

This specification describes a tally system for first-past-the-post (FPTP) elections.

In an FPTP election, citizens are registered as voters and candidates. Every candidate is a voter, but not every voter is a candidate.

This an anonymous teller, which means that every voter is issued a token, and a voter votes for a token among the set of candidate tokens.

It is outside the scope of this specification to ensure the anonymity of tokens. It is also outside the scope of this specification to ensure that all voters are handed out a token, and no duplicate ballots occur.

$[TOKEN]$

$voters : \mathbb{P} \text{ } TOKEN$ $candidates : \mathbb{P} \text{ } TOKEN$
$candidates \subseteq voters$

$ballot : voters \rightarrow candidates$
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$[T]$ $reduce : (T \times T \rightarrow T) \times T \times \text{seq } T \rightarrow T$ $\forall f : T \times T \rightarrow T \bullet \forall a : T \bullet \forall as : \text{seq } T \bullet reduce(f, a, as) =$ $\text{if } \# as = 0 \text{ then } a \text{ else } f(head\ as, reduce(f, a, tail\ as))$
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$sum : \text{seq } \mathbb{N} \rightarrow \mathbb{N}$
$\forall plus : \mathbb{N} \times \mathbb{N} \rightarrow \mathbb{N} \bullet \forall x, y : \mathbb{N} \bullet \forall as : \text{seq } \mathbb{N} \bullet$ $plus(x, y) = x + y \Rightarrow sum(as) = reduce(plus, 0, as)$

$Teller$ $tally : candidates \rightarrow \mathbb{N}$
$\forall v : voters \bullet \forall c : candidates \bullet \forall i : \mathbb{N} \bullet$ $\forall votes : candidates \rightarrow \text{seq } \mathbb{N} \bullet$ $votes(c)(i) = \text{if } ballot(v) = c \text{ then } 1 \text{ else } 0 \Rightarrow$ $tally(c) = sum(votes(c))$