Turing Machine Language

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Introduction

- Turing Machines (TM) are a model of computation.
- They are typically taught theoretically, i.e. pen-and-paper.
- Students find it hard to learn the content.
- Perhaps it is easier to learn as a programming language (PL)?

Turing Machines

- Can be thought of as boolean functions on string
- Has states and transitions
- Can be represented as a directed graph (called FSM)

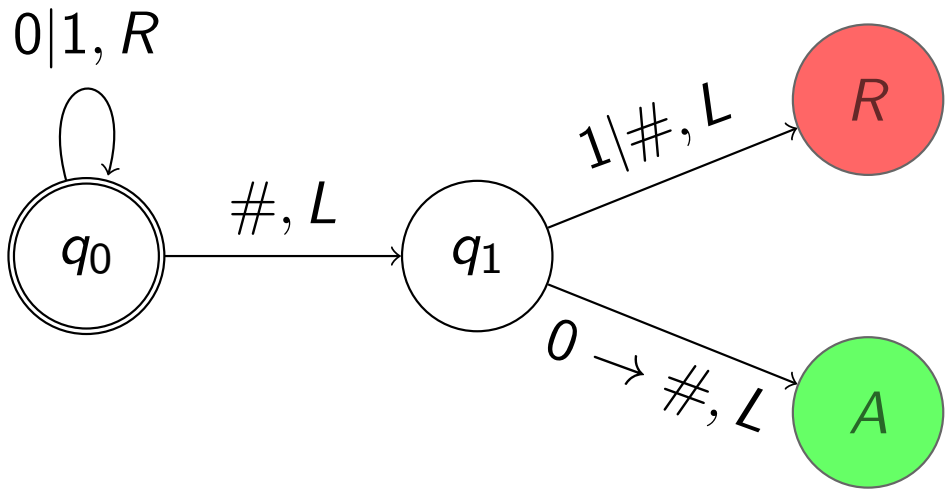

Figure: A FSM representation of TMs.

Project Overview

1. Creating the Turing Machine Language (TML).
2. Constructing a parser for TML.
3. Constructing the product (website) to showcase the parser.

Language

```
1  alphabet = {0, 1}
2  module isDiv2 {
3      // move to the end
4      while 0, 1 {
5          move right
6      } if blank {
7          move left
8          // check last letter is 0
9          if 0 {
10             changeto blank
11             accept
12         } if 1, blank {
13             reject
14         }
15     }
16 }
```

Parser

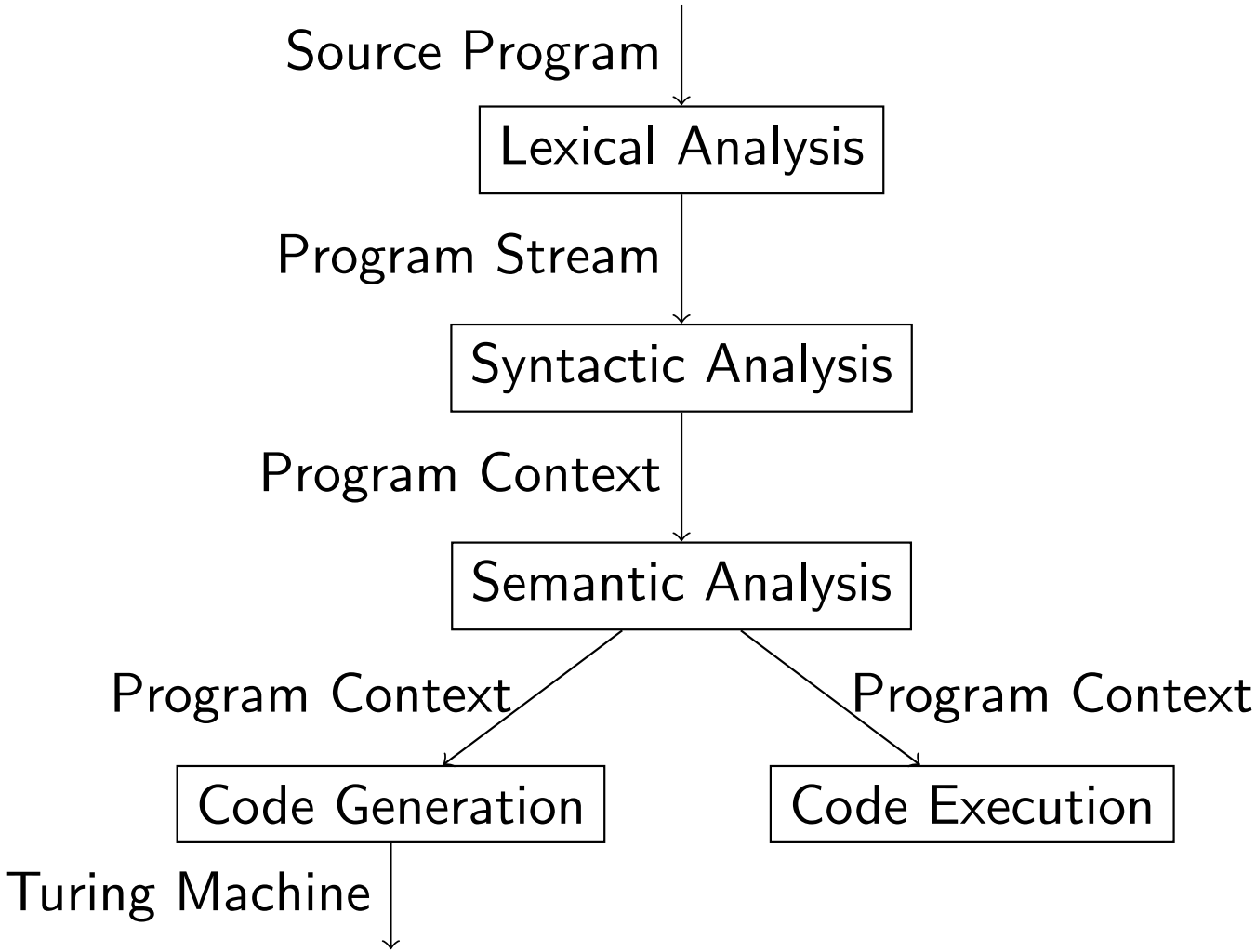

Figure: The parsing process.

Product

1. Homepage
   1.1 Editor
   1.2 Convert to FSM and definition
   1.3 Execute on tape
2. Documentation Pages
3. Error Pages

Evaluation

- Unit testing throughout
  - Parser
  - Website- less successful due to mocking
- User evaluation
  - Worksheet on TM and TML.
  - With 18 second year CS students.
  - It is easier to grasp TML than TM, but the results might not apply in general.

Future Work

- Improve the language with more features:
  - `move end;`
  - parametrisation.
- Make the website more accessible:
  - Add a play button;
  - Allow the FSM to be zoomed in.