

PA Introduction

Brandeis University
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Introduction

Generating DFA from whitelist

Minimization

Representing graphs

Questions

Introduction

Warning! Some text may be kind of small.

Get the slides here: <http://rmarcus.info/dfa.pdf>

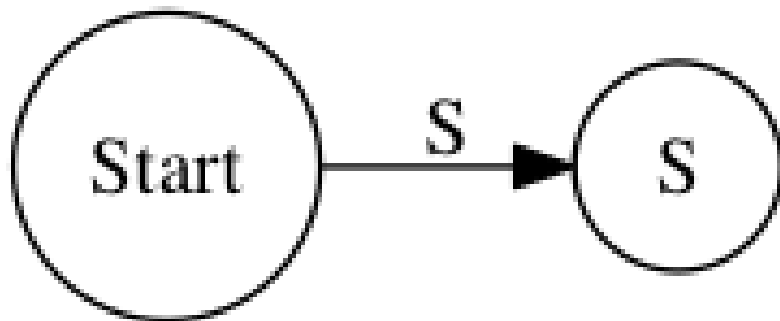
Whitelist

Serena Lily Vanessa Jenny Blaire



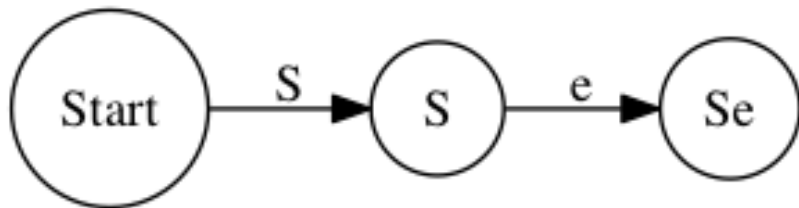
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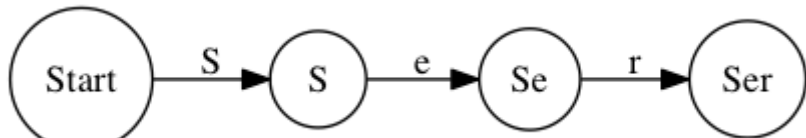
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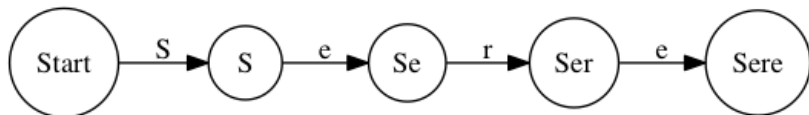
