

# State Machines

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**CivicActions**

# dkan

And non-standar CSVs

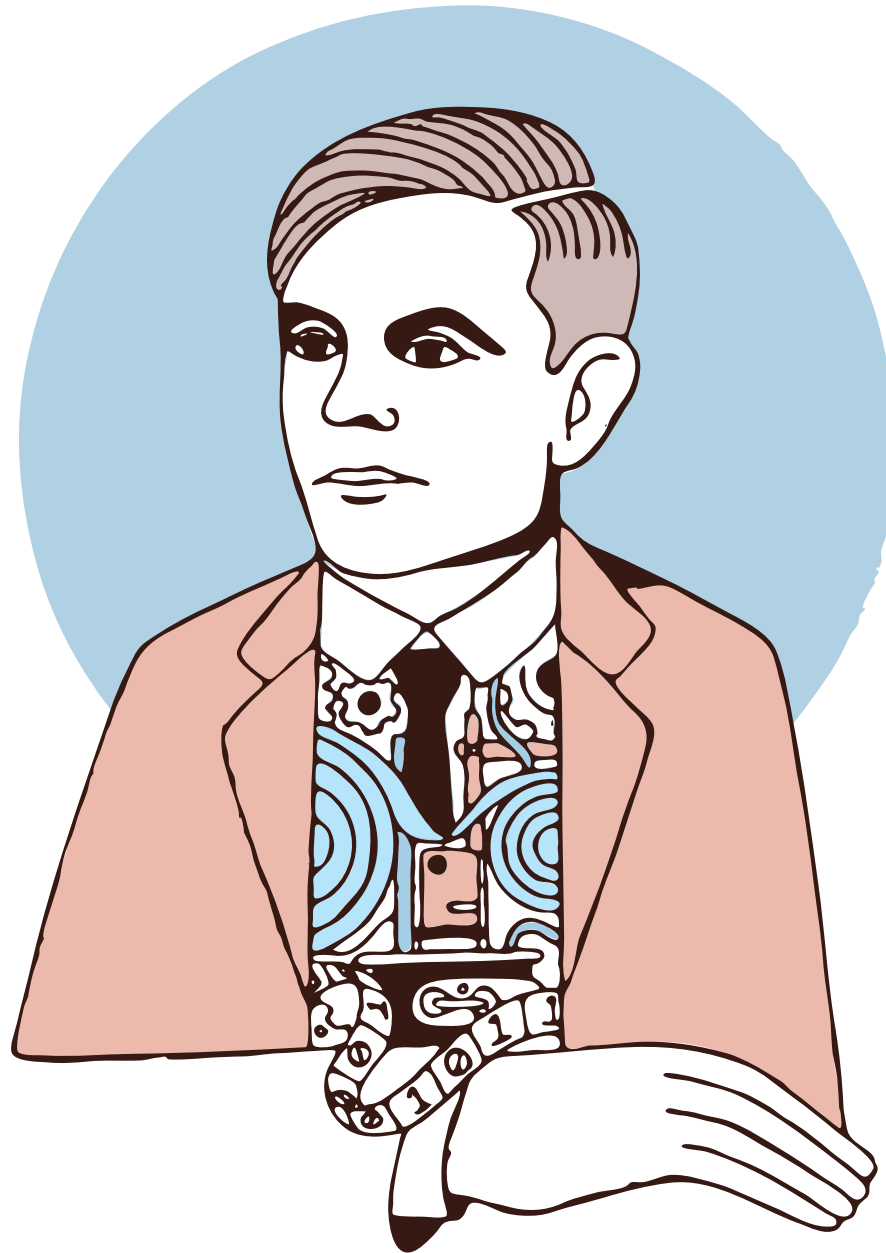
# Theory of Computation

... is the branch that deals with how efficiently problems can be solved on a model of computation, using an algorithm.

