Programming Languages

HW2

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1 - Why can machine languages not be used to define statements in operational semantics?

The machine language is too low to be easily understood. Therefore, an interpreter must be created for the intermediate language if it will be used for operational semantics.

2 - Write an attribute grammar whose BNF basis is that of Example 3.6 in Section 3.4.5 but whose language rules are as follows: Data types cannot be mixed in expressions, but assignment statements need not have the same types on both sides of the assignment operator.

1- **Syntax rule:** <assign> → <var> = <expr>

2- **Syntax rule:** <expr> → <var>[2] + <var>[3]

3- **Predicate:** <var>[2].actual_type == <var>[3].actual_type

4- **Syntax rule:** <expr> → <var>

5- **Syntax rule:** <var> → A | B | C

6- **Semantic rule**: <var>.actual_type ← lookup(<var>.string)

3 - What are the reasons why using BNF is advantageous over using an informal syntax description?

1. BNF programs are understandable for both people and software systems that use them.
2. BNF can be used as the basis for the syntax analyzer.
3. BNF is easier to maintain due to the BNF's structure.

4 - Describe briefly the three approaches to building a lexical analyzer ?

1. With regular expressions, the language's patterns are written using a language.

2. A diagram is designed to express the patterns of the language and a program that implements the diagram is written.

3. A diagram is designed to express the patterns of the language and construct a driven implementation