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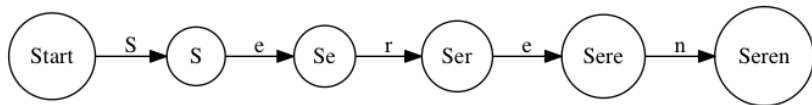
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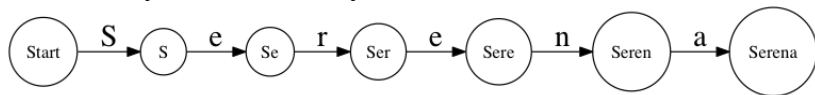
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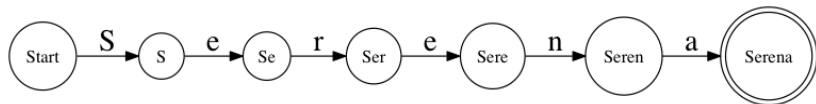
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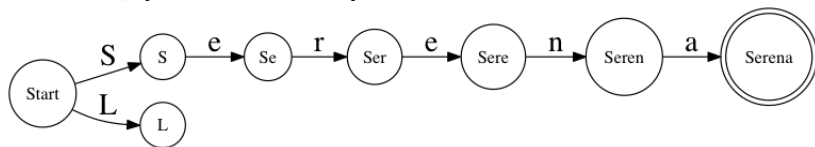
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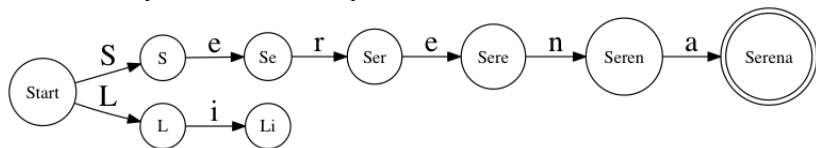
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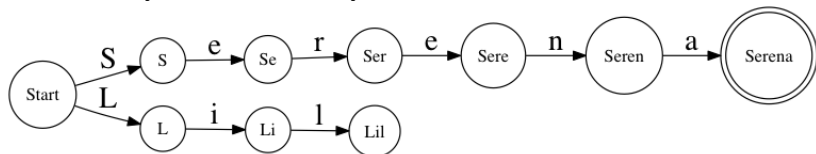
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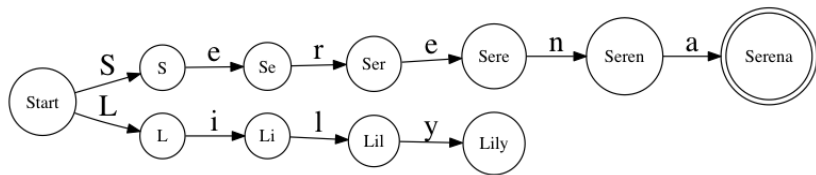