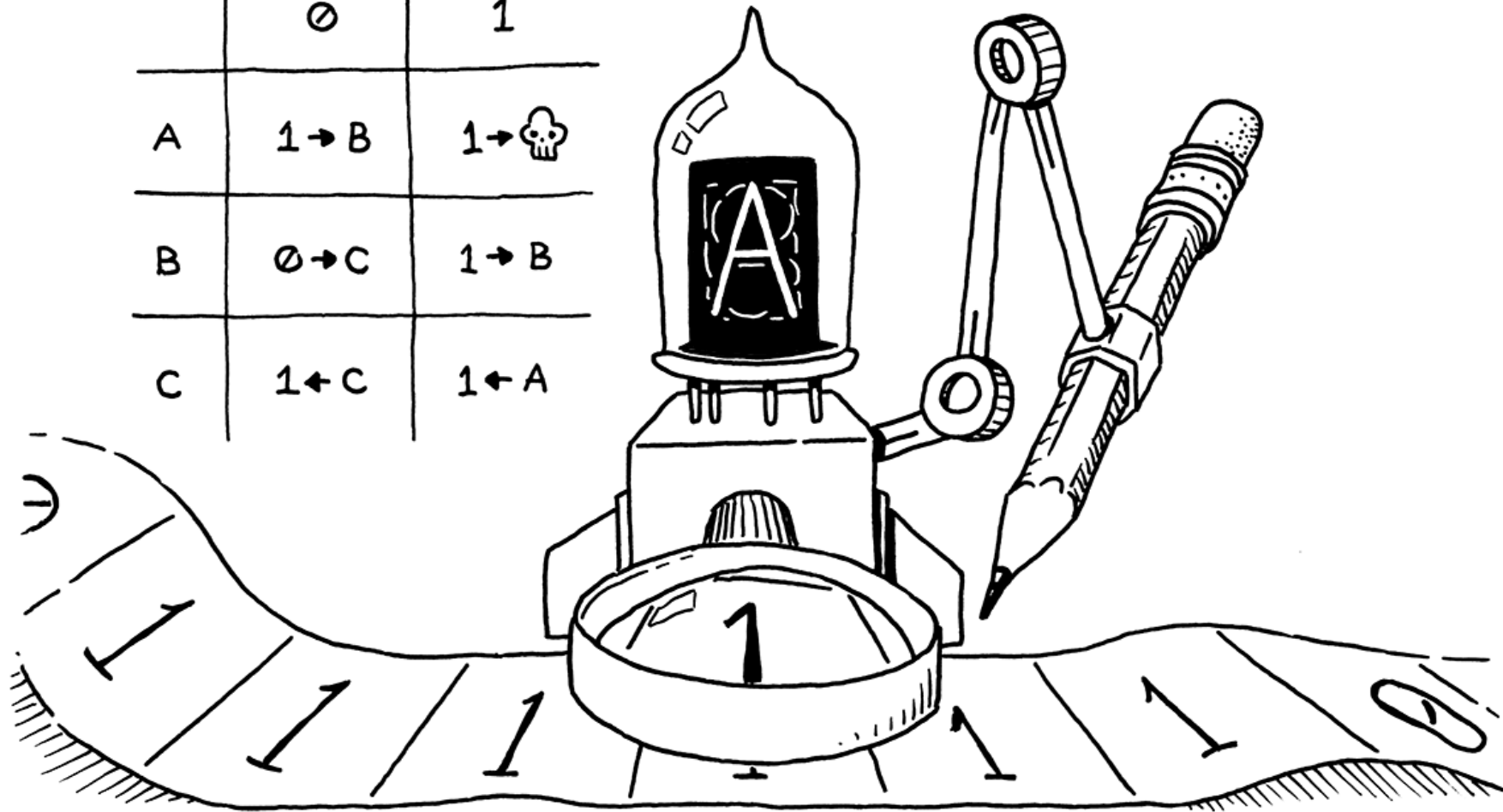
- automata theory and languages
- computability theory
- computational complexity theory



# Entscheidungsproblem



	$\emptyset$	1
A	$1 \rightarrow B$	$1 \rightarrow \clubsuit$
B	$\emptyset \rightarrow C$	$1 \rightarrow B$
C	$1 \leftarrow C$	$1 \leftarrow A$

