

**Compiler Theory and Practice**

**Course Assignment**

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Study-unit: **Object Oriented Programming**

Code: **CPS2000**

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# Implementation

Please note that the required **PixArDis Compiler** was programmed in the **C++ programming language**. Furthermore, the implementation contains the following hierarchy of files:

The following are the **source code files** used:

1. **Lexer.cpp** 
   * This file contains the implementation of the Lexer.
2. **Token.cpp**
   * This file contains the implementation of the Token class, which will be used by the Lexer.
3. **Parser.cpp**
   * This file contains the implementation of the Parser.
4. **ASTNodes.cpp** 
   * This file contains the respective implementations of the AST class nodes to represent the EBNF structure.
5. **XMLVisitorNodes.cpp**
   * This file contains the implementation of the Visitor Nodes, which perform the XML Pass.
6. **SemanticVisitorNodes.cpp** 
   * This file contains the implementation of the Visitor Nodes, which perform the Semantic Pass.
7. **CodeGeneratorVisitorNodes.cpp** 
   * This file contains the implementation of the Visitor Nodes, which generate the PixIr code.
8. **SymbolTable.cpp** 
   * This file contains the implementation of the Symbol Table, which is utilised in the Semantic and Code Generation Passes.
9. **MainClass.cpp** 
   * This file loads the PixArLang code for the compiler to run.

The following are the **header files** used:

1. **ASTNodes.h** 
   * This file contains the class definitions of the ASTNodes.cpp file.
2. **HeaderFile.h** 
   * This file contains the class definitions of the Lexer.cpp, Token.cpp, Parser.cpp files.
3. **VisitorNodes.h** 
   * This file contains the class definitions of the XMLVisitorNodes.cpp, SemanticVisitorNode.cpp and CodeGeneratorVisitorNodes.cpp files.
4. **SymbolTable.h**
   * This file contains the class definitions of the SymbolTable.cpp file.

The following are the **csv table files** used:

1. **IdentifierTable.csv** 
   * This file contains the identifier (keyword) Table used in Lexical Analysis.
2. **CAT.csv** 
   * This file contains the category Table used in Lexical Analysis.
3. **TokenTable.csv** 
   * This file contains the token Table used in Lexical Analysis.
4. **TransTable.csv**
   * This file contains the transition Table used in Lexical Analysis.

Moreover, the compiler utilises the **PixArLang.txt file** whichholds the PixArLang code to compile.

# Task 1 - Table-driven lexer

# Task 2 - Hand-crafted LL(k) parser

〈Statement〉 ::= 〈VariableDecl〉 ‘;’

| 〈Assignment〉 ‘;’

| 〈PrintStatement〉 ‘;’

| 〈DelayStatement〉 ‘;’

| 〈PixelStatement〉 ‘;’

| 〈**ClearStatement〉** ‘;’

| 〈IfStatement〉

| 〈ForStatement〉

| 〈WhileStatement〉

| 〈RtrnStatement〉 ‘;’

| 〈FunctionDecl〉

| 〈Block〉

**〈ClearStatement〉 ::= ‘\_\_clear’ <ColourLiteral>**

**Diagram, schematic

Description automatically generated**

# Task 3 - AST XML Generation Pass

# Task 4 - Semantic Analysis Pass

# Task 5 - PixIR Code Generation Pass

# Evaluation and Testing

Diagram

Description automatically generated

Table

Description automatically generated with low confidenceGraphical user interface, application

Description automatically generatedA screenshot of a computer

Description automatically generated with low confidence

Table

Description automatically generated

Text

Description automatically generated

Plagiarism Declaration Form