**Syntax Analysis**

| **Type** | **Description** | **Published** | **Link to content** |
| --- | --- | --- | --- |
| Syntax Tree | Syntax analysis creates a syntax tree, which is a hierarchical representation of the code’s structure. The tree shows the relationship between the various parts of the code, including statements, expressions, and operators | No | File |
| CFG | Syntax analysis uses context-free grammar to define the syntax of the programming language. Context-free grammar is a formal language used to describe the structure of programming languages. **G = ( V, Σ, P, S )** | No | File |
| LR variant parse tree | The parse tree is constructed by using the pre-defined Grammar of the language and the input string. If the given input string can be produced with the help of the syntax tree (in the derivation process), the input string is found to be in the correct syntax. if not, the error is reported by the syntax analyzer.  The main goal of syntax analysis is to create a parse tree or abstract syntax tree (AST) of the source code, which is a hierarchical representation of the source code that reflects the grammatical structure of the program. | No | File |
| Error detection | Syntax analysis is responsible for detecting syntax errors in the code. If the code does not conform to the rules of the programming language, the parser will report an error and halt the compilation process. | No | File |
|  |  | No | File |
| Optimization | Syntax analysis can perform basic optimizations on the code, such as removing redundant code and simplifying expressions.  The pushdown automata (PDA) is used to design the syntax analysis phase. | No | File |
|  |  | No | File |

**Links**

1. [Introduction to Syntax Analysis in Compiler Design - GeeksforGeeks](https://www.geeksforgeeks.org/introduction-to-syntax-analysis-in-compiler-design/)
2. [Compiler Design - Syntax Analysis (tutorialspoint.com)](https://www.tutorialspoint.com/compiler_design/compiler_design_syntax_analysis.htm)
3. [Slides02.pdf (stanford.edu)](https://web.stanford.edu/class/archive/cs/cs143/cs143.1128/lectures/02/Slides02.pdf)
4. [Introduction to Syntax Analysis - CSCI4160: Compiler Design and Software Development (mtsu.edu)](https://www.cs.mtsu.edu/~zdong/3210/OldSlides/SyntaxAnalyzerIntroduction.pdf)