Name	Coin Flip
ID	CER_001
Description	Picks a random winner for the election or picks who gets eliminated when there is a tie for last place.
Actors	Voting System
Organization Benefits	Ultimately decides the winner(s) in the event of a tie.
Frequency of Use	Whenever there is a tie that impedes the progress of the election.
Triggers	T1 Candidates have the same number of votes in the final round of instant runoff voting. T2 Two or more candidates equally have the lowest number of votes in a round of instant runoff. T3 Two or more candidates have the same number of votes for the final seat in OPL voting.
Preconditions	The system must be running an election.
Postconditions	A tie is settled that will either allow the system to move on to the next stage in the election or determine a winner.
Main Course	1. Ballots will be counted from a CSV file. **Instant Runoff** I. In each of the counts, if there is no majority winner and there is a tie for a loser, a coin flip will be performed to determine which candidate will stay for the next round and the election proceeds. II. In the final count, if the two remaining candidates have the same number of votes, a coin flip will be performed to determine the winner. **Open Party Listing** I. If there is a tie for the last seat, a coin flip will be performed to decide who wins it.
Alternate Course	AC1 There is not a tie and appropriate candidates have different numbers of votes. 1. The election will proceed as usual.
Exceptions	EX1 There is a tie between two or more candidates and one winner is desired. 1. A winning candidate will be selected via a randomly generated number. EX2 There is a tie between two or more candidates and more than one winner is desired.

	1. Multiple winning candidates will be selected via randomly generated numbers.

Name	Store Voting Information
ID	ALBF_001
Description	Defines the file format for voting information
Actors	Election Officials
Organization Benefits	Ensures a specific format that the file must be stored in. This creates consistency between file transportation and program usage. Having a predetermined file format simplifies the Voting System's algorithm because it knows exactly the style of input being passed in.
Frequency of Use	Every time an election is held, new election results have to be computed. This includes normal and special elections. The Voting System will be executed once for a particular election and will generate all necessary results.
Triggers	Every time a new election is held, a new file with the corresponding voting information will need to be created.
Preconditions	1. The election has finished and all of the voting information has been collected and organized. 2. Voting information is all accurate and correct.
Postconditions	1. The created file should be written as a comma separated file, CSV. 2. This CSV file contains all the required voting information in the desired format. 3. Additionally, the Voting System will not modify this file during runtime.
Main Course	1. Election officials will host the election. 2. After the election has completed, they will collect the ballots. 3. All data will then be organized into the comma separated file format specified above and saved. 4. The file is then transported to the election official who will run the Voting System algorithm on the corresponding file.
Alternate Course	AC1 The election officials could have already created the desired file. 1. In this case, either file can be used as long as they both follow the specified format and correspond to the correct election.
Exceptions	EX1 File name already exists in the Voting System's execution directory. 1. In this case, the new file should replace the old one.

Name	Program Execution
ID	CER_002
Description	Execute the Voting System program
Actors	Election Officials, Voting System
Organization Benefits	Produces election results that election officials can use to assign winning candidates their appropriate seats.
Frequency of Use	Election officials will execute the program every time election results need to be computed. This likely occurs after elections are hosted.
Triggers	Voting System will execute every time election results need to be computed. This typically occurs right after elections.
Preconditions	Election has finished and the ballots have been organized into the desired CSV file format.
Postconditions	The Voting System outputs fair election results that follow the type of election depicted in the first line of the CSV file. Program execution will not modify the pre-existing CSV file.
Main Course	1. Election has completed 2. Election officials have created the voting information file specified in UC_002 3. Voting information file is located in the same directory as the Voting System executable. 4. Election officials run the Voting System program. a. Command to run Voting System. '> *./votingsystem ballots.csv*', where Voting System is the name of the executable and ballots.csv is the name of the voting information CSV file. 5. Program terminates and results are produced assuming successful execution.
Alternate Course	AC1 The election results were already computed for the provided CSV file. Voting System will create new output files with the current date and time so there will not be duplicate files.

Exceptions	EX1 Program name is Invalid
	    1. The election official will be prompted to try and execute the program again because the shell did not recognize the program name.
	EX2 Ballot CSV filename is invalid.
	    1. The Voting System program will exit with an error message displaying that the passed in filename was not recognized.
	EX3 Invalid Ballot CSV Format

	1. The Voting System program will exit with an error message denoting that it did not recognize the passed in file format.

