ALaRI – Software Compilers

Written Exam

29/01/2009

Exercise 1 (25%)

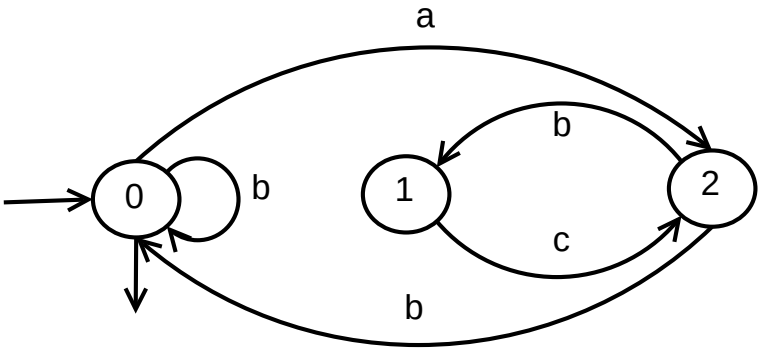
Given the following regular expression e:

$$e = a(b|bc^*)^*d$$

build the deterministic automaton that recognizes it.

Exercise 2 (25%)

Given the following finite state automaton that accepts strings of the language L_1, compute the regular expression of L_1.



Exercise 3 (50%)

Given the following program:

```
1  begin
2      m ← 0
3      v ← 0
4      if v ≤ n then
5          goto 22
6      end
7      s ← 0
8      q ← m
9      if q < n then
10         goto 14
11     end
12     m ← m + 1
13     goto 4
14     x ← M[q]
15     s ← s + x
16     if s ≤ v then
17         goto 20
18     end
19     q ← q + 1
20     v ← s
21     goto 9
22     return v
23 end
```

Perform flow analysis:

1. Draw the control flow graph.

2. Calculate live-in and live-out at each statement.

3. Construct the register interference graph.

4. Provide a register allocation, assuming a 4 registers machine.