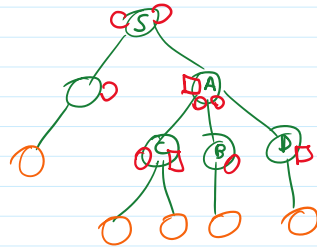


• Cartoon Views:

What if you could attach information to the intermediate nodes.



ATTRIBUTE GRAMMAR:

- expand parse tree with semantic info:
 - D. Knuth and Wagner.

idea:

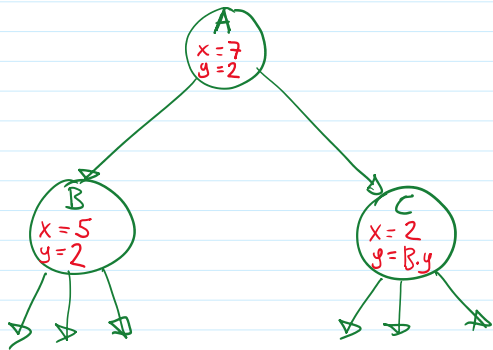
- attach to each node a collection of attributes
- for each grammar symbol X a set of attributes $att(X)$
- for each grammar rule R a collection of rules (attribute rules) that assign values to the attributes of symbols in R .

EG #1

Grammar Rule
 $A \rightarrow BC$

attributes x, y

Attribute Rules:
 $A.x \leftarrow B.x + C.x$
 $A.y \leftarrow 2$
 $B.y \leftarrow A.y$
 $C.y \leftarrow B.y$



Synthesized:
 $A.x \ B.x \ C.x \ A.y$

Inherited:
 $B.y \ C.y$

-Types of attributes

- "Synthesized" attributes
 - depend on the attribute values of a node's children.
 - info flows from bottom to top of the tree.
- "Inherited"
 - depends on the attribute values of a node's parent or siblings
 - info flows from top to bottom of the tree
Side to side

• E.G #2.

attributes type exptype.

Astmt \rightarrow var := Expr

Expr.exptype \leftarrow var.type

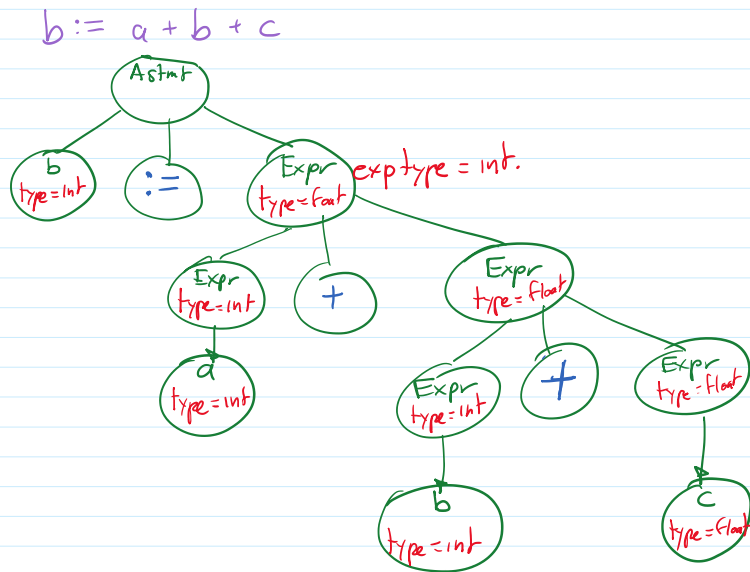
Expr₀ \rightarrow Expr₁ + Expr₂

Expr₀.type \leftarrow $\begin{cases} \text{int} & \text{if } \text{Expr}_1.\text{type} = \text{int} \\ & \text{and} \\ & \text{Expr}_2.\text{type} = \text{int} \\ \text{float} & \text{otherwise} \end{cases}$

Expr \rightarrow var

Expr.type \leftarrow var.type.

Symbol	table
a	int
b	int
c	float.



COMPUTING ATTRIBUTE VALUES

- Synthesized Attributes
 - traverse tree bottom-up.
- Inherited Attributes
 - traverse tree top-bottom
 - taking care of siblings.
- Mix
 - multiple traversals bottom-up \wedge top-down.
 - and

— 6 — EOF