

# ALaRI – Software Compilers

Written Exam

29/01/2009

## **Exercise 1 (25%)**

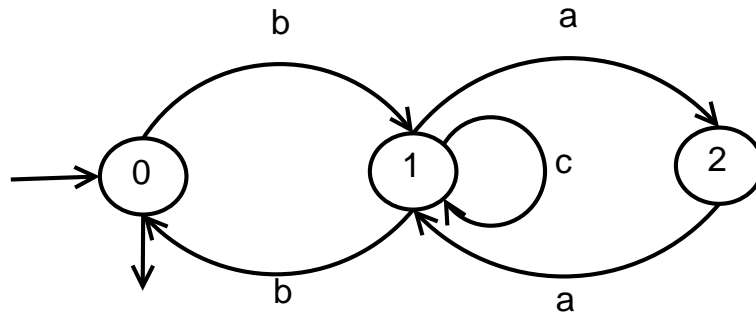
Given the following regular expression  $e$ :

$$e = a(b|cc)^*cb$$

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    $m \leftarrow 0$ 
3    $v \leftarrow 0$ 
4   if  $v \leq n$  then
5     goto 22
6   end
7    $r \leftarrow v$ 
8    $s \leftarrow 0$ 
9   if  $r < n$  then
10    goto 14
11  end
12   $v \leftarrow v + 1$ 
13  goto 4
14   $x \leftarrow M[r]$ 
15   $s \leftarrow s + x$ 
16  if  $s \leq m$  then
17    goto 20
18  end
19   $m \leftarrow s$ 
20   $r \leftarrow r + 1$ 
21  goto 9
22  return  $m$ 
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.