Worksheet # 24 Solution

(From Lecture #24 given on 4/17/2019)

Question 1. In older versions of Fortran, string literals were expressed in the following format without using quotation marks:

$$\langle string\_literal \rangle ::= \langle numeral \rangle \; H \; \langle string \rangle$$

where $\langle numeral \rangle$ is a base-ten integer (≥ 1), H is a keyword, and $\langle string \rangle$ is a sequence of characters.
The key constraint was that the length of $\langle string \rangle$ must be equal to the base ten integer represented by $\langle numeral \rangle$, e.g., 3Habc is valid but 1Hxy is not.

This attribute grammar has two attributes *numeral.Val* (synthesized) which represents the value of the numeral, and *string.Size* (inherited) which represents the length of the string.

string_literal → *numeral* '*H*' *string*
string.Size ← numeral.Val

numeral → *digit*
numeral.Val ← _____

numeral → $numeral_2$ *digit*
numeral.Val ← numeral_2.Val_____

string → $string_2$ *char*
string_2.Size ← string.Size_____

string → *char*
check that string.Size = 1

Answer:

$string\_literal \rightarrow numeral\ 'H'\ string$

string.Size ← numeral.Val

$numeral \rightarrow digit$

numeral.Val ← digit.Val

$numeral \rightarrow numeral_2\ digit$

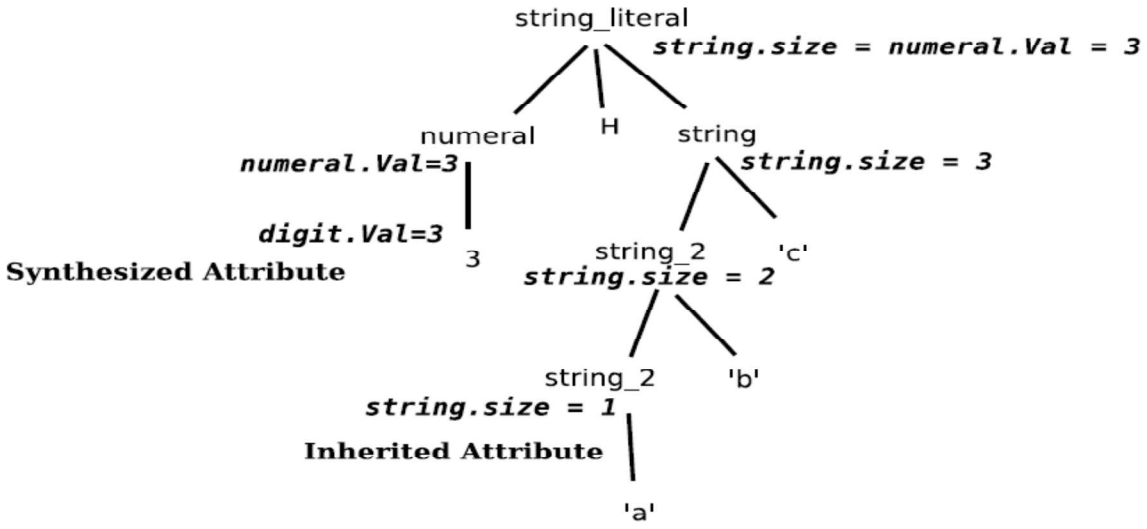
$\text{numeral.Val} \leftarrow \text{numeral}_2\text{.Val} * 10 + \text{digit.Val}$

$string \rightarrow string_2\ char$

$\text{string}_2\text{.Size} \leftarrow \text{string.Size} - 1$

$string \rightarrow char$

check that string.Size = 1



- **Synthesized attribute *(numeral.Val)* :** attribute of parent is derived from children's attributes
- **Inherited attribute *(string.Size)* :** attribute is derived from parent and/or siblings' attributes