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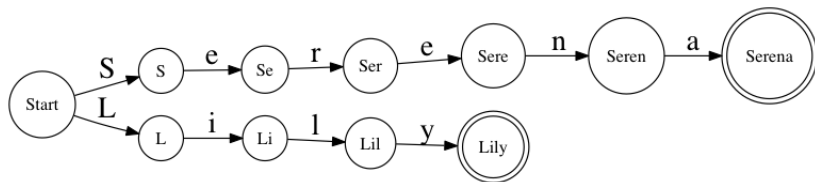
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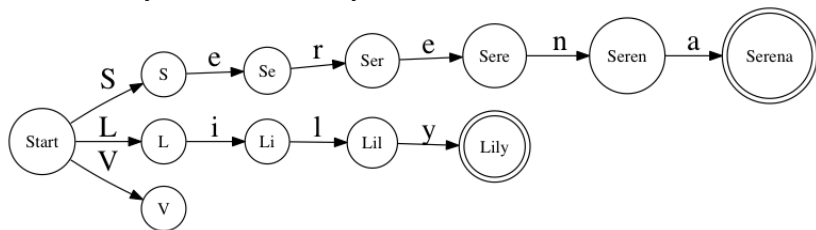
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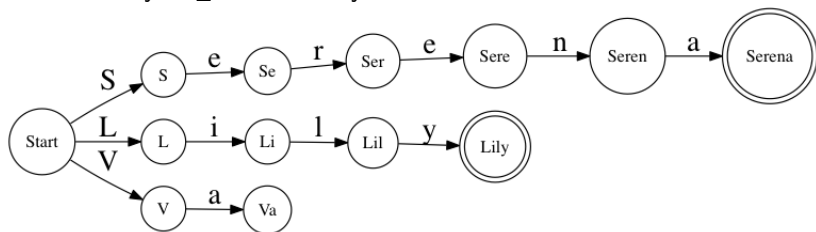
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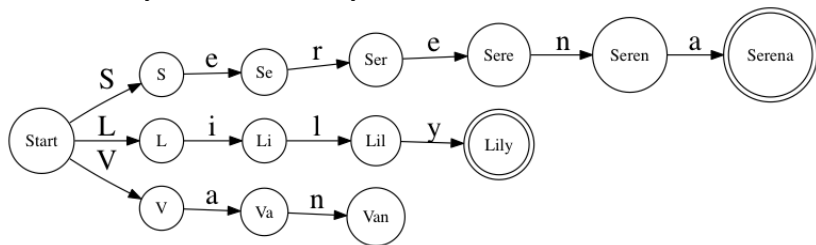
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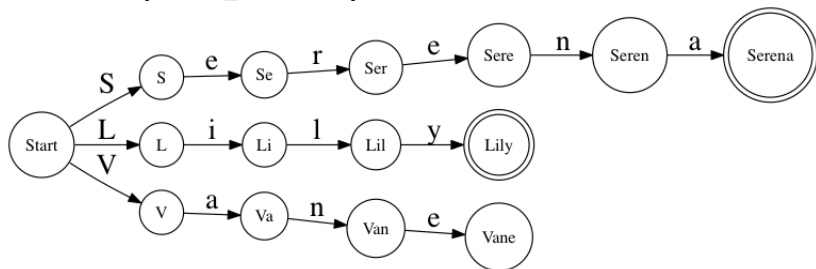
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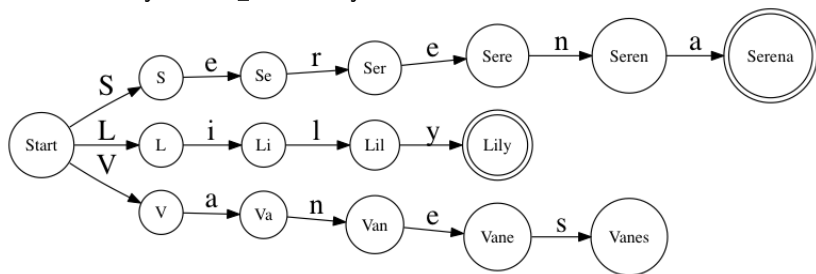
