The Parser of Pascal

C++ Implementation

Outline

- 1.Introduction
- 2.Journal of testing
- 3.Conclusion

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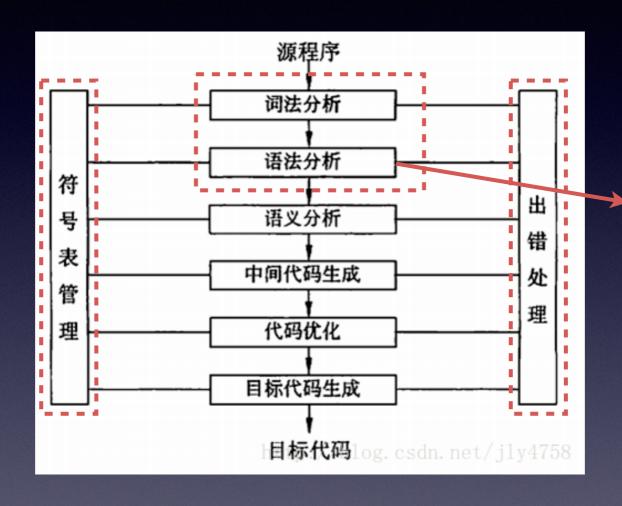


Overview



Figure: Processing Pipeline

Overview



We have reached here!

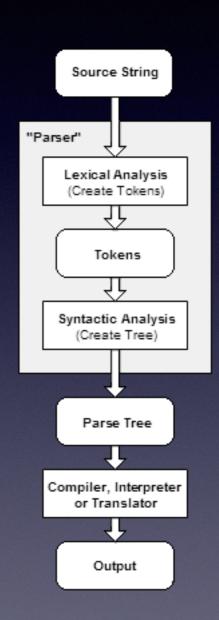
Figure: Processing Pipeline

Introduction

- Writing a C++ parser with respect to SLR(1) mechanism.
- Two approaches to construct SLR(1) parser:
 - 1.Flex+Bison: Mature and Simple
 - 2.Hand-Writing: Learning SLR(1) the "hard" way

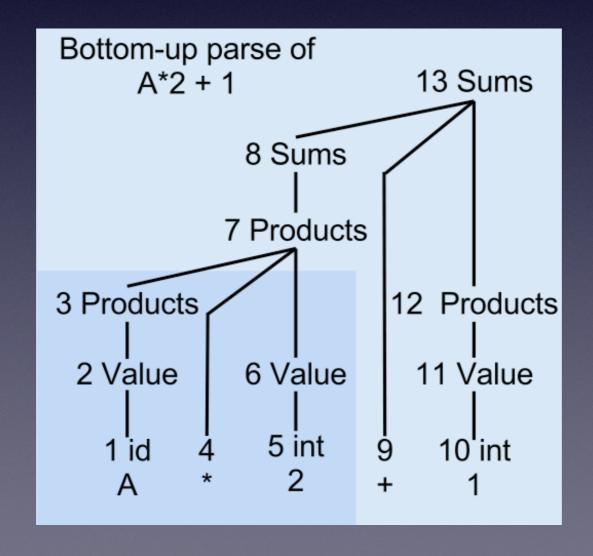
Parser

- · Given a grammar and a statement;
- Judging if the statement matches the grammar.



Bottom-Up Parsing

- Scanning and parsing the input text.
- Building up the parse tree bottom up, and left to right.



Shift and Reduce Actions

- Shift: advances in the input stream by one symbol
- Reduce: applies a completed grammar rule

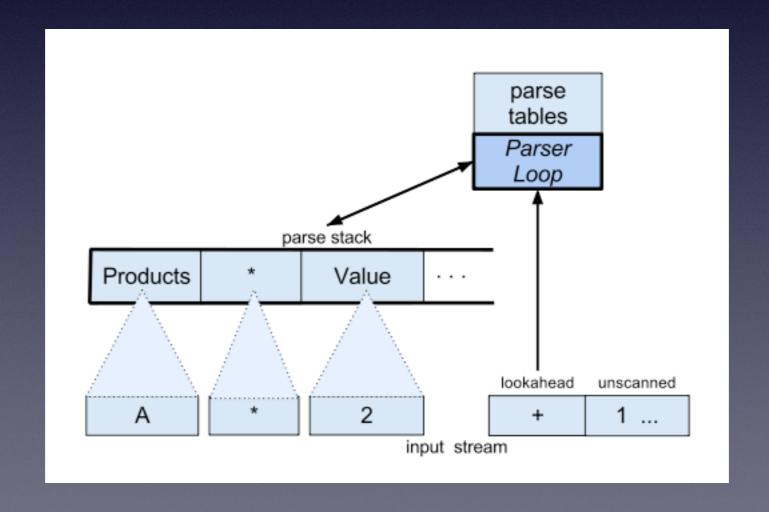


Table-based LR(1)