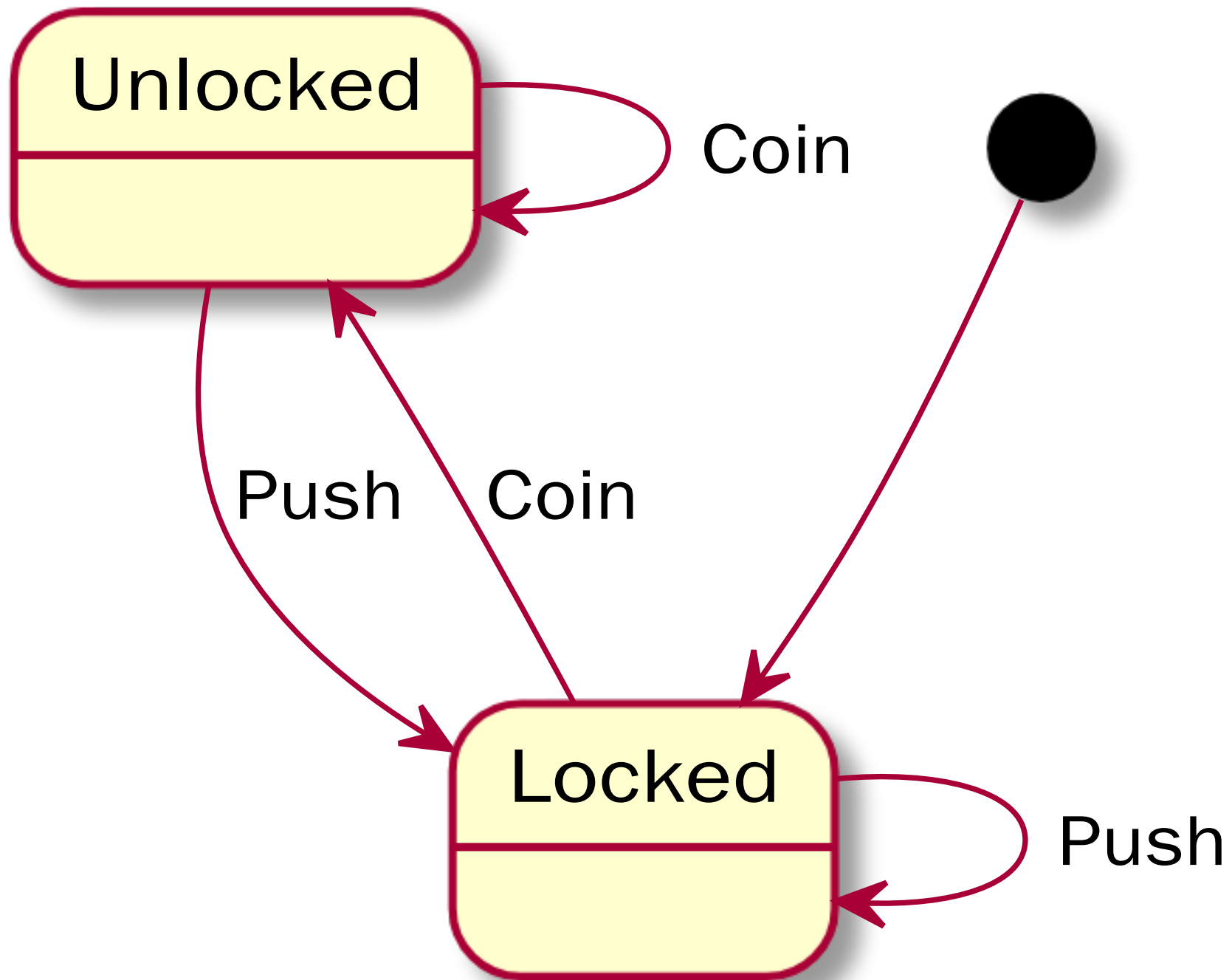


# Halting Problem



$$(\Sigma, S, s_0, \delta, F)$$

$$\delta : S \times \Sigma \rightarrow S$$



# Back to CSV

(?: (?: \r\n)? [ \t] ) \* (?: (?: (?: [^()<>@,;: \\". \[ \] \000-\031] + (?: (?: (?: \r\n)? [ \t] ) + | \Z | (?: [= \[ " ( ) <>@,;: \\". \[ \] ] ) ) | " (?: [^ \r\n] | \\. | (?: (?: \r\n)? [ \t] ) ) \* (?: [^()<>@,;: \\". \[ \] \000-\031] + (?: (?: (?: \r\n)? [ \t] ) + | \Z | (?: [= \[ " ( ) <>@,;: \\". \[ \] ] ) ) | " (?: [^ \r\n] | \\. | (?: (?: \r\n)? [ \t] ) ) \* (?: (?: \r\n)? [ \t] ) \* ) \* @ (?: (?: \r\n)? [ \t] ) \* (?: [^()<>@,;: \\". \[ \] \000-\031] + (?: (?: (?: \r\n)? [ \t] ) + | \Z | (?: [= \[ " ( ) <>@,;: \\". \[ \] ] ) ) | \[ (?: [^ \[ \] \r\n] | \\. ) \* \] (?: (?: \r\n)? [ \t] ) \* (?: \. (?: (?: \r\n)? [ \t] ) \* (?: [^()<>@,;: \\". \[ \] \000-\031] + (?: (?: (?: \r\n)? [ \t] ) + | \Z | (?: [= \[ " ( ) <>@,;: \\". \[ \] ] ) ) | \[ (?: [^ \[ \] \r\n] | \\. ) \* \] (?: (?: \r\n)? [ \t] ) \* ) \* | (?: [^()<>@,;: \\". \[ \] \000-\031] + (?: (?: (?: \r\n)? [ \t] ) + | \Z | (?: [= \[ " ( ) <>@,;: \\". \[ \] ] ) ) | " (?: [^ \r\n] | \\. | (?: (?: \r\n)? [ \t] ) ) \* (?: (?: \r\n)? [ \t] ) \* ) \* \< (?: (?: \r\n)? [ \t] ) \* (?: @ (?: [^()<>@,;: \\". \[ \] \000-\031] + (?: (?: (?: \r\n)? [ \t] ) + | \Z | (?: [= \[ " ( ) <>@,;: \\". \[ \] ] ) ) | \[ (?: [^ \[ \] \r\n] | \\. ) \* \] (?: (?: \r\n)? [ \t] ) \* (?: \. (?: (?: \r\n)? [ \t] ) \* (?: [^()<>@,;: \\". \[ \] \000-\031] + (?: (?: (?: \r\n)? [ \t] ) + | \Z | (?: [= \[ " ( ) <>@,;: \\". \[ \] ] ) ) | \[ (?: [^ \[ \] \r\n] | \\. ) \* \] (?: (?: \r\n)? [ \t] ) \* ) \* (?: , @ (?: (?: \r\n)? [ \t] ) \* (?: [^()<>@,;: \\". \[ \] \000-\031] + (?: (?: (?: \r\n)? [ \t] ) + | \Z | (?: [= \[ " ( ) <>@,;: \\". \[ \] ] ) ) | \[ (?: [^ \[ \] \r\n] | \\. ) \* \] (?: (?: \r\n)? [ \t] ) \* (?: \. (?: (?: \r\n)? [ \t] ) \* (?: [^()<>@,;: \\". \[ \] \000-\031] + (?: (?: (?: \r\n)? [ \t] ) + | \Z | (?: [= \[ " ( ) <>@,;: \\". \[ \] ] ) ) | \[ (?: [^ \[ \] \r\n] | \\. ) \* \] (?: (?: \r\n)? [ \t] ) \* ) \* ) \* : (?: (?: \r\n)? [ \t] ) \* ) ? (?: [^()<>@,;: \\". \[ \] \000-\031] + (?: (?: (?: \r\n)? [ \t] ) + | \Z | (?: [= \[ " ( ) <>@,;: \\". \[ \] ] ) ) | " (?: [^ \r\n] | \\. | (?: (?: \r\n)? [ \t] ) ) \* (?: [^()<>@,;: \\". \[ \] ] ) ) | " (?: [^ \r\n] | \\. | (?: (?: \r\n)? [ \t] ) ) \* (?: (?: \r\n)? [ \t] ) \* ) \* ...

