

Concepts of Programming Languages, CSCI 305, Fall 2021
Attribute Grammars, follow-up Exercise, Nov. 29

The following contains an error. Find the error and fix it.

$\langle \text{binary numeral} \rangle \rightarrow \langle \text{binary digits} \rangle . \langle \text{fraction digits} \rangle$
 $\langle \text{binary numeral} \rangle . \text{val} := \langle \text{binary digits} \rangle . \text{val} + \langle \text{fraction digits} \rangle . \text{val}$

$\langle \text{binary digits} \rangle \rightarrow \langle \text{binary digits} \rangle \langle \text{bit} \rangle$
 $\langle \text{binary digits} \rangle . \text{val} := 2 * \langle \text{binary digits} \rangle . \text{val} + \langle \text{bit} \rangle . \text{val}$

$\langle \text{binary digits} \rangle \rightarrow \langle \text{bit} \rangle$
 $\langle \text{binary digits} \rangle . \text{val} := \langle \text{bit} \rangle . \text{val}$

$\langle \text{fraction digits} \rangle_1 \rightarrow \langle \text{fraction digits} \rangle_2 \langle \text{bit} \rangle$
 ~~$\langle \text{fraction digits} \rangle_1 . \text{val} := \frac{1}{2} * \langle \text{fraction digits} \rangle_2 . \text{val} + \frac{1}{4} * \langle \text{bit} \rangle . \text{val}$~~
 $\langle \text{fraction digits} \rangle_1 . \text{pos} := \langle \text{fraction digits} \rangle_2 . \text{pos} + 1$
 $\langle \text{fraction digits} \rangle_1 . \text{val} := \langle \text{fraction digits} \rangle_2 . \text{val} + (\frac{1}{2})^{\langle \text{fraction digits} \rangle_1 . \text{pos}} * \langle \text{bit} \rangle . \text{val}$

$\langle \text{fraction digits} \rangle \rightarrow \langle \text{bit} \rangle$
 $\langle \text{fraction digits} \rangle . \text{val} := \frac{1}{2} * \langle \text{bit} \rangle . \text{val}$
 $\langle \text{fraction digits} \rangle . \text{pos} := 1$

$\langle \text{bit} \rangle \rightarrow 0$
 $\langle \text{bit} \rangle . \text{val} := 0$

$\langle \text{bit} \rangle \rightarrow 1$
 $\langle \text{bit} \rangle . \text{val} := 1$