- Stack: Runtime State, Symbol
- Goto Table: State Transition
- Action Table: Applied Action

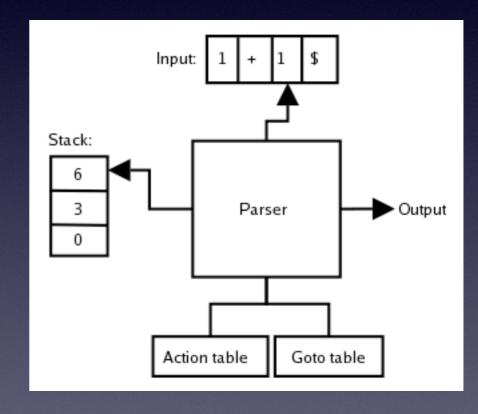
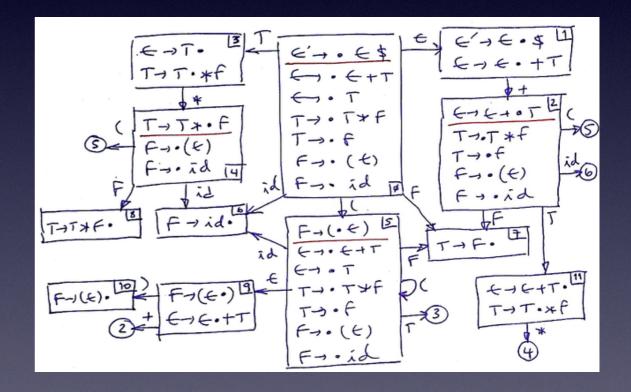


Table Construction

- Items, eg. $E \rightarrow \bullet E + B$
- Closure of item sets
- Building the canonical LR(1) collection
- Finite automaton machine



Conflict Resolution

- Manually defining the priority in the item set.
- · See our testing example below.



Problems with Grammars

- Grammars can cause problems when constructing a LR parser
 - Shift-reduce conflicts
 - Reduce-reduce conflicts

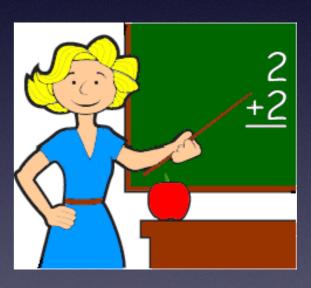
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Input Grammar

- S program id; | compound_stmt.
- compound_stmt begin stmts end
- stmts stmt | stmts; stmt
- stmt id := expr | compound_stmt | if_stmt | for_stmt | while bool do stmt | ε
- if_stmt if bool then stmt | if bool then stmt else stmt
- for_stmt for id := expr to expr do stmt | for id := expr downto expr do stmt
- bool expr > expr | expr < expr
- expr expr + expr | expr expr | expr * expr | expr / expr | expr ^ factor | factor
- factor id | num | (expr)

Test Program

```
program test;
  begin
     x = 19;
     for i:=100 downto 15 do
       if x < y + (15-9) then y := x
             else begin
          while x+y*z>x do begin y:=y+y^5-1 end;
           z := z * 7 + x
  end
end.
```

• Generating Token file by using our lexer program.

```
parser_tests — -bash — 58×24
ChenMac:parser_tests wasdns$ cat given_example_tocken.txt 🗏
Token(PROGRAM, 'PROGRAM')
Token(ID, 'test')
Token(BEGIN, 'BEGIN')
Token(ID, 'x')
Token(ASSIGN, ':=')
Token(INTEGER_CONST, 19)
Token(SEMI, ';')
Token(ID, 'for')
Token(ID, 'i')
Token(ASSIGN, ':=')
Token(INTEGER_CONST, 100)
Token(ID, 'downto')
Token(INTEGER_CONST, 15)
Token(ID, 'do')
Token(ID, 'if')
Token(ID, 'x')
Token(LANGBRA, '<')
Token(ID, 'y')
Token(PLUS, '+')
Token(LPAREN, '(')
Token(INTEGER_CONST, 15)
Token(MINUS, '-')
Token(INTEGER_CONST, 9)
```

Figure 2: Our Lexer Output(Partly)

