I

R_{26}: LETTER → J

3.2 Terminal Symbols

Σ = {1, 2, 3, 4, 5, 6, 7, 8, 9, 0, A, B, C, D, E, F, G, H, I, J}

3.3 Non-terminal Symbols

N = {STRING, DIGIT, LETTER}

3.4 Finite State Machine