

CSE 341 HW2

Chapter 3

- Review Question 13

Q: Why can machine languages not be used to define statements in operational semantics?

A: One of the important reasons of this matter is machine language being too narrow than any other high-level language, being less readable.

One other reason is machine languages individual steps during the execution of statements being too numerous.

- Problem Set 19

Q: Why can machine languages not be used to define statements in operational semantics?

A: Grammar should change according to following:

1. Syntax rule: $\langle \text{assign} \rangle \rightarrow \langle \text{var} \rangle = \langle \text{expr} \rangle$
Semantic rule: $\langle \text{expr} \rangle.\text{expected_type} \leftarrow \langle \text{var} \rangle.\text{actual_type}$
2. Syntax rule: $\langle \text{expr} \rangle \rightarrow \langle \text{var} \rangle[2] + \langle \text{var} \rangle[3]$
Semantic Rule: $\langle \text{var} \rangle[2].\text{env} \leftarrow \langle \text{expr} \rangle.\text{env}$
 $\langle \text{var} \rangle[3].\text{env} \leftarrow \langle \text{expr} \rangle.\text{env}$
 $\langle \text{expr} \rangle.\text{actual_type} \leftarrow \langle \text{var} \rangle[2].\text{actual_type}$
Predicate: $\langle \text{var} \rangle[2].\text{actual_type} == \langle \text{var} \rangle[3].\text{actual_type}$
3. Syntax rule: $\langle \text{expr} \rangle \rightarrow \langle \text{var} \rangle$
Semantic rule: $\langle \text{expr} \rangle.\text{actual_type} \leftarrow \langle \text{var} \rangle.\text{actual_type}$
Predicate: $\langle \text{expr} \rangle.\text{actual_type} == \langle \text{expr} \rangle.\text{expected_type}$
4. Syntax rule: $\langle \text{var} \rangle \rightarrow A \mid B \mid C$
Semantic rule: $\langle \text{var} \rangle.\text{actual_type} \leftarrow \text{look-up}(\langle \text{var} \rangle.\text{string})$

Chapter 4

- Review Question 1

In terms of computer science BNF is better than informal syntax descriptions because it's formal, strict notation and using it you can more precisely describe grammar than doing it in any other informal description. In terms of meaning both of them could mean the same but with BNF even your syntax description has some rules to describe your programming languages syntax.

- Review Question 5

- Write a formal description of the token patterns of the language using a descriptive language related to regular expression.
- Design a state transition diagram that describes the token patterns of the language and write a program that implements the diagram.
- Design a state transition diagram that describes the token patterns of the language and hand-construct a table-driven implementation of the state diagram.