• Converting the token.txt with the parser-familiar format

```
build — -bash — 58×24
ChenMac:build wasdns$ cat input.txt
program
id
begin
id
:=
num
for
id
:=
num
downto
num
do
if
id
<
id
+
num
```

Figure 3: Converted Lexer Output(Partly)

```
ChenMac:pascal-compiler wasdns$ ls
LICENSE
                                                 run_lexer.py
                        docs
                                                 run_lexer_ply.py
                         lexer_tests
README
build
                        parser_tests
                                                 run_parser_demo.sh
                        ply_frontend
cleanup.sh
                                                 src
ChenMac:pascal-compiler wasdns$ ./run_parser_demo.sh
ChenMac:pascal-compiler wasdns$ cd build/
ChenMac:build wasdns$ ls
action_and_goto.txt
                        grammar.txt
                                                 parser
                                                 slr.txt
                         input.txt
error.txt
first_and_follow.txt
                        output.txt
ChenMac:build wasdns$
```

```
ChenMac:pascal-compiler wasdns$ ls
LICENSE
                                                 run_lexer.py
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[ChenMac:pascal-compiler wasdns$ ./run_parser_demo.sh
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action_and_goto.txt
                        grammar.txt
                                                 parser
error.txt
                                                 slr.txt
                        input.txt
first_and_follow.txt
                        output.txt
ChenMac:build wasdns$
```

What's does this script do?

- 1.Creating build/ folder;
- 2. Running Lexer and generating **output files** in build/;
- 3. Compiling parser program;
- 4. Reading and parsing the grammar and the output files;
- 5. Generating results in build/folder.

```
ChenMac:pascal-compiler wasdns$ ls
LICENSE
                                                 run_lexer.py
                        docs
                                                 run_lexer_ply.py
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                                                 run_parser_demo.sh
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action_and_goto.txt
                        grammar.txt
                                                 parser
                                                 slr.txt
error.txt
                        input.txt
first_and_follow.txt
                        output.txt
ChenMac:build wasdns$
```

Results of running parser

1.first_and_follow.txt: Print the first set and follow set

```
00
```

```
====FIRST====
FIRST(S') = { program }
FIRST(S) = { program }
FIRST(compound_stmt) = { begin }
FIRST(stmts) = \{;, begin, for, id, if, while, \epsilon\}
FIRST(stmt) = \{ begin , for , id , if , while , \epsilon \}
FIRST(if_stmt) = { if }
FIRST(for_stmt) = { for }
FIRST(bool) = \{ ( , id , num \}
FIRST(expr) = { ( , id , num }
FIRST(factor) = { ( , id , num }
FIRST(id) = { id }
FIRST(;) = { ; }
FIRST(.) = {.}
FIRST(begin) = { begin }
FIRST(end) = { end }
FIRST(:=) = { := }
FIRST(while) = { while }
FIRST(do) = { do }
FIRST(if) = { if }
FIRST(then) = { then }
FIRST(else) = { else }
FIRST(to) = { to }
FIRST(downto) = { downto }
FIRST(>) = { > }
FIRST(<) = { < }
FIRST(+) = \{ + \}
FIRST(-) = \{ - \}
FIRST(*) = { * }
FIRST(/) = { / }
FIRST(^) = { ^ }
FIRST(num) = { num }
FIRST(() = { ( } )
FIRST()) = { } 
FIRST(program) = { program }
FIRST(for) = { for }
FIRST(\$) = \{\$\}
_____
====F0LL0W====
FOLLOW(S) = \{ \$ \}
FOLLOW(compound_stmt) = { . , ; , else , end }
FOLLOW(stmts) = { ; , end }
FOLLOW(stmt) = { ; , else , end }
FOLLOW(if_stmt) = { ; , else , end }
FOLLOW(for_stmt) = { ; , else , end }
FOLLOW(bool) = { do , then }
```