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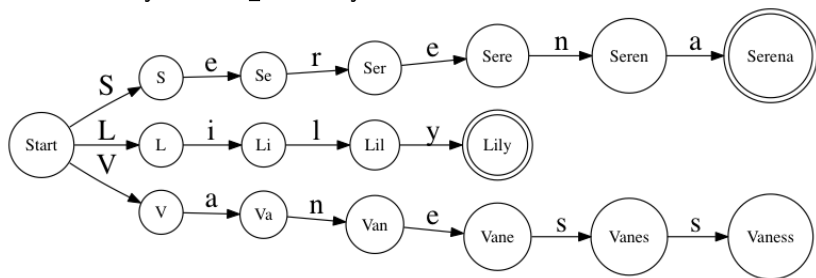
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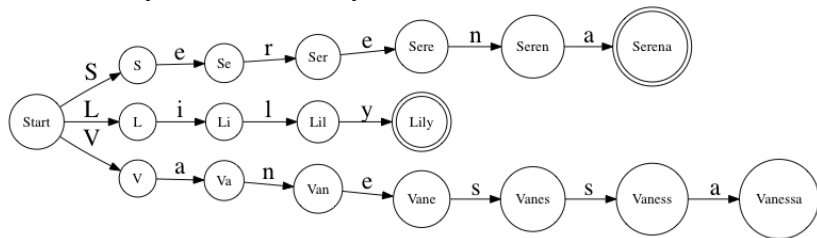
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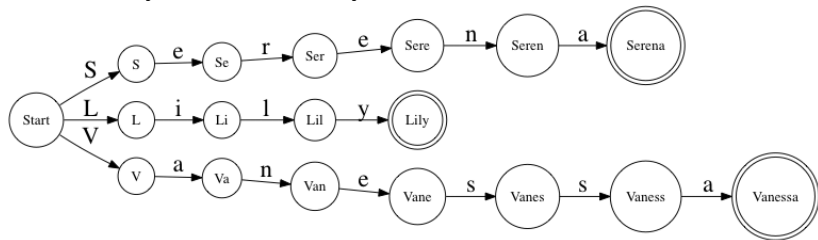
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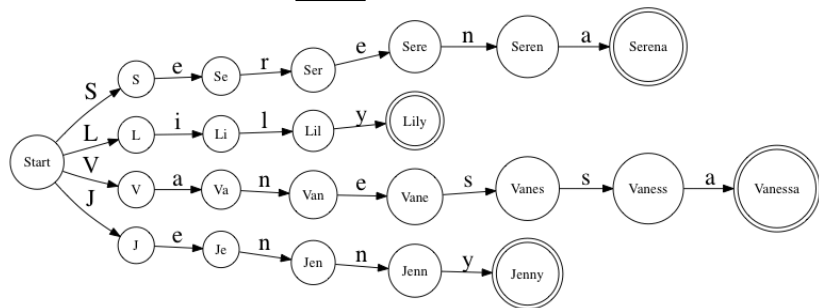
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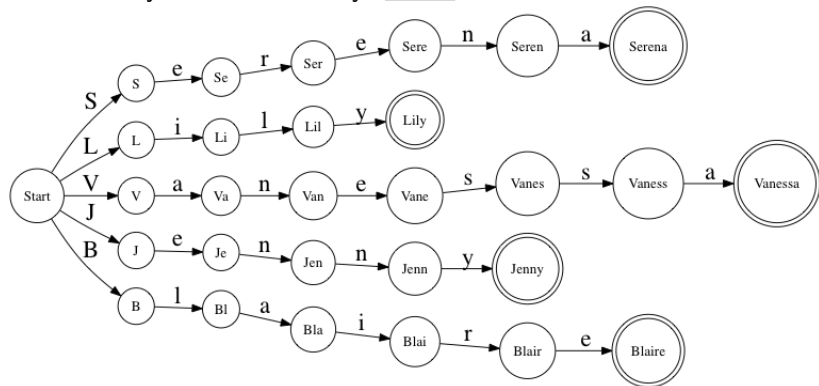
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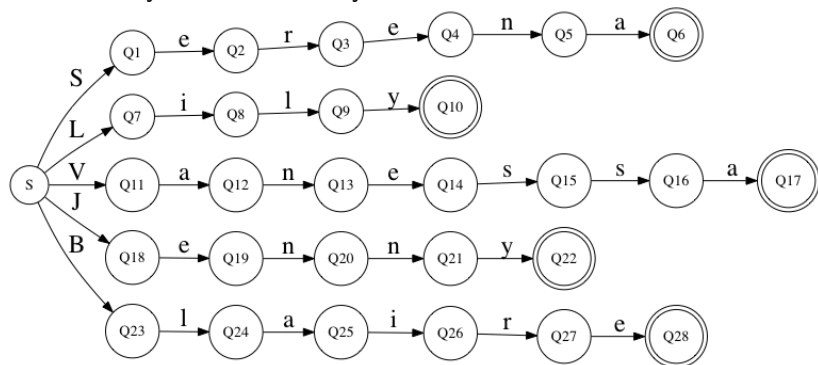
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Whitelist

