CS 4402 Discussion Assignment 2

In your own words, describe the steps of compilation described by Niklaus Wirth in his 2005 text “Compiler Construction”.  You must include a description of what a ‘Context Free Grammar’ is, and how it relates to the compilation process.

You are expected to make a minimum of 3 responses to your fellow student’s posts.

**Compiler Construction**

To understand the function of the compiler for a programming language, we first need to understand the computer does not take the program text into execution but there requires a middleman to convert the programming source code into the executable sequence instructions. The compiler is the translator that converts the source code into the computer's understandable instructions.

The compilation process can be broken down into the below four parts(Wirth, n.d.):

**Lexical analysis:**

Source code is breaking into the elementary components for symbols, letters, and digits.

**Syntax analysis (Parsing):**

The sequence of symbols is transformed into a mirror structure of the syntactic structure of the source code. This process will make the structure of the source code easy to recognize.

**Type checking:**

Verification of the rules of syntax and the symbols appeared and additional checks on their compatibilities between the operators and operands.

**Code** **generation**:

Based on the syntax analysis. The instructions of the source codes are generated.

The code generation can be further divided into smaller tasks depending on the requirements.

Due to some limit of storage of the compiling intermediate. There are often multiple passes that are required to process one compilation for a single program. As for modern computers, the stores are more abundant, and it only become feasible to have single-pass compilers.

According to (Wirth, n.d.), the term “context-free” is a notion to describe the syntax of languages. This describes the substitution of symbols left of assignment = is permitted by the sequence derived from the expression to the right, regardless of the context in which the symbols are contained in the sentences.

Context-free grammar consists of below elements:

* Terminal symbols: the tokens of language like keywords, identifiers, and operators.
* Non-terminal symbols: the placeholder that represents the symbols.
* Production rules: the rules define that non-terminals can be replaced by terminals and non-terminals.

Complying and conforming to the grammar is a formal way to specify the valid syntax of programming languages.

**Reference**

Wirth, N. (n.d.). *Compiler construction* (Vol. 1).