



**L-Università ta' Malta**  
**Faculty of Information &  
Communication Technology**

## Assignment Report

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# 1 Introduction

This assignment is implemented in c++.

## 2 Question 1

### 2.1 How the problem was tackled

First off, an FSA was dedigned to accept numbers. Then the required structures where initialized in code. The FSA was translated to code in the form of transition table. Then, code was developed to successfully read the numbers with a stack and rollback capabilities. This was done according to the pseudo code provided in the text book. Following that, more and more elements where added, testing the lexer as it grew.

### 2.2 Data Structures

The following structures are defined in "transitions.h". Three enumerations were done to keep track of classifiers, states and token types. The enum for token types is divided into two parts (shown via the comment). The second part is used exclusively by the parser.

An array of accepting states was declared to keep track of the states which were final. The transisition table was implemented as a 2d array with classifiers as columns and states as rows.

The char\_cat and type tables were implemented as functions.

### 2.3 FSA

The following are parts of the FSA in the order they where added to the transition table.

## 3 Question 2

### 3.1 How the problem was tackled

#### 3.1.1 AST Nodes

First off, the needed nodes were declared in ast.h. The nodes use inheritance to inherit features from more general nodes. These nodes hold data about what they represent, as well as pointers to their children nodes.

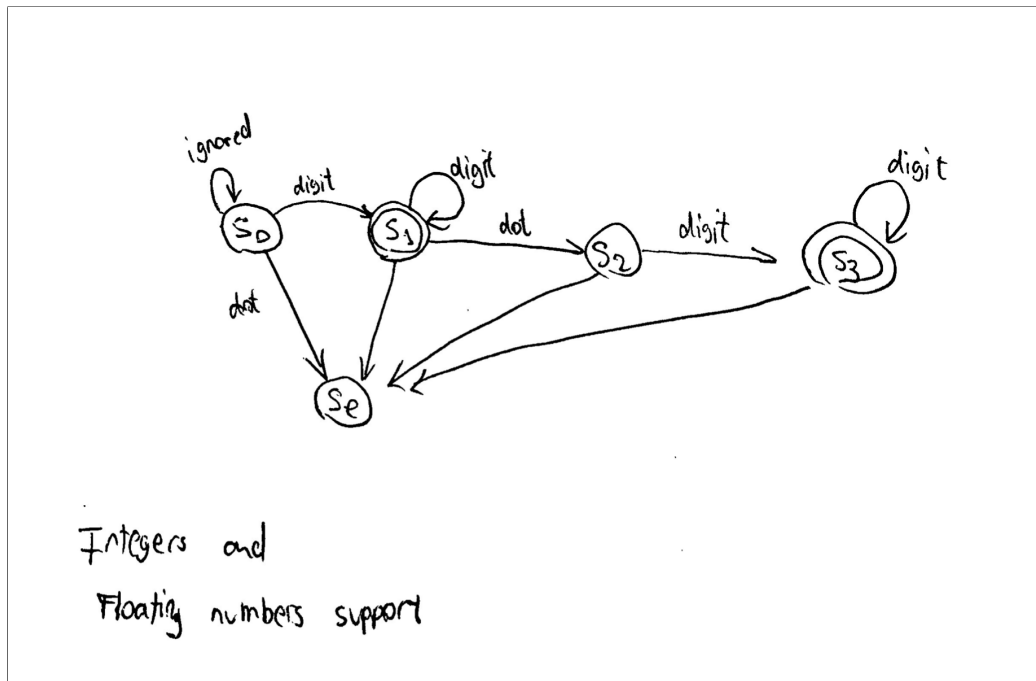


Figure 1: FSA (part concerned with numbers)

There are three abstract nodes. `ASTNode` is the super class which the other two inherit from. `ASTStatementNode` and `ASTExpressionNode` are the other two. All node classes inherit from these two. The only exception is `ASTProgramNode`, which is the topmost node of the Abstract Syntax Tree. This node consists of a list of statement nodes. This list is implemented as a vector.

### 3.1.2 Parser

The parser keeps track of the current token and the next token in line. This enables its look ahead functionality thus classifying as an LL(1) parser.

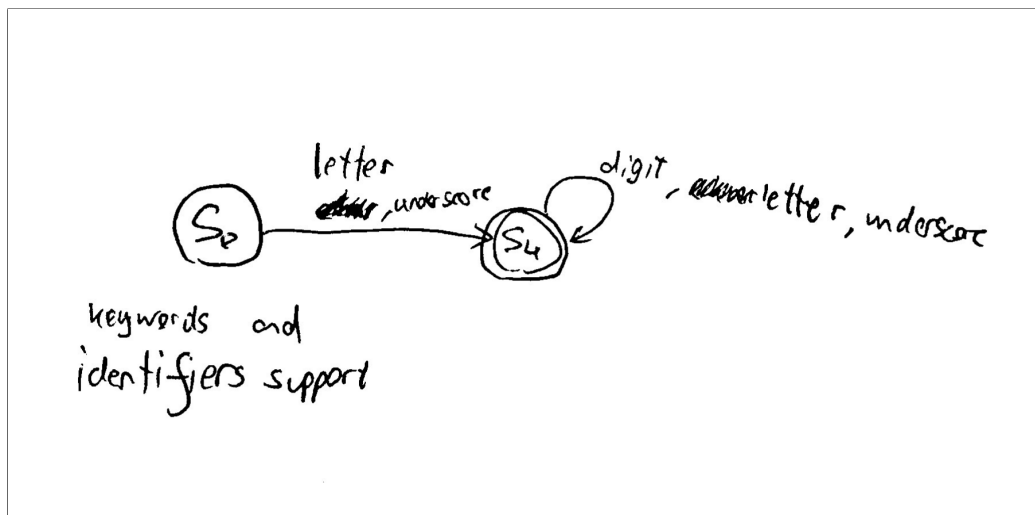


Figure 2: FSA (part concerned with identifiers and keywords)

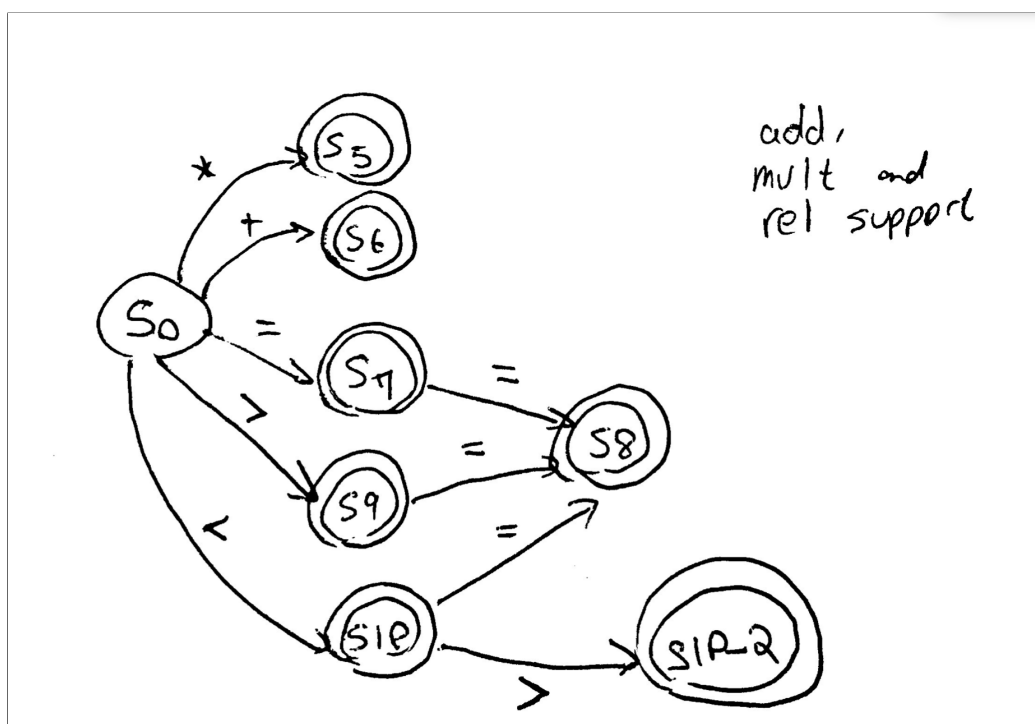


Figure 3: FSA (part concerned with operators)

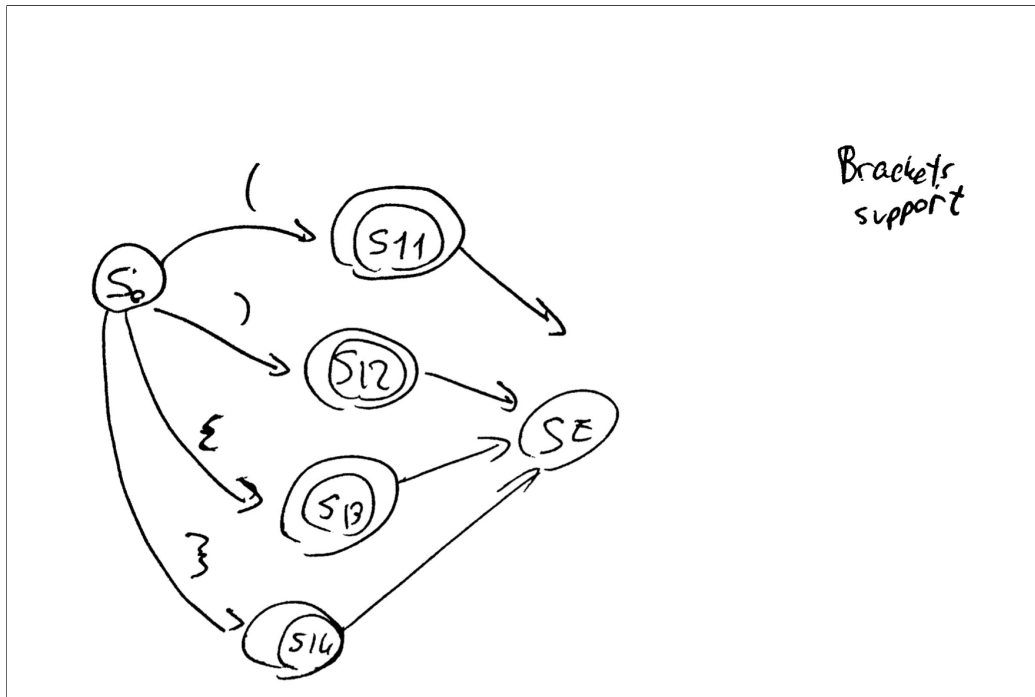


Figure 4: FSA (part concerned with brackets)