*Regular expressions describe regular languages*

*A regular language can be defined as a language recognized by a finite automaton*

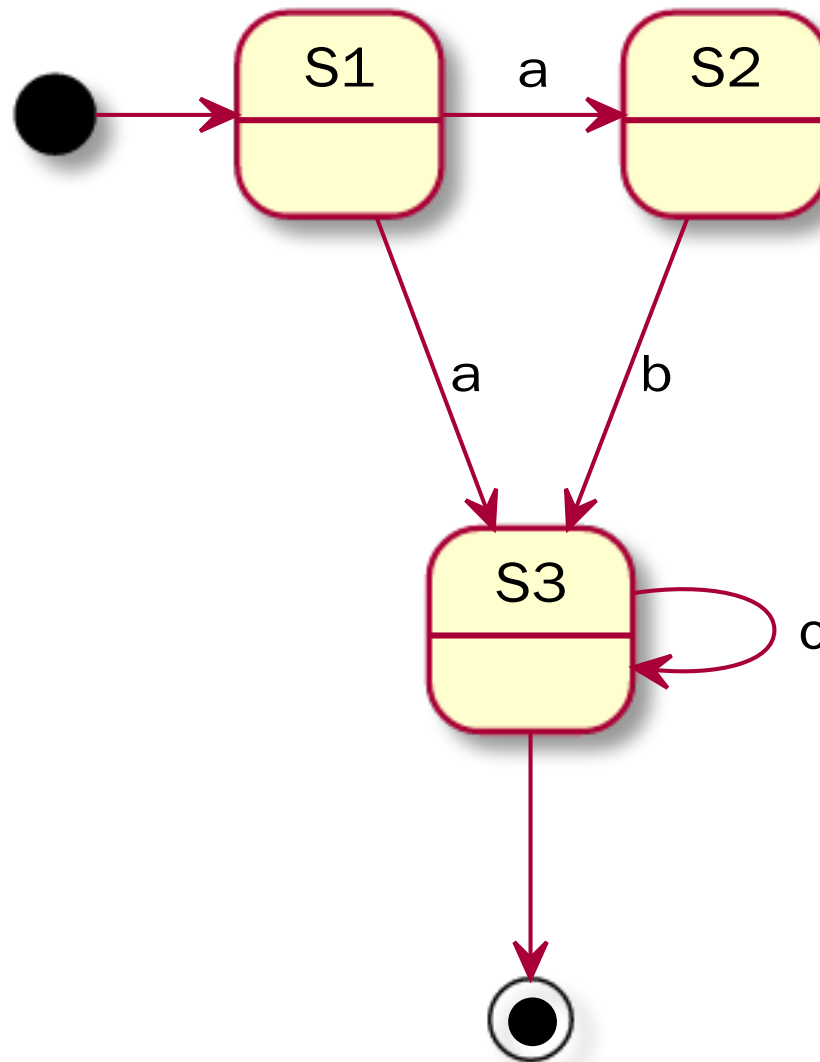
$$a (b|\epsilon) c^*$$

- a
- accccc
- ab
- abcc

