

Design an electronic voting and counting system. The system must be generic and provide for different methods of voting and defining the winner.

As regards the voting methods, those to be supported are:

- ordinal vote: the voter is asked to order the candidates (or groups/parties) present on the ballot based on their preferences.
- categorical vote: the voter enters a preference for a candidate (or group/party).
- categorical vote with preferences: the voter enters a preference for a group/party and has the possibility of indicating one or more preferences among the candidates of the selected group/party (no separate vote).
- referendum: consists of a question asked to the electorate asking whether they are for or against a certain question.

Regarding the possible ways to define the winner of the voting procedure, the minimum set to consider includes:

- majority: the winner is the candidate who obtained the highest number of votes.
- absolute majority: the winner is the candidate who obtained the absolute majority of votes, i.e. 50% + 1 of the votes cast.
- referendum without quorum: the votes are counted regardless of whether the majority of those entitled to vote participated in the consultation or not.
- referendum with quorum: the votes cast are counted only if the majority of those entitled to vote have participated in the consultation.

Votes must be able to be cast in person at a polling station after the phase of recognition of the voter's identity and verification of his or her right to vote has taken place (which is assumed to take place manually), or remotely (in this case, the identification and verification phase of voting rights are carried out by the system to be implemented).

Two types of user must be considered: the voter and the system employee/manager who must be able to configure a voting session, specifying the voting and winner calculation methods, inserting the lists of candidates, starting the counting phase and view the outcome of the vote.

Some of the essential requirements that the system must include are:

- the vote cast must remain secret and must not be traceable to the voter;
- each voter can vote only once;
- for each ballot, only one valid vote or the exercise of the right to abstain from the choice is permitted (blank ballot);
- the counting of electronic votes can only be activated after all voting operations have been closed.

An auditing system must also be provided to verify the correct functioning of the application, for example based on a (simplified) log system.

Please note that the description of the system to be implemented is intentionally incomplete. You need to better specify the requirements during the requirements analysis and specification phase of your project (and provide documentation).