Name	Produce Audit Report
ID	PER_001
Description	Displays election results and progression information in an audit file.
Actors	Voting System
Organization Benefits	Placing election results and progression information into a single audit file allows for easy interpretation of results. Additionally, it can be distributed to others to prove a fair election was implemented.
Frequency of Use	A new audit report will be generated anytime the Voting System successfully executes on election information.
Triggers	The generation of an audit report is triggered when the Voting System is being executed.
Preconditions	The Voting System algorithm executes successfully.
Postconditions	An audit file displaying the election results and how it progressed is created.
Main Course	1. The election has completed. 2. Election officials have organized the voting information into a CSV file that follows specifications in ALBF_001 3. The Voting System is executed, described in CER_002 4. Voting System will create an audit report during program execution that denotes the election results along with how the election progressed.
Alternate Course	AC1 The Voting System encounters a predicted error during execution. 1. In the case of an error, no audit report will be generated because no results should be concluded from a bad execution.
Exceptions	EX1 An unpredicted error occurs. 1. If this happens, an audit report should not be created either because no results should be concluded from a failed program execution.

Name	Compile Program
ID	MISC_001

Description	Transforms Voting System code into instructions the target machine can execute.
Actors	Testers, Programmers
Organization Benefits	Compiling the program creates an executable that can run and compute the election results.
Frequency of Use	The Voting System will need to be compiled often during development and once for the creation of the final executable.
Triggers	Voting System compilation will trigger when the code has been modified, or the executable is lost.
Preconditions	Voting System is free of syntax errors.
Postconditions	A complete working executable will be created for the target machine.
Main Course	1. The newest executable is required to run the Voting System. 2. Compile the voting system with the 'make' keyword in the development area. a. Make will call the g++ compiler which translates Voting System code into machine instructions
Alternate Course	AC1 Manually compile the Voting System with g++ using the '-g' flag to enable debugging. AC2 Manually compile Voting System with g++ rather than using make.

Exceptions	EX1 Syntax errors arise during compilation.
	    1. These will be reported to the screen.
	EX2 Occurs when compilation fails due to an incorrect file name.
	    1. An error message will be reported denoting the invalid filename.
	EX3 Occurs when compilation fails due to an invalid Makefile.
	    1. Make will display this error to the screen during runtime.

Name	Produce Media Report
ID	PER_002
Description	Creates a media report for the general public to understand the election results.
Actors	Voting System
Organization Benefits	Provides election information to the media so they can share the results with the general public. A media report provides a simple way for the results to be interpreted.
Frequency of Use	A media report is created every program execution. The Voting System

	runs during normal or special elections.
Triggers	The generation of a media report is triggered when the Voting System is being executed.
Preconditions	The Voting System algorithm executes successfully.
Postconditions	A media report is generated and stored in the same directory as the Voting System executable. The report contains information displaying the election statistics.
Main Course	1. The election has completed. 2. Election officials have organized the voting information into a CSV file that follows specifications in ALBF_001 3. The Voting System is executed, described in CER_002 4. Voting System will create a media report during program execution that denotes the election results. a. Media report is a text file containing election statistics including winners and losers, candidates, number of seats and ballots, election type, and percentages.
Alternate Course	AC1 The Voting System encounters a predicted error during execution. 1. In the case of an error, no media report will be generated because no results should be concluded from a bad execution. The predicted error message will be displayed to the screen.
Exceptions	EX1 An unpredicted error occurs when running the Voting System. 1. A media report will not be created and the error will be presented to the terminal.

Name	Display Election Information In Terminal
ID	PER_003
Description	Displays election results to the console upon successful program termination.
Actors	Voting System
Organization Benefits	Shows the election officials a quick summary of the election preventing them from reading through the audit file. This makes interpreting the election results quick.
Frequency of Use	Election output will be displayed every successful program execution. The program will be executed every time election results for an election want to be computed.
Triggers	Output will be displayed once the program terminates successfully.

	Election officials trigger the execution of the Voting System by running the program.
Preconditions	The Voting System algorithm executes successfully.
Postconditions	Election results will be displayed to the screen.
Main Course	1. Election officials will run the Voting System program on a voting information CSV file that is assumed to be accurate. 2. The Voting System algorithm will determine the results of the election. 3. Election results are displayed on screen.
Alternate Course	AC1 Predicted error occurs during program execution. 1. In this case, the Voting System will try to identify the error such as bad filename or incorrect file format and display the appropriate error message to the screen.
Exceptions	EX1 Unpredicted error occurs and the program terminates ungracefully. 1. In this case, the output of the terminal will be from the shell, not the Voting System itself.