$\backslash db?c+$

- 1c
- 5bcc

$(0|1|2|3|4|5|6|7|8|9)(b|\epsilon)cc^*$



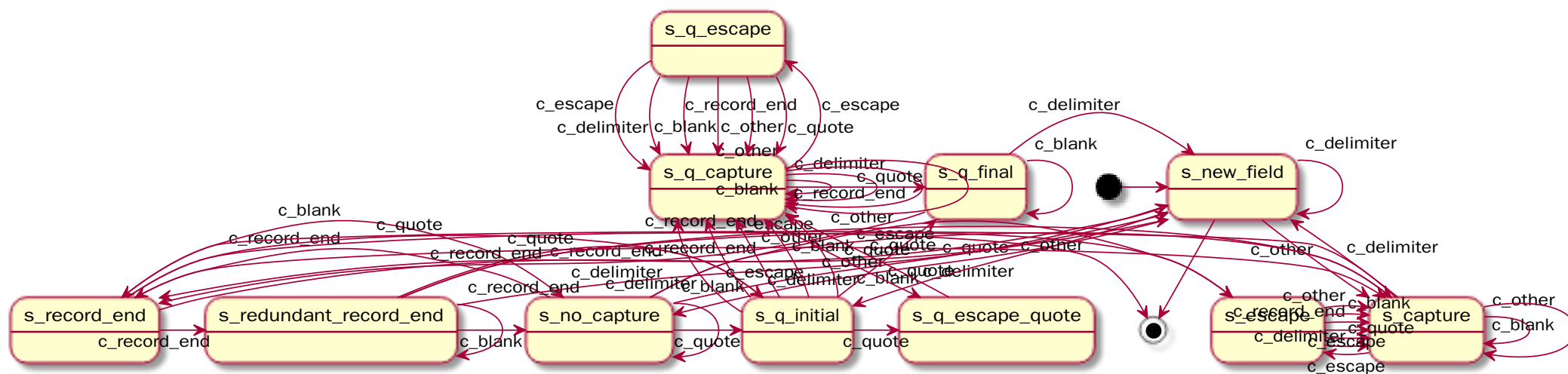
$a(b|\epsilon)c^*$

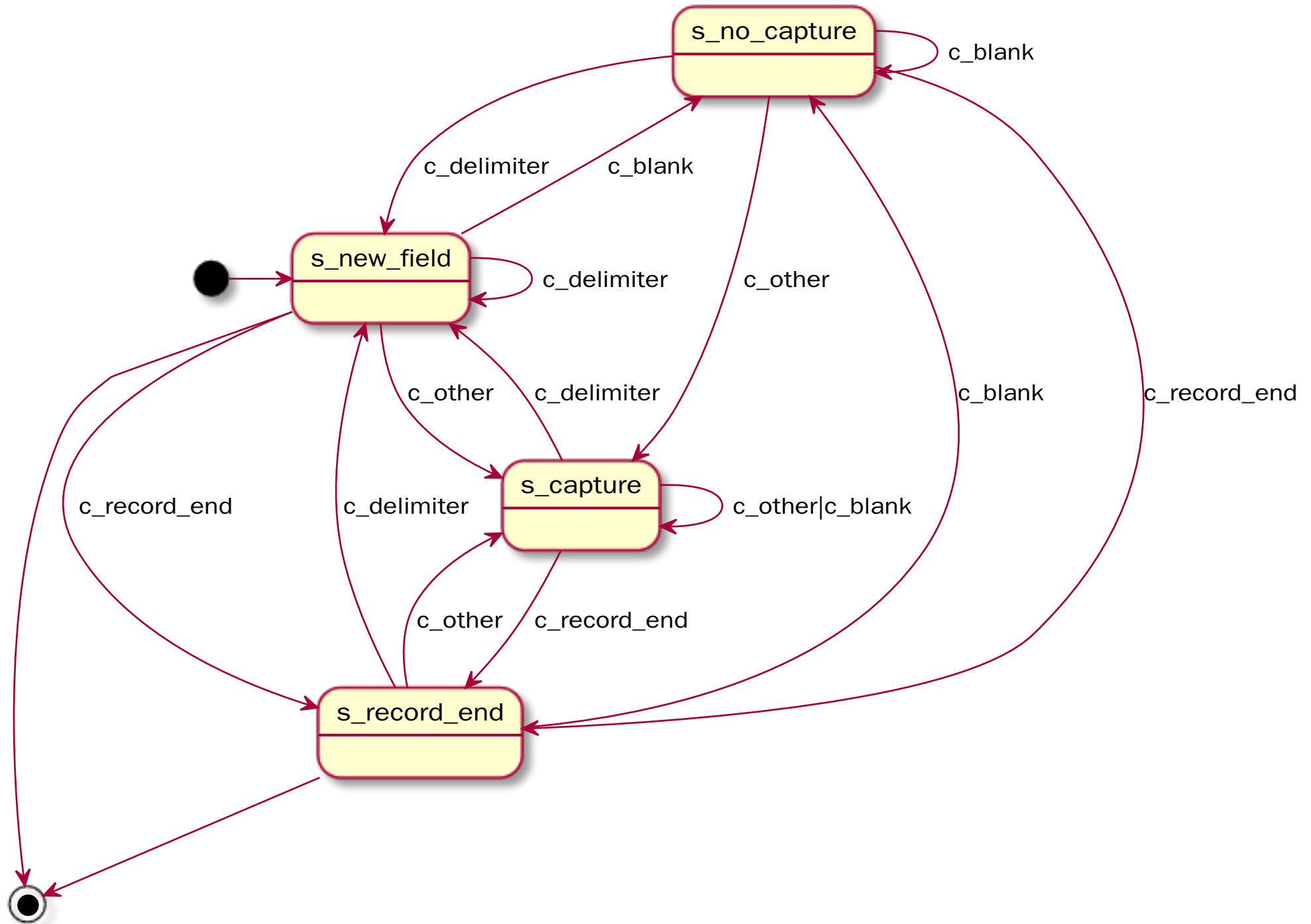
- accccc ,ab, abcc



Back to CSV ... Again!

```
