

Laurea Magistrale in INFORMATICA
Principi di Linguaggi di Programmazione
Compiler Techniques

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Regular Exam VI - Sept 10th 2014

(Available Time: 2 hours. Mandatory: In each exercise get at least, one half of the assigned points)

Exercise 1 (pts 10). Let $E1 = ((b \mid a)^* c^*)^*$ and $E2 = (a \mid b \mid c)^*$.

- a) Using dotted automata, provide a proof of the equivalence of $E1$ and $E2$;
- b) Apply to $E1$, the method for transforming DFSA into right-linear grammars.
- c) Show the LL(1) parsing table of the grammar You obtain in (b).

Exercise 2 (pts 10). Let L be the following language:

$$L = \{a^{n_1} c \dots a^{n_k} c b^m d^{n-m} \mid k \geq 1, n = n_1 + \dots + n_k, (\forall i: 1 \leq i \leq k) n_i > 0\}$$

- (a) Provide a LR grammar G for L ;
- (b) Provide the collection $\text{Coll}(1)$ of G
- (c) Looking at the collection, answer:
 - [1] is G an LR(1) grammar (yes or not)?
 - [2] is G a LALR(1) grammar (yes or not)?
 - [3] is G a SLR(1) grammar and why (motivations)?.

Exercise 3 (pts 10). Extend the language "Semplice" with the multiple assignment defined below

$\text{Cmd} ::= \text{MUpd}$

$\text{MUpd} ::= \text{Ide IdeList} := \text{Exp ExpList}$

$\text{IdeList} ::= , \text{Ide IdeList} \mid \epsilon$

$\text{Exp} ::= , \text{Exp ExpList} \mid \epsilon$

Multiple assignement requires that the number of the identifiers on the left hand of $:=$ is the same of the number of expression on the right hand. Moreover, it behaves like any arbitrary sequence of assignments "ide_i := exp_i" where $1 \leq i \leq n$, ide_i (resp. exp_i) is the i-th identifier (resp. expression) of the list on the left (resp. right) hand of $:=$.

Provide a translation scheme of the productions above, with attributes that:

- a) check whether or not the requirement on the size of the lists is satisfied;
- b) produce, by side-effects, the 3AC code of the multiple assignment;