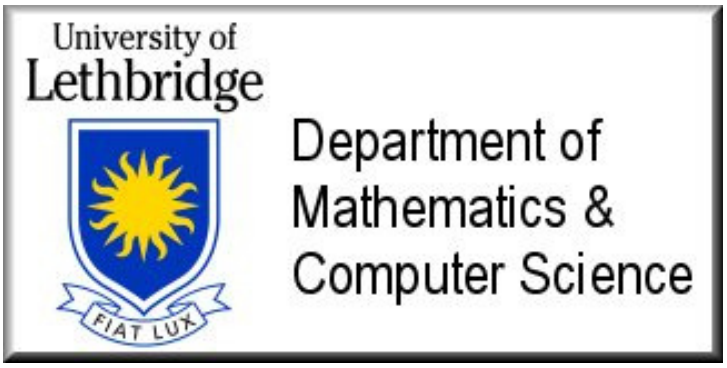

CPSC 1620 A – Fundamentals of Programming I – Fall 2021

Assignment 9 [20 points]

Due December 6th, 2021 at 11:59 PM

General Instructions

- Go to `Assignment 9 A` on `gitlab.cs.uleth.ca`.
- Fork `Assignment 9 A`.
- Clone it in Atom.
- Create a file `vote.in` that contains your data.
- Create a file `vote.cc` that contains your program.
- Work on your assignment. Each time you go back to work on your assignment, make sure to follow the standard: fetch/pull → work → stage all/commit/push procedure.
- Make sure to make the last push before the assignment deadline as the last push before the deadline will be graded.
- Once you are done:
  - Go to your assignment on Gitlab
  - Check if you are satisfied with your solutions
  - From the left sidebar choose `Project information - Members`
  - Switch from `Invite member` to `Invite group`,
  - Enter the group name `Team1620` in the `Select a group to invite` field,
  - Leave `Max role` as `Maintainer`,
  - Click the `Invite` button.

Problems

1. **[15 points]** Instead of using parallel arrays, redo assignment 8 using an array of structs:

```
struct candidateType {
      string name;
      int numVotes;
      double percent;
};
```

Write a program `vote.cc` that allows to read from a file `vote.in` the last names of the candidates in an election and the number of votes received by each candidate. The program should then output each candidate's name, the number of votes received, and the percentage of the total votes received by the candidate in descending order. Your program should also output the winner of the election. A sample output is:

```
Candidate            Votes Received      % of Total Votes
Johnson                    6000                31.09
Brown                      5000                25.91
Miller                     4000                20.73
Duffy                      2500                12.95
Robson                     1800                 9.33

Total                     19300

The Winner of the Election is Johnson
```

Your program should have the following functions:

(a) Write a function `openFile` that prompts a user to enter a file name and opens it.

(b) Write a function `closeFile` that closes an open file.

(c) Write a function `getData` that reads from the file the candidate names and their number of votes received and returns them in an array of structs.

(d) Write a function `computePercentages` that takes as its parameter an array of structs and computes the percents.

(e) Write a function `sortVotes` that takes as its parameter the array of structs and sort it in descending order of the number of votes or percentages.

(f) Write a function `display` that displays the candidate names, their number of votes received, their percentages in descending order, and the total number of votes, as formatted above.

(g) Write a function `displayWinner` that displays the winner of the election.