Figure: First and Follow

Figure: First and Follow

```
8 0
                                                     first_and_follow.txt
                                                                                                 使用"文本编辑"打开
====FIRST====
FIRST(S') = { program }
FIRST(S) = { program }
FIRST(compound_stmt) = { begin }
FIRST(stmts) = { ; , begin , for , id , if , while , ε }
FIRST(stmt) = { begin , for , id , if , while , ε }
FIRST(if_stmt) = { if }
FIRST(for_stmt) = { for }
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FIRST(expr) = { ( , id , num }
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FIRST(id) = { id }
FIRST(;) = { ; }
FIRST(.) = { . }
FIRST(begin) = { begin }
FIRST(end) = { end }
FIRST(:=) = { := }
FIRST(while) = { while }
FIRST(do) = { do }
FIRST(if) = { if }
FIRST(then) = { then }
FIRST(else) = { else }
FIRST(to) = { to }
FIRST(downto) = { downto }
FIRST(>) = { > }
FIRST(<) = { < }
FIRST(+) = \{ + \}
FIRST(-) = \{ - \}
FIRST(*) = { * }
FIRST(/) = { / }
FIRST(^) = { ^ }
FIRST(num) = { num }
FIRST(() = { ( } )
FIRST()) = { ) }
FIRST(program) = { program }
FIRST(for) = { for }
FIRST(\$) = \{\$\}
====F0LL0W====
FOLLOW(S) = \{ s \}
FOLLOW(compound_stmt) = { . , ; , else , end }
FOLLOW(stmts) = { ; , end }
FOLLOW(stmt) = { ; , else , end }
FOLLOW(if_stmt) = { ; , else , end }
                                              Follow
FOLLOW(for_stmt) = { ; , else , end }
FOLLOW(bool) = { do , then }
-----
```

Figure: First and Follow

```
ChenMac:pascal-compiler wasdns$ ls
LICENSE
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                        grammar.txt
                                                 parser
                                                 slr.txt
                        input.txt
error.txt
first_and_follow.txt
                        output.txt
ChenMac:build wasdns$
```

Results of running parser

```
1.first_and_follow.txt: Print the first set and follow set

2.action_and_goto.txt: Print the action and goto table
```

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17	1	r2	r2	1	r2	1	1	1	1	1	r2		1	1	1	1	T			1	ī	1	T	1	1		1	1	1	1		1	1	1		1	1	1
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120	1			1	1	1	1	530	01	1	1		1	1	1	1	1	ī		1	1	1	ī	1	1		ī	1	1	1		1	1	1	1	1	1	
21	1	1		1	1	1	1	1	1	1	1	1	1	IS	31 5	32 5	33	534	535	53	5 53	7		1	1		T	1	1	1		1	1	1	1	1		
22	1	r22		1	r22	1	1	r22	2	r22	Ira	2 r	22 r22	Ir	22 r	22 r	22	r22	r22	r2	2 r2	2	1	1	22		1	1	1	1		1	1	1	1	1	1	
23	1	r23		1	r23	1	1	r23	3	r23	r2	3 r	23 r23	In	23 r	23 r	23	r23	r23	r2	3 r2	3	1	1	23		1	1	1	1	1	1	1	1	1	1	1	
24	1	r24			r24	1	1	r2	4	r24	r2	4 r	24 r24	r2	24 r	24 r	24	r24	r24	r2	4 r2	4	1	1	-24		1	1	1	1	1	1	1	1		1	1	
25					1		1	1	1	1		1		1	1	1		1						25					1		1	1	1	1			22	
126					1	1	1		1	539				1	1	1									-		1	1	1	1		1	1	1		1		
27					<u> </u>			<u> </u>				<u>-</u> -		1	I	1				1	1	1	1						<u>-</u> -			1						-
28					14				1	1	1			1	1	1				1	1	1	1									1			1	1		
29								-			Ir	5				15	331	5341	S35	153	5 53	71										1		1		1		
130																				1										11		141	12	13		-		
131															-					1	-	IS	2419	251						1		1		1		142	122	
			200											100			1																					

Figure: Action and Goto

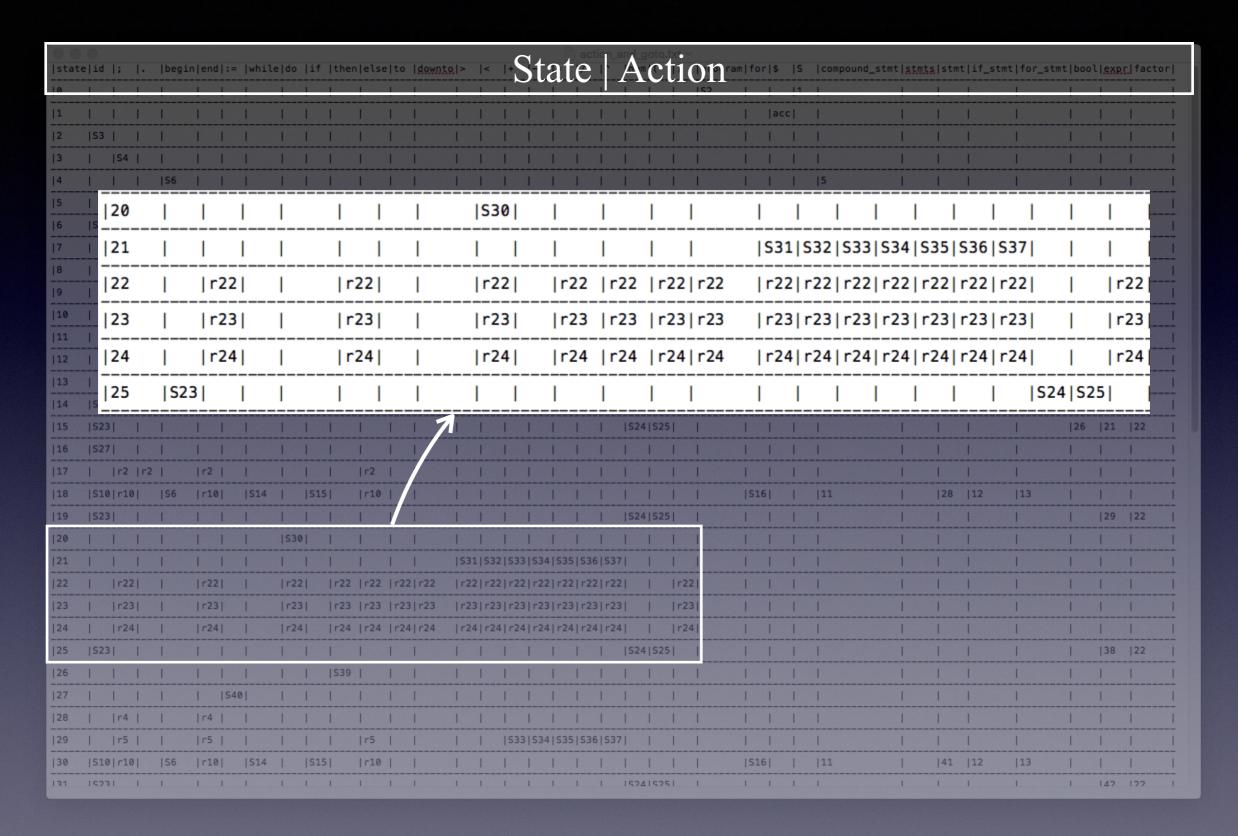


Figure: Action and Goto

```
ChenMac:pascal-compiler wasdns$ ls
LICENSE
                                                 run_lexer.py
                        docs
                                                 run_lexer_ply.py
                        lexer_tests
README
build
                        parser_tests
                                                 run_parser_demo.sh
                        ply_frontend
cleanup.sh
                                                 src
[ChenMac:pascal-compiler wasdns$ ./run_parser_demo.sh
ChenMac:pascal-compiler wasdns$ cd build/
ChenMac:build wasdns$ ls
action_and_goto.txt
                        grammar.txt
                                                 parser
error.txt
                                                 slr.txt
                        input.txt
first_and_follow.txt
                        output.txt
ChenMac:build wasdns$
```

Results of running parser

```
1.first_and_follow.txt: Print the first set and follow set2.action_and_goto.txt: Print the action and goto table3.output.txt: Print the runtime stack and applied actions
```

output.txt (112) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 15 26 39 50 52 6 8 18 10 19 29 35 22 symbolStack: program id ; begin stmts ; for id := expr downto expr do if bool then stmt else begin stmts; id := expr * factor INPUT: + id end end . \$ 根据expr-> factor规约 (113) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 15 26 39 50 52 6 8 18 10 19 29 35 46 symbolStack: program id : begin stmts : for id := expr downto expr do if bool then stmt else begin stmts; id := expr * expr INPUT: + id end end . \$ 移入 (114) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 15 26 39 50 52 6 8 18 10 19 29 35 46 33 symbolStack: program id ; begin stmts ; for id := expr downto expr do if bool then stmt else begin stmts; id := expr * expr + INPUT: id end end . \$ 移入 (115) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 15 26 39 50 52 6 8 18 10 19 29 35 46 33 23 symbolStack: program id ; begin stmts ; for id := expr downto expr do if bool then stmt else begin stmts ; id := expr * expr + id INPUT: end end . \$ 根据factor-> id规约 (116) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 15 26 39 50 52 6 8 18 10 19 29 35 46 33 22 symbolStack: program id ; begin stmts ; for id := expr downto expr do if bool then stmt else begin stmts ; id := expr * expr + factor INPUT: end end . \$ 根据expr-> factor规约 (117) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 15 26 39 50 52 6 8 18 10 19 29 35 46 33 44 symbolStack: program id; begin stmts; for id := expr downto expr do if bool then stmt else begin stmts ; id := expr * expr + expr INPUT: end end . \$ 根据expr-> expr + expr规约 (118) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 15 26 39 50 52 6 8 18 10 19 29 35 46 symbolStack: program id ; begin stmts ; for id := expr downto expr do if bool then stmt else begin stmts; id := expr * expr INPUT: end end . \$ 根据expr-> expr * expr规约 (119) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 15 26 39 50 52 6 8 18 10 19 29 symbolStack: program id ; begin stmts ; for id := expr downto expr do if bool then stmt else begin stmts; id := expr INPUT: end end . \$ 根据stmt-> id := expr规约 (120) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 15 26 39 50 52 6 8 18 28 symbolStack: program id ; begin stmts ; for id := expr downto expr do if bool then stmt else begin stmts; stmt INPUT: end end . \$ 根据stmts-> stmts; stmt规约 (121) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 15 26 39 50 52 6 8 symbolStack; program id; begin stmts; for id := expr downto expr do if bool then stmt else begin stmts INPUT: end end . \$ 移入 (122) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 15 26 39 50 52 6 8 17 symbolStack: program id ; begin stmts ; for id := expr downto expr do if bool then stmt else begin stmts end INPUT: end . \$ 根据compound stmt-> begin stmts end规约 (123) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 15 26 39 50 52 11 symbolStack: program id ; begin stmts ; for id := expr downto expr do if bool then stmt else compound stmt INPUT: end . \$ 根据stmt-> compound stmt规约 (124) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 15 26 39 50 52 55 symbolStack: program id ; begin stmts ; for id := expr downto expr do if bool then stmt else stmt INPUT: end . \$ 根据if_stmt-> if bool then stmt else stmt规约 (125) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 12 symbolStack: program id ; begin stmts ; for id := expr downto expr do if_stmt INPUT: end . \$ 根据stmt-> if_stmt规约 (126) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 61 symbolStack: program id ; begin stmts ; for id := expr downto expr do stmt INPUT: end . \$ 根据for_stmt-> for id := expr downto expr do stmt规约 (127) stateStack: 0 2 3 4 6 8 18 13 symbolStack: program id ; begin stmts ; for_stmt INPUT: end . \$ 根据stmt-> for_stmt规约 (128) stateStack: 0 2 3 4 6 8 18 28 symbolStack: program id ; begin stmts ; stmt INPUT: end . \$ 根据stmts-> stmtx ; stmt规约 (129) stateStack: 0 2 3 4 6 8 symbolStack: program id; begin stmts INPUT: end . \$ 移入 (130) stateStack: 0 2 3 4 6 8 17 symbolStack: program id ; begin stmts end INPUT: . \$ 根据compound_stmt-> begin stmts end规约 (131) stateStack: 0 2 3 4 5 symbolStack: program id; compound_stmt INPUT: . \$ 移入 (132) stateStack: 0 2 3 4 5 7 symbolStack; program id; compound stmt . INPUT: \$ 根据S-> program id; compound stmt .规约

Figure: Runtime Output

(133) stateStack: 0 1 symbolStack: S INPUT: \$ accept

No. 1 State Stack | Symbol Stack Input Action of book then start else begin stmts ; id := expr * expr INPUT: + id end end . \$ 移入 (114) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 15 26 39 50 52 6 8 18 10 19 29 35 46 33 symbolStack: program id ; begin stmts ; for id := expr downto expr do if bool then stmt else begin stmts ; id := expr * expr + INPUT: id end end . \$ 移入 (115) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 15 26 39 50 52 6 8 18 10 19 29 35 46 33 23 symbolStack: program id ; begin stmts ; for id := expr downto expr do if bool then stmt else begin stmts ; id := expr * expr + id INPUT: end end . \$ 根据factor-> id规约 (116) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 15 26 39 50 52 6 8 18 10 19 29 35 46 33 22 symbolStack: program id ; begin stmts ; for id := expr downto expr do if bool then stmt else begin stmts; id := expr * expr + factor INPUT: end end . \$ 根据expr-> factor规约 (117) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 15 26 39 50 52 6 8 18 10 19 29 35 46 33 44 symbolStack: program id ; begin stmts ; for id := expr downto expr do if bool then stmt else begin stmts; id := expr * expr + expr INPUT: end end . \$ 根据expr-> expr + expr规约 (118) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 15 26 39 50 52 6 8 18 10 19 29 35 46 symbolStack: program id ; begin stmts ; for id := expr downto expr do if bool then stmt else begin stmts ; id := expr * expr INPUT: end end . \$ 根据expr-> expr * expr规约 (119) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 15 26 39 50 52 6 8 18 10 19 29 symbolStack: program id ; begin stmts ; for id := expr downto expr do if bool then stmt else begin stmts ; id := expr INPUT: end end . \$ 根据stmt-> id := expr规约 (120) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 15 26 39 50 52 6 8 18 28 symbolStack: program id ; begin stmts ; for id := expr downto expr do if bool then stmt else begin stmts; stmt INPUT: end end . \$ 根据stmts-> stmts; stmt规约 (121) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 15 26 39 50 52 6 8 symbolStack: program id ; begin stmts ; for id := expr downto expr do if bool then stmt else begin stmts INPUT: end end . \$ 移入 (122) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 15 26 39 50 52 6 8 17 symbolStack: program id ; begin stmts ; for id := expr downto expr do if bool then stmt else begin stmts end INPUT: end . \$ 根据compound_stmt-> begin stmts end规约 (123) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 15 26 39 50 52 11 symbolStack: program id ; begin stmts ; for id := expr downto expr do if bool then stmt else compound_stmt INPUT: end . \$ 根据stmt-> compound_stmt规约 (124) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 15 26 39 50 52 55 symbolStack: program id ; begin stmts ; for id := expr downto expr do if bool then stmt else stmt INPUT: end . \$ 根据if stmt-> if bool then stmt else stmt规约 (125) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 12 symbolStack: program id ; begin stmts ; for id := expr downto expr do if_stmt INPUT: end . \$ 根据stmt-> if_stmt规约 (126) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 61 symbolStack: program id ; begin stmts ; for id := expr downto expr do stmt INPUT: end . \$ 根据for_stmt-> for id := expr downto expr do stmt规约 (127) stateStack: 0 2 3 4 6 8 18 13 symbolStack: program id ; begin stmts ; for_stmt INPUT: end . \$ 根据stmt-> for_stmt规约 (128) stateStack: 0 2 3 4 6 8 18 28 symbolStack: program id ; begin stmts ; stmt INPUT: end . \$ 根据stmts-> stmts ; stmt规约 (129) stateStack: 0 2 3 4 6 8 symbolStack: program id; begin stmts INPUT: end . \$ 移入 (130) stateStack: 0 2 3 4 6 8 17 symbolStack: program id ; begin stmts end INPUT: . \$ 根据compound_stmt-> begin stmts end规约 (131) stateStack: 0 2 3 4 5 symbolStack: program id; compound_stmt INPUT: . \$ 移入 (132) stateStack: 0 2 3 4 5 7 symbolStack: program id ; compound_stmt . INPUT: \$ 根据S-> program id ; compound_stmt .规约

