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          -> id 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
$0S 1$ Shift
$0S1 $ 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: