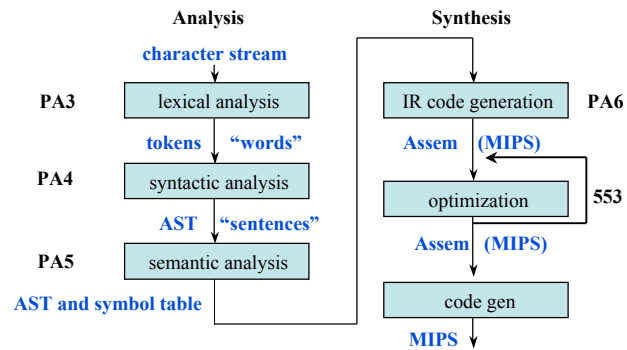


## Structure of the MiniJava Compiler



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## Plan for Today

### Studying for the midterm

- review all slides and notes taken in class
- do suggested exercises
- redo any examples we did in class
- reread assigned reading
- the midterm WILL NOT have anything about MIPS

### Lexical Analysis, or scanning

### Syntactic Analysis, or parsing

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## Lexical Analysis, or scanning

### Terminology

- regular expressions
- tokens
- DFA
- NFA
- longest match and priority

### Techniques

- creating a scanner for a set of tokens

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## Syntactic Analysis, or parsing

### Terminology

- context-free grammars, terminal, non-terminal, symbol, derivation
- syntax-directed translation, actions, attributes
- LR(0) versus LR(1) grammars
- parse trees versus abstract syntax trees
- ambiguity
- LL(k) and left recursion
- top-down and bottom-up parsing
- precedence and associativity
- pre- and post-order depth-first traversals
- error handling

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## Syntactic Analysis, or parsing cont...

### Techniques

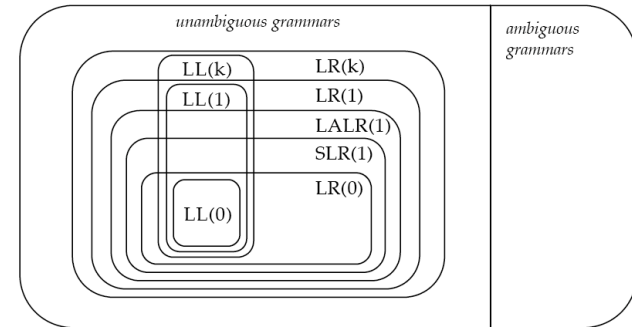
- rewrite a grammar so that it is LL(1)
- calculate FIRST and FOLLOW sets
- write a predictive parser with panic mode error handling
- disambiguate expression and list grammars
- create an LR(0) or LR(1) parse table
- parse a string of tokens with an LR parse table

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## Grammar Hierarchy



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## Predictive parser for Float Assignment Grammar

```

void S() { switch (lookahead) {
  case ID:
    case EOF:// the 2 characters in the FIRST(StmList EOF)
      try { StmList(); match(EOF); } catch { panic(S); } break;
    default: panic(S); break;
}}
void StmList() { switch (lookahead) {
  case ID: // FIRST( Stm StmList ) = { ID }
    try { Stm(); StmList(); } catch { panic(StmList) } break;
  case EOF: // FOLLOW(StmList) = { EOF }
    break;
  default: panic(StmList); break;
}}
void Stm() { switch (lookahead) {
  case ID: try { match(ID); match(ASSIGN); match(FLOAT);
    } catch { panic(Stm); } break;
  default: panic(Stm); break;
}}
    
```

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## Example LR Parse Table

- (1)  $S \rightarrow S ( S )$
- (2)  $S \rightarrow \text{epsilon}$

State	Action			Goto
	(	)	\$	S
0	r2	r2	r2	1
1	s2		accept	
2	r2	r2	r2	3
3	s2	s4		
4	r1	r1	r1	

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