

Lab Nine

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CRAFTING A COMPILER

5.5

Transform the following grammar (Appendix) into LL1 using the techniques presented in Section 5.5.

```
DeclList    -> Decl V1
V1           -> ; DeclList
              | lambda
Decl         -> IdList : Type
IdList       -> IdList V2
V2           -> , id
              | lambda
Type         -> ScalarType
              | array (ScalarTypeList) of Type
ScalarType   -> id
              | Bound .. Bound
Bound        -> Sign intconstant
              | id
Sound        -> +
              | -
              | lambda
```

```
ScalarTypeList -> ScalarTypeList, ScalarType
                | ScalarType
```

DRAGON

4.5.3

Give bottom-up parses for the following input strings and grammar:

a) The input 000111 according to the grammar of Exercise 4.5.1 (Appendix)

```
$ 000111 $ Shift
$ 0 00111$ Shift
$00 0111$ Shift
$000 111$ Shift
$0001 11$ Reduce S -> 01
$00S 11$ Shift
$00S1 1$ Reduce: S -> 0S1
$OS 1$ Shift
$OS1 $ Reduce: S -> 0S1
$S $ Accept
```

b) The input $aaa*a++$ according to the grammar of Exercise 4.5.2 (Appendix)

```
$ aaa*a++$ Shift
$a aa*a++$ Reduce S -> a
$S aa*a++$ Shift
$Sa a*a++$ Reduce S -> a
$SS a*a++$ Shift
$SSa *a++$ Reduce S -> a
$SSS *a++$ Shift
$SSS* a++$ Reduce S -> SS*
$SS a++$ Shift
$SSa ++$ Reduce S -> a
$SSS ++$ Shift
$SSS+ +$ Reduce S -> SS+
$SS +$ Shift
$SS+$ Reduce S -> SS+
$S $ Accept
```

APPENDIX

5.5 GRAMMAR

1	DeclList	→ DeclList ; Decl
2		Decl
3	Decl	→ IdList : Type
4	IdList	→ IdList , id
5		id
6	Type	→ ScalarType
7		array (ScalarTypeList) of Type
8	ScalarType	→ id
9		Bound .. Bound
10	Bound	→ Sign intconstant
11		id
12	Sign	→ +
13		−
14		λ
15	ScalarTypeList	→ ScalarTypeList , ScalarType
16		ScalarType

Exercise 4.5.1: For the grammar $S \rightarrow 0 S 1 \mid 0 1$ of Exercise 4.2.2(a), indicate the handle in each of the following right-sentential forms:

Exercise 4.5.2: Repeat Exercise 4.5.1 for the grammar $S \rightarrow S S + \mid S S * \mid a$ of Exercise 4.2.1 and the following right-sentential forms: