

Lab 9

CMPT 432 - Spring 2023 | Dr. Labouseur

Josh Seligman | joshua.seligman1@marist.edu

April 13, 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. $\text{DeclList} \rightarrow \text{DeclList}; \text{Decl}$
2. $\mid \text{Decl}$
3. $\text{Decl} \rightarrow \text{IdList} : \text{Type}$
4. $\text{IdList} \rightarrow \text{IdList}, \text{id}$
5. $\mid \text{id}$
6. $\text{Type} \rightarrow \text{ScalarType}$
7. $\mid \text{array} (\text{ScalarTypeList}) \text{ of Type}$
8. $\text{ScalarType} \rightarrow \text{id}$
9. $\mid \text{Bound} . . \text{Bound}$
10. $\text{Bound} \rightarrow \text{Sign intconstant}$
11. $\mid \text{id}$
12. $\text{Sign} \rightarrow +$
13. $\mid -$
14. $\mid \lambda$
15. $\text{ScalarTypeList} \rightarrow \text{ScalarTypeList}, \text{ScalarType}$
16. $\mid \text{ScalarType}$

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. $\text{DeclList} \rightarrow \text{Decl DeclNext}$

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

2 DRAGON

2.1 EXERCISE 4.2.1