

# Second Assignment Automata & Process Theory (2IT15)

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The deadline of this assignment is Friday, 4 June 2010. The assignment is graded in the week thereafter and resulting grade will be worth 12.5% of the total grade.

**Assignment 1.** Consider the following language  $L$  over the alphabet  $\{a, b, c\}$ :

$$L = \{a^{2n}b^m c^{3n+m} \mid m > 0, n \geq 0\} .$$

- Give a recursive specification over SA for the language  $L$ .
- Construct a push-down automaton for the language  $L$ . Motivate the construction by indicating what the stack contents and states represent.

**Assignment 2.** Consider the following recursive specification over SA

$$\begin{aligned} S &= a.A \cdot B + b.A \cdot F + S \cdot D , & D &= d.D \cdot E , \\ A &= A \cdot B \cdot A + B + a.1 + 1 , & E &= a.S + 1 , \\ B &= b.B + 1 , & F &= F + a.0 \cdot B . \\ C &= a.A + B , \end{aligned}$$

- Simplify the recursive specification using language equivalence by applying the following procedures (if possible) to remove: zeroes, 1-summands, unreachable variables, single variable summands, head recursion, and non-productive variables. Give intermediate steps of this simplification by showing the result of each procedure.
- Transform the simplified recursive specification in Greibach normal form.
- Give a derivation that shows that  $abba \in \mathcal{L}(S)$ .
- Show whether the recursive specification of (b) is ambiguous or not.