Figure: Runtime Output

(133) stateStack: 0 1 symbolStack: S INPUT: \$ accept

```
No. 1 State Stack | Symbol Stack | Input | Action of book then start else
begin stmts ; id := expr * expr INPUT: + id end end . $ 移》
 (114) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 15 26 39 50 52 6 8 18 10 19 29 35 46 33 symbolStack: program id ; begin stmts ; for id := expr downto expr do if bool then stmt
else begin stmts ; id := expr*expr+INPUT: id end end . $ 移入
  (127) stateStack: 0 2 3 4 6 8 18 13 symbolStack: program id ; begin stmts ; for_stmt INPUT: end . $ 根据stmt-> for_stmt规约
  (128)stateStack: 0 2 3 4 6 8 18 28 symbolStack: program id ; begin stmts ; stmt INPUT: end . $ 根据stmts-> stmts ; stmt规约
  (129) stateStack: 0 2 3 4 6 8 symbolStack: program id ; begin stmts INPUT: end . $ 移入
  (130)stateStack: 0 2 3 4 6 8 17 symbolStack: program id ; begin stmts end INPUT: . $ 根据compound_stmt-> begin stmts end规约
  (131) stateStack: 0 2 3 4 5 symbolStack: program id ; compound_stmt INPUT: . $ 移入
  (132)stateStack: 0 2 3 4 5 7 symbolStack: program id ; compound_stmt . INPUT: $ 根据S-> program id ; compound_stmt .规约
  (133) stateStack: 0 1 symbolStack: S INPUT: $ accept
end INPUT: end . $ 根据compound_stmt-> begin stmts end规约
(123) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 15 26 39 50 52
                                                              symbolStack: program id; begin stmts; for id := expr downto expr do if bool then stmt else compound_stmt
INPUT: end . $ 根据stmt-> compound_stmt规约
(124) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 15 26 39 50
                                                           55 symbolStack: program id ; begin stmts ; for id := expr downto expr do if bool then stmt else stmt INPUT: end .
$ 根据if stmt-> if bool then stmt else stmt规约
(125) stateStack: 0 2 3 4 6 8 18 16 27 40 51 54 57 59 12 symbols
                                                        ack: program id ; begin stmts ; for id := expr downto expr do if_stmt INPUT: end . $ 根据stmt-> if_stmt规约
(126) stateStack: 0 2 3 4 6 8 18
                                                       tack: program id ; begin stmts ; for id := expr downto expr do stmt INPUT: end . $ 根据for_stmt-> for id := expr downto
expr do stmt规约
(127) stateStack: 0 2 3 4 6 8 18 13 symbolStack: program id ; begin stmts ; for_stmt INPUT: end . $ 根据stmt-> for_stmt规约
(128) stateStack: 0 2 3 4 6 8 18 28 symbolStack: program id ; begin stmts ; stmt INPUT: end . $ 根据stmts-> stmts ; stmt规约
(129) stateStack: 0 2 3 4 6 8 symbolStack: program id ; begin stmts INPUT: end . $ 移入
(130) stateStack: 0 2 3 4 6 8 17 symbolStack: program id ; begin stmts end INPUT: . $ 根据compound_stmt-> begin stmts end规约
(131) stateStack: 0 2 3 4 5 symbolStack: program id; compound stmt INPUT: . $ 移入
(132) stateStack: 0 2 3 4 5 7 symbolStack: program id ; compound_stmt . INPUT: $ 根据S-> program id ; compound_stmt .规约
(133) stateStack: 0 1 symbolStack: S INPUT: $ accept
```

Figure: Runtime Output

```
ChenMac:pascal-compiler wasdns$ ls
LICENSE
                                                 run_lexer.py
                        docs
                                                 run_lexer_ply.py
                         lexer_tests
README
build
                        parser_tests
                                                 run_parser_demo.sh
                        ply_frontend
cleanup.sh
                                                 src
[ChenMac:pascal-compiler wasdns$ ./run_parser_demo.sh
ChenMac:pascal-compiler wasdns$ cd build/
ChenMac:build wasdns$ ls
action_and_goto.txt
                        grammar.txt
                                                 parser
error.txt
                                                 slr.txt
                        input.txt
first_and_follow.txt
                        output.txt
ChenMac:build wasdns$
```

Results of running parser

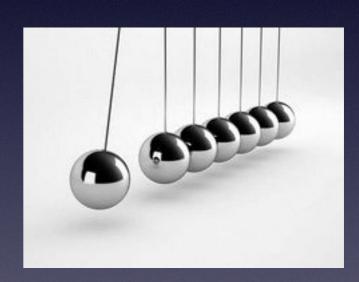
```
1.first_and_follow.txt: Print the first set and follow set 2.action_and_goto.txt: Print the action and goto table 3.output.txt: Print the runtime stack and applied actions 4.error.txt: The runtime error log
```

```
int main() {
582
         char gramarFile[50] = "./grammar.txt";
583
         char outputFile[50] = "./output.txt";
584
         char actionAndGotoFile[50] = "./action_and_goto.txt";
585
         char DFAFile[50] = "./slr.txt";
586
         char errorFile[50] = "./error.txt";
587
         char inputFile[50] = "./input.txt";
588
589
         init();
590
         getGrammar(gramarFile);
591
         getCanonical();
592
593
594
         calFirst();
         printFirst();
595
         calFollow();
596
         printFollow();
597
598
         printDFA(DFAFile);
599
         setActionAndGoto();
600
601
         printActionAndGoto(actionAndGotoFile);
         readInput(inputFile);
602
         solve(outputFile, errorFile);
603
604
         return 0;
605 }
```

Figure: Overview of Main Procedure

Outline

- 1.Introduction
- 2.Journal of testing
- 3.Conclusion



Conclusion

- Introduction of SLR(1) and Our Program;
- Giving an Example of Testing Our Program.



Experiences

- · Requiring enough time to complete this task.
- Fully understanding of parser mechanism.
- The other things are coming soon. Stay Tuned!



That's all. Thank you!

Group Members: 吴媛媛, 林诗尧, 陈翔