first_name, last_name, stuff\n\r
    Gerardo      , "Gonzalez Calle ", \\ After spaces\\, yes!\n\r
Camila, "" "Awesomeness" " Gonzalez", Great\\\nEscape\n\r
```

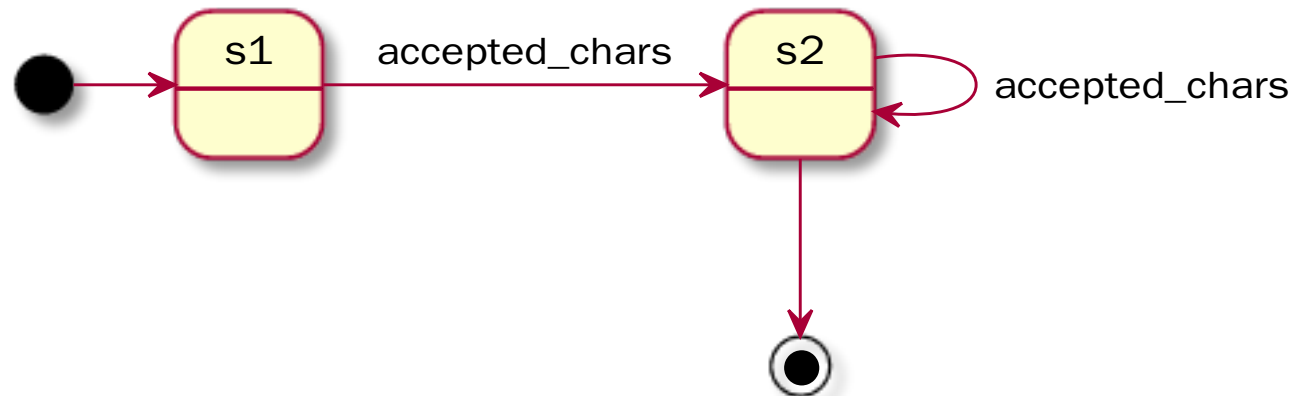
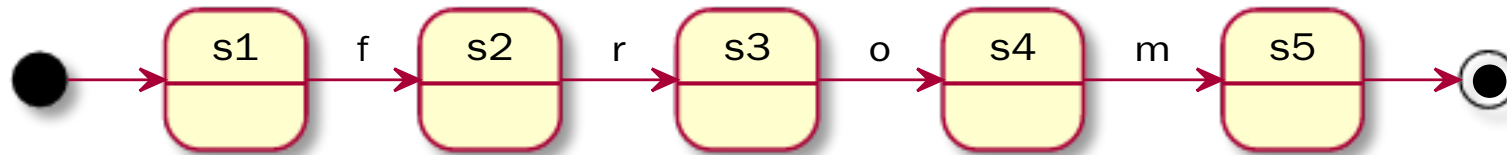


