Certificate Grammar

December 13, 2018

num := "0" | "1" | "2"| "3" | "4" | "5"| "6" |"7" |"8" | "9"
quota := num % num
seats := num
candidate := "A" | "B" | "C" | "D" | "E" | "F" | "G" | "H" | "I" | "J" |
"K" | "L" | "M" | "N" | "O" | "P" | "Q" | "R" | "S" | "T" | "U"
| "V" | "W" | "X" | "Y" | "Z" | "a" | "b" | "c" | "d" | "e" | "f"
| "g" | "h" | "i" | "j" | "k" | "l" | "m" | "n" | "o" | "p" | "q" | "r"
| "s" | "t" | "u" | "v" | "w" | "x" | "y" | "z"
rational :=
num % num
candidate list :=
"[]" | "[" candidate ("," candidate)* "]"
ballot :=
"(" candidate "," rational ")"
ballot list :=
"[]" | "[" ballot ("," ballot)* "]"
(ballot list) list :=
"[]" | "[" ballot list ("," ballot list)* "]"
tally :=
candidate "{" rational "}"
tally list :=
"" | tally (" " tally)*
pile :=
candidate "{" (ballots list) list "}"
pile list :=
"" | pile (" " pile)*
judgement line :=
ballot list ";" " "
tally list ";" " "
pile list ";" " "
candidate list ";" " '
candidate list ";" " "
candidate list ";" " "
candidate list

certificate :=

rational "\n"
seats "\n"
candidate list "\n"
candidate list "\n"
(judgement line)*

1 Explanation

It may be good to explain the above further. The list of candidates, list of ballots, and list of (ballot list) are all comma separated lists (where items in the list are distinguished by one comma symbol). The list of tally and list of pile are both space separated lists where items are distinguished by one (and exactly one) space between items.

In a judgement line, items are separated by the symbol ";" followed by one space. If it made it easier, we could design a certificate (and therefore the parser) to simply separate items in a judgement line by ";" without any space after it.

A certificate (from top to bottom) is a quota line, then a seats line, then list of all participating candidates in the election, then a list of winner candidates, then followed by some lines of judgements.

An instance of a certificate like the following.

$$\dfrac{\dfrac{\dfrac{\dfrac{\dfrac{\dfrac{\dfrac{\dfrac{}{\begin{array}{c}8\%3\\2\\[A,\ B,\ C]\\[A,C]\end{array}}}{[b_4,([A,B,C],1\%9)];\ A3\%1\ B10\%9\ C11\%9;\ A[]\ B[]\ C[[b_5,([C],1\%9),([C,B],1\%9),([C],1\%9)]];\ [];\ [];\ [A];\ [C]}\ \text{hwin}}{[];\ A3\%1\ B10\%9\ C11\%9,\ A[]\ B[[b_4,([A,B,C],1\%9)]]\ C[[b_5,([A,C],1\%9),([A,C,B],1\%9)]];\ [];\ [];\ [A];\ [B,C]}\ \text{elim}}{[([A,C],1\%9),([A,B,C],1\%9),([A,C,B],1\%9)];\ A3\%1\ B1\%1\ C1\%1;\ A[]\ B[[b_4]]\ C[[b_5]];\ [];\ [];\ [A];\ [B,C]}\ \text{count}}{[];\ A3\%1\ B1\%1\ C1\%1;\ A[[([A,C],1\%9),([A,B,C],1\%9),([A,C,B],1\%9)]]\ B[[b_4]]\ C[[b_5]];\ [];\ [A];\ [A];\ [B,C]}\ \text{transfer}}{[];\ A3\%1\ B1\%1\ C1\%1;\ A[[b_1,b_2,b_3]]\ B[[b_4]]\ C[[b_5]];\ [];\ [];\ [];\ [A,B,C]}\ \text{elect}}{\text{ba};\ A0\%1\ B0\%1\ C0\%1;\ A[]\ B[]\ C[];\ [];\ [];\ [];\ [A,B,C]}\ \text{count}$$

Figure 1: Example Certificate