Compiler Construction

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Exercise Sheet 1

Assignment 1.1 Regular Expressions

Give regular expressions (containing terminals, parenthesis, '|', and '$*$') where '|' is used at most once such that the language of the regular expression satisfies the given constraints.

1. Language includes:
   - ca
   - cccccc
   - ccaa

   but does not include:
   - ccc
   - ccccc
   - a

2. Language includes:
   - abc
   - abca
   - abcabc

   but does not include:
   - abcab
   - abcaa
   - a

3. Language includes:
   - j
   - iiiij
   - ixxxxxxxj
   - ixxiij

   but does not include:
   - jj
   - xij

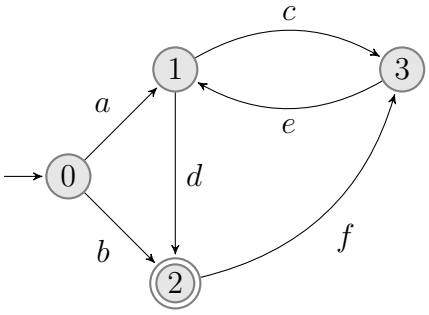
Assignment 1.2 Languages of Regular Expressions

Give the languages described by the following regular expressions.
For example $[\![a^*]\!] = \{a^n \mid n \in \mathbb{N}\}$

1. $[\![x^*y^*]\!]$
2. $[\![(a|b|\epsilon)c(a|\epsilon)]\!]$
3. $[\![(x|y^*)z]\!]$

Assignment 1.3 Automata Implementation

Come up with an implementation of the following given automata in Java. Do not make use of any "fancy" library, i.e., YOU should do the implementation ;-)



Assignment 1.4 Thompson's Algorithm

Using Thompson's Algorithm, transform the following regular expressions to NFAs.

1. ab^*c
2. $(b|a)^*b$
3. $(b|ab)b(a|b)^*$

Assignment 1.5 Berry-Sethi Algorithm (Naive Approach)

Give the transitions for the naive Berry-Sethi approach for the expression r^+ where r is any regular expression.