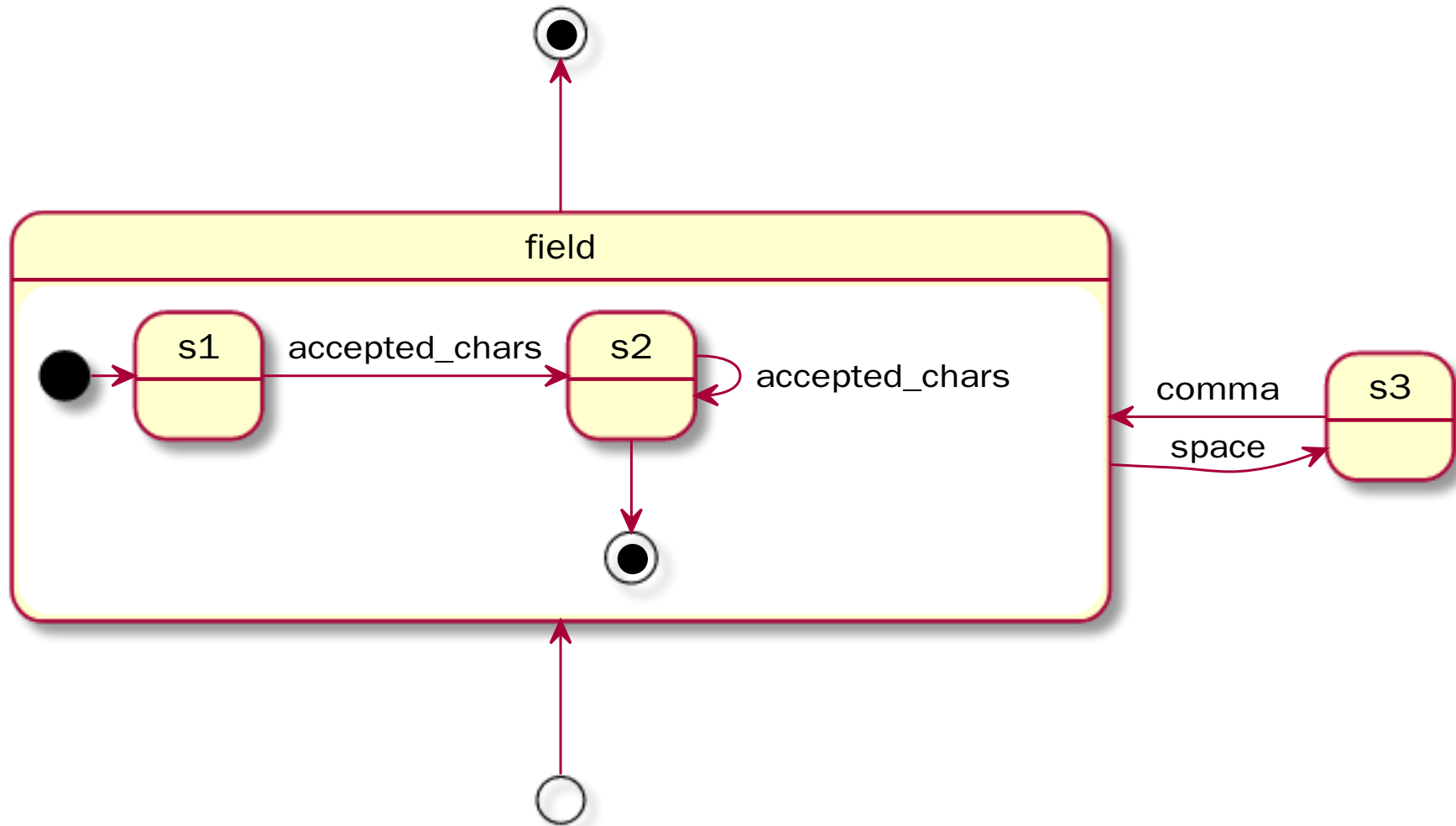


```
if ($endState == sm::STATE_RECORD_END)
{
    $this->createNewRecord();
}
elseif ($endState == sm::STATE_NEW_FIELD)
{
    $this->createNewField();
}
elseif (
    $endState == sm::STATE_CAPTURE ||
    $endState == sm::STATE_QUOTE_CAPTURE
)
{
    $this->addCharToField($input);
}
```

```
SELECT field1,field2 FROM blah;
```

```
SELECT * FROM blah;
```







# Takeaways

- State machines are simple but powerful
- Constraints can help simplify, and crystalize systems
- Validating, parsing, categorizing, control-systems

# Recommendation

- !Implementation -> Mental exercise

# Resources

- [PHP State Machine Library](#)
- [State-Machine-Driven CSV Parser](#)
- [JS State Machine Implementation](#)
- [Debug Regular Expressions](#)
- [Diagrams as Text](#)
- [Diagrams as Test Editor](#)
- [Presentation as Text](#)

# Q&A

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