

Programming Languages: Lecture 17

Synthesized and Inherited Attributes

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1 Forms of SDDs

In an SDD, each grammar production rule $X \rightarrow \alpha$ associated with it a set of semantic rules of the form $b = f(a_1, \dots, a_k)$ where a_1, \dots, a_k are attributes belonging to X and/or the grammar symbols of α .

Definition 1. Given a productions $X \rightarrow \alpha$, an attributed a is

synthesized: synthesized attribute of X (denoted by $X.a$) or,

inherited: inherited attribute of one of the grammar symbols of α (denoted by $B.a$ if a is an attribute of B)

2 Attribute Grammars

An attribute grammar is an SDD in which the functions in semantic rules can have no side-effects.

The attribute grammar also specifies how the attributes are propagated through the grammar, by using graph dependency between the productions.

In general different occurrences of the same non-terminal symbol in each production will be distinguished by appropriate subscripts when defining the semantic rules associated with the rule.

3 Attributes: Basic Assumptions

- Terminal symbols are assumed to have only synthesized attributes. Their attributes are all supplied by the lexical analyser during scanning.
- The start symbol of the grammar can have only synthesized attributes.
- In the case of LR parsing with its special start symbol, the start symbol cannot have any inherited attributes.