

Lab 9

CMPT 432 - Spring 2023 | Dr. Labouseur

Josh Seligman | joshua.seligman1@marist.edu

May 1, 2023

1 CRAFTING A COMPILER

1.1 EXERCISE 5.5

Transform the following grammar into LL(1) form using the techniques presented in Section 5.5:

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

Removal of left recursion for DeclList, IdList, ScalarTypeList and also modified the base cases to include ϵ to make them LL(1) because otherwise multiple productions match their first token. Create the productions for BoundId and BoundIdFollow because ScalarType and Bound both match id and are not LL(1), so combine them to become LL(1).

1. DeclList \rightarrow Decl DeclNext

2. DeclNext \rightarrow ; DeclList
3. $| \epsilon$
4. Decl \rightarrow IdList : Type
5. IdList \rightarrow id IdNext
6. IdNext \rightarrow , IdList
7. $| \epsilon$
8. Type \rightarrow ScalarType
9. $| \text{array} (\text{ScalarTypeList}) \text{ of Type}$
10. BoundId \rightarrow id BoundIdFollow
11. BoundIdFollow \rightarrow . . id
12. $| \epsilon$
13. ScalarType \rightarrow BoundId
14. $| \text{Sign intconstant}$
15. Sign \rightarrow +
16. $| -$
17. $| \lambda$
18. ScalarTypelist \rightarrow ScalarType, ScalarTypeList
19. ScalarTypeNext \rightarrow , ScalarTypeList
20. $| \epsilon$

2 DRAGON

2.1 EXERCISE 4.5.3

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