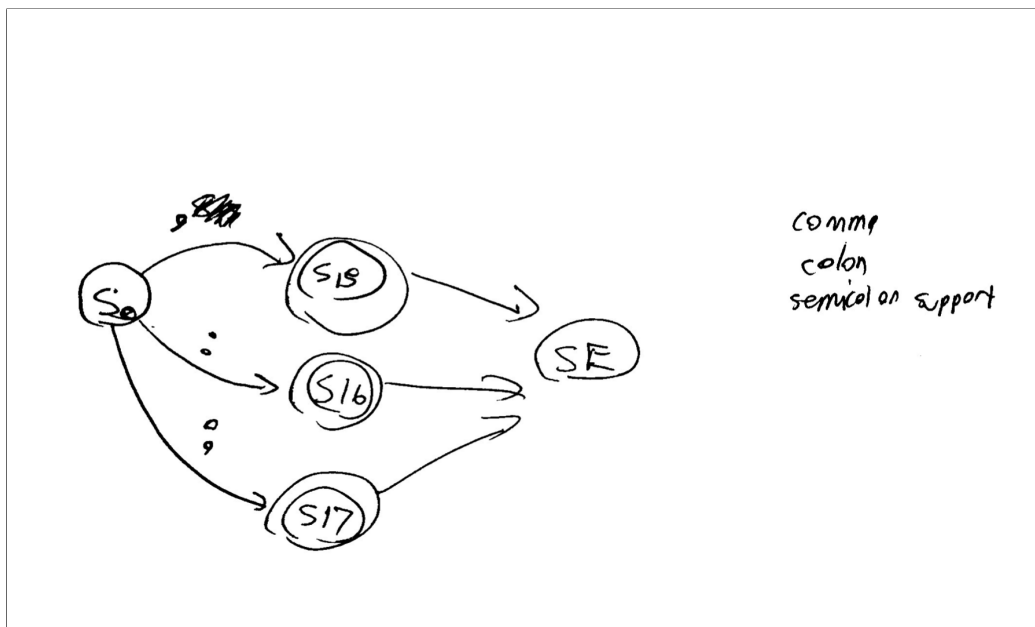


Figure 5: FSA (part concerned with colons and comma)

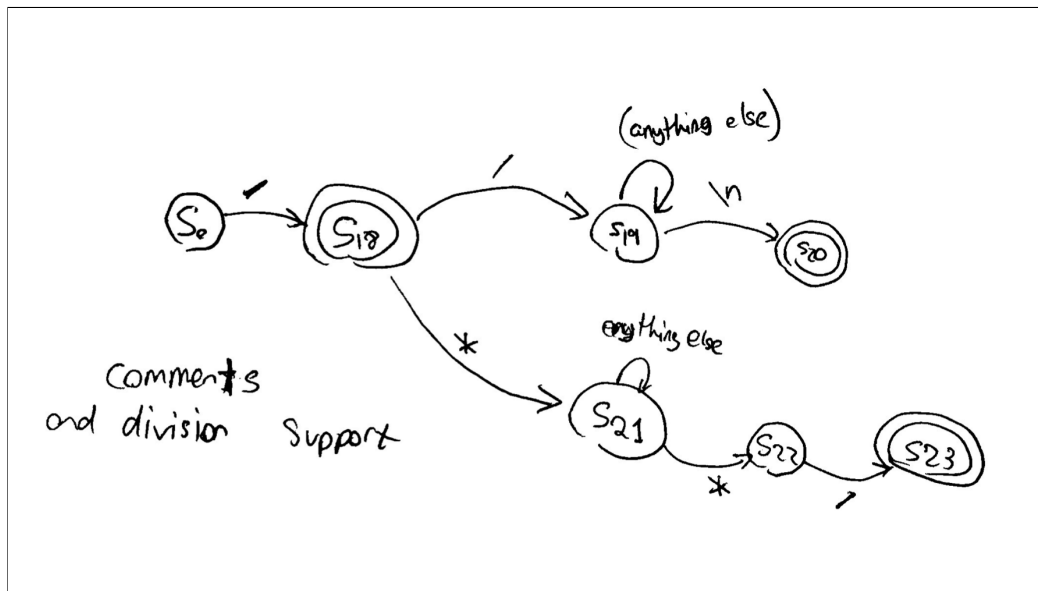


Figure 6: FSA (part concerned with comments and division operator