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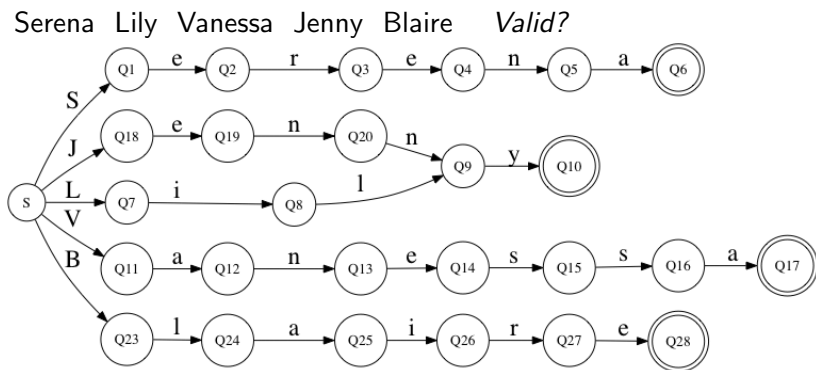


Minimization

Not enough to give the DFA...

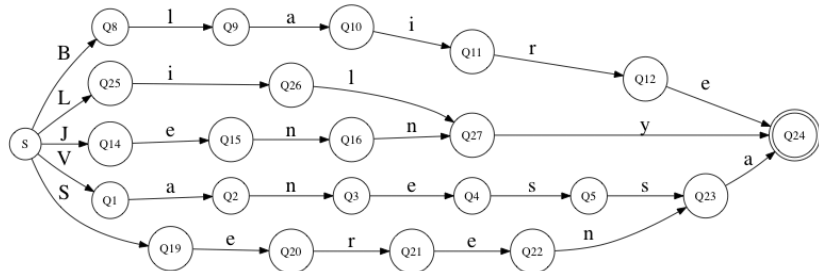
Must give a minimal DFA!

Minimization



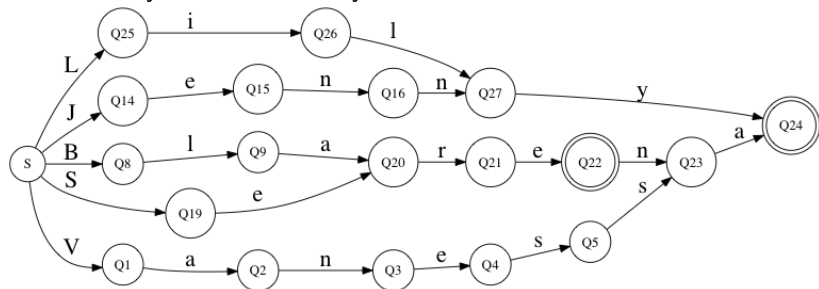
Minimization

Serena Lily Vanessa Jenny Blaire Valid?

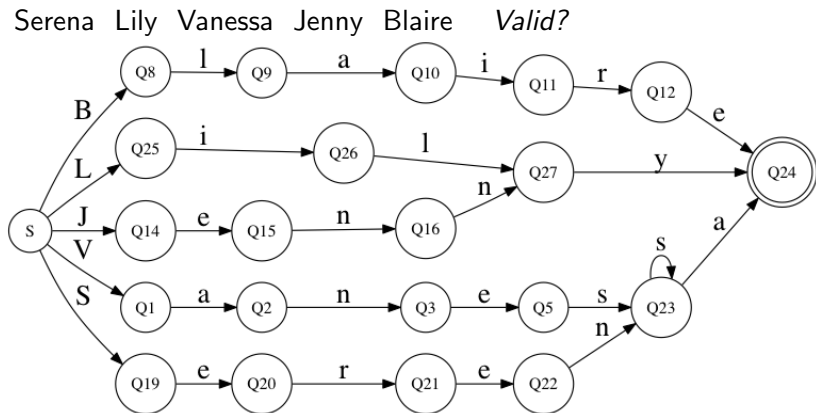


Minimization

Serena Lily Vanessa Jenny Blaire Valid?



Minimization



Representation

How can we represent a DFA in Java?

Well, a DFA is a graph, so...

Representation

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Well, a DFA is a graph, so...

Node class

Adjacency list

Adjacency matrix

Representation: Node Class

```
class Node {  
    Map<String, Node> transitions;  
    String nodeLabel;  
  
    public Node(String label) {  
        transitions = new HashMap<String, Node>();  
        this.nodeLabel = label;  
    }  
  
    public void addTrans(String on, Node to) {  
        transitions.put(on, to);  
    }  
}  
  
Node s = new Node("S");  
Node q1 = new Node("Q1");  
s.addTrans("b", q1);
```

Representation: Adjacency List

```
Map<String, Map<String, String>> adjList =  
    new HashMap<String, Map<String, String>>();  
  
Map<String, String> edgesOfS =  
    new HashMap<String, String>();  
  
edgesOfS.put("b", "Q1");  
  
adjList.put("S", edgesOfS);
```

Representation: Adjacency Matrix

```
int c = getNumberOfNodesNeeded();  
String[][] m = new String[c][c];  
  
m[0][1] = "b";
```

Representation

Method	Insert	Lookup	Space
Node	$O(1)$	$O(1)$	$O(n)$
List	$O(1)$	$O(1)$	$O(n)$
Matrix	$O(1)$	$O(1)$	$O(n^2)$

Questions?