Name	Sharing Election Results with Media Officials
ID	PER_004
Description	The results of the election will be shared with media officials in the form of a media report.
Actors	Election Officials
Organization Benefits	The results of the election will become known by the public and the winning candidates will know to proceed.
Frequency of Use	Election results will be shared after the Voting System has successfully computed the election results. The Voting System will calculate election results after normal or special elections.
Triggers	Media Officials want a media report containing the election results.
Preconditions	The program is successfully executed.
Postconditions	Media officials obtain the media report.
Main Course	1. Voting System terminated successfully producing an audit and media report. 2. Media report is given to media officials.
Alternate Course	AC1 Primary mode of media report delivery is not feasible. 1. Must contact media officials and conclude upon an alternative

	form of media report delivery.
Exceptions	EX1 The program is not successfully executed and there is no media report. 1. No results are shared.

Name	Load CSV FIle
ID	ALBF_002
Description	The data stored in the CSV file is read by the program into its memory.
Actors	Voting System
Organization Benefits	Loading CSV results into CSV memory allows for the Voting System to interpret the data. This allows for the program to run and execute on the provided data to compute election results.
Frequency of Use	Every time the program is run.
Triggers	Calling the program with a CSV file as its parameter.
Preconditions	The CSV file follows proper format.
Postconditions	The CSV data is stored in variables in the program.
Main Course	1. A valid ballot CSV file will be passed as a command line parameter to the program by the user. 2. Each line of it will be read and processed accordingly.
Alternate Course	AC1 No CSV file is passed to the program by the user. 1. The program will terminate indicating it requires a path to a CSV file containing ballot and election data.
Exceptions	EX1 An improperly formatted CSV file is passed to the program by the user. 1. The program will terminate with an error and display the appropriate message.

Name	Filename Convention
ID	UC_002
Description	The convention for naming the files produced by the Voting System. Two files should be produced, the audit file and the media report.
Actors	Voting System
Organization	Standardizing a naming convention will prevent overwriting previous files

Benefits	that are left in the execution directory. Additionally, it will notify the readers when exactly this audit file was produced, so they can infer which election the file corresponds to.
Frequency of Use	The naming convention will be used twice throughout program execution. Program execution will occur any time election results need to be computed. This will most likely follow hosted elections to produce the results.
Triggers	The naming convention is triggered every time a file (audit and report file) is created during Voting System's execution.
Preconditions	1. The current date and time on the machine of execution is accurate. 2. The Voting System algorithm executes successfully.
Postconditions	An audit and report file will be generated and named the date and time of the program's execution. Additionally, these files will contain accurate election information.

Main Course	1. The Voting System algorithm will execute as normal.
	2. An audit file and report file are created to share the appropriate election information.
	3. The Voting System names the file as follows.
	    a. If the generated file is the audit file, it will name the file "audit-DATE-TIME", where DATE and TIME are the current date and time.
	    b. If the generated file is the media report file, it will name the file "report-DATE-TIME", where DATE and TIME are the current date and time.

Alternate Course	AC1 The Voting System fails to access the date and time on the system. 1. The user will then be prompted to textually enter a custom filename in the command line. 2. The audit or media report file will be generated with the name the user entered.
Exceptions	EX1 The Voting System fails to execute to completion. 1. The program will not output any file, and will print an error message.

Name	Determining Election Type
ID	CER_003
Description	The election type is determined during Voting System runtime, so it knows which election system to proceed with.
Actors	Voting System

Organization Benefits	Determining the appropriate election type allows for the correct results to be computed. Therefore, the Voting System will execute normally and produce accurate election results.
Frequency of Use	Every time the Voting System runs on a provided CSV ballot file. Voting System executing typically follows normal or special elections throughout the year.
Triggers	The program is executed and a CSV file is taken in.
Preconditions	The provided CSV is accurate and follows the specified file format.
Postconditions	The Voting System will proceed and calculate the results for the appropriate election type.

Main Course	1. The Voting System is executed on a provided CSV ballot file.
	2. The program reads the CSV file.
	    a. If the first line is "IR", the program will perform the appropriate functions for an instant runoff election.
	    b. If the first line is "OPL", the program will perform the appropriate functions for an open party list election.

Alternate Course	AC1 The user manually specifies the election type from the terminal 1. The program will go down the path corresponding to the election type specified by the user.
Exceptions	EX1 Invalid CSV file format. 1. The program is terminated and displays that it did not recognize the supplied CSV file format. EX2 Invalid filename. 1. The program will terminate and display that it did not recognize the provided filename.