**List of semantic rules implemented:**

All 15 semantic rules required are implemented.

**Design:**

Overall design

1. SymbolType.java: super class of VariableType, FunctionType and ClassType
2. VariableType.java: data structure containing attributes specifically for variables (base type and possibly dimension if it is array)
3. FunctionType.java: data structure containing attributes specifically for functions (return type, parameters)
4. ClassType.java: data structure containing attributes specifically for classes (parent classes)
5. SymbolTableRecord.java: data structure with name, kind, type and link to sub-scope
6. SymbolTable.java: data structure containing semantic records and some helper functions
7. Visitor: parent class providing default visit behavior
8. SymbolTableGenerationVisitor.java: phase 1 traversal to generate symbol table
9. SemanticCheckingVisitor.java: phase 2 traversal to check if there is any semantic error in the statements

Phases

Symbol table generation phase

* 1. Generate symbol table
  2. Check multiply declared variable/function/class error
  3. Check overloaded function
  4. Check circular class dependencies
  5. Check shadowed member variables

1. Semantic checking phase
   1. Check variable types for assign and arithmetic operation
   2. Check parameter type of function call
   3. Check usage of array and its dimension

**Use of tools:**

- Gephi: visualize produced AST

- Excel: visualize symbol table in “.tsv”.