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| **Project Name: Project 1: Voting System Team#08** | |
| **Test Stage: Unit \_\_ System \_\_X** | **Test Date: 3/24/2023** |
| **Test Case ID#: SystemIR\_05** | **Name(s) of Testers: Ugtakhbayar Battulga** |
| **Test Description:**Testing the whole system with an IR election input ballot “IRElectionTests\_WinnerTie.csv”. The csv is an instance of an IR election that has one instance of a tie to choose the winner for the election. | When running this test all files are in the same working directory which can be found in Project1/src. The csv files can be found in Project1/testing. The csv file used in this specific test is called IRElectionTests\_WinnerTie.csv |
| **Automated: yes\_\_\_ no \_X\_\_** |  |
| **Results: Pass \_\_\_\_X\_ Fail\_\_\_\_\_\_\_\_** |  |
|  |  |
| **Preconditions for Test:**  An IRElection csv file is required to be in the Project1/testing directory titled “IRElectionTest\_WinnerTie.csv”. Makefile was called and exe files are ready to call. | |

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| **Step**  **#** | **Test Step**  **Description** | **Test**  **Data** | **Expected**  **Result** | **Actual**  **Result** | **Notes** |
| 1 | Running the system using  ./2-TypeElection.exe with the argument ../testing/IRElecitonTests\_WinnerTie.csv | ../testing/IRElecitonTests\_ WinnerTie.csv | N/A | N/A | Running with command line argument. System is given the file name |
| 3 | Entering the date of the IR election in format MMDDYYYY | Date in 03262005 format | N/A | N/A | Sets the date used for the audit file. |
| 4 | Election runs. | ../testing/IRElecitonTests\_ WinnerTie.csv | Expected results can be found below for both the terminal and the audit file | Actual results matched the expected results. Checked manually | The expected results and the actual results were manually checked and matched. Since there is a tie for the winner of the election there are multiple expected outputs for the audit file and the terminal output that can be found below. |

**Post condition(s) for Test:**

Audit file “03262005IR.txt” is created and results of the Election are printed to the terminal.

Test Passed

expectedResult1 for audit file:

      "IRElection\n"

      "Number of Candidates: 5\n"

      "Candidate 1: A\n"

      "Candidate 2: B\n"

      "Candidate 3: C\n"

      "Candidate 4: D\n"

      "Candidate 5: E\n"

      "Number of ballots: 15\n"

      "Ballot ID: 1 Ballot Info: 1,,,,2\n"

      "Ballot ID: 2 Ballot Info: 1,,,,2\n"

      "Ballot ID: 3 Ballot Info: 1,,,,\n"

      "Ballot ID: 4 Ballot Info: ,1,,,2\n"

      "Ballot ID: 5 Ballot Info: ,1,2,,\n"

      "Ballot ID: 6 Ballot Info: ,,1,,\n"

      "Ballot ID: 7 Ballot Info: ,,1,,\n"

      "Ballot ID: 8 Ballot Info: ,,1,,\n"

      "Ballot ID: 9 Ballot Info: ,,1,,\n"

      "Ballot ID: 10 Ballot Info: ,,1,,\n"

      "Ballot ID: 11 Ballot Info: ,,2,1,\n"

      "Ballot ID: 12 Ballot Info: ,,,,1\n"

      "Ballot ID: 13 Ballot Info: ,,,,1\n"

      "Ballot ID: 14 Ballot Info: ,,,,1\n"

      "Ballot ID: 15 Ballot Info: ,,,,1\n"

      "Counting Ballots\n"

      "Ballot #1 went to Candidate #1\n"

      "Ballot #2 went to Candidate #1\n"

      "Ballot #3 went to Candidate #1\n"

      "Ballot #4 went to Candidate #2\n"

      "Ballot #5 went to Candidate #2\n"

      "Ballot #6 went to Candidate #3\n"

      "Ballot #7 went to Candidate #3\n"

      "Ballot #8 went to Candidate #3\n"

      "Ballot #9 went to Candidate #3\n"

      "Ballot #10 went to Candidate #3\n"

      "Ballot #11 went to Candidate #4\n"

      "Ballot #12 went to Candidate #5\n"

      "Ballot #13 went to Candidate #5\n"

      "Ballot #14 went to Candidate #5\n"

      "Ballot #15 went to Candidate #5\n"

      "Candidate #1 received 3 vote(s)\n"

      "Candidate #2 received 2 vote(s)\n"

      "Candidate #3 received 5 vote(s)\n"

      "Candidate #4 received 1 vote(s)\n"

      "Candidate #5 received 4 vote(s)\n"

      "No Majority Found with more than 2 Candidates remaining\n"

      "Dropped Candidate Name: D\n"

      "Redistribute Votes\n"

      "Ballot #1 went to Candidate #1\n"

      "Ballot #2 went to Candidate #1\n"

      "Ballot #3 went to Candidate #1\n"

      "Ballot #4 went to Candidate #2\n"

      "Ballot #5 went to Candidate #2\n"

      "Ballot #6 went to Candidate #3\n"

      "Ballot #7 went to Candidate #3\n"

      "Ballot #8 went to Candidate #3\n"

      "Ballot #9 went to Candidate #3\n"

      "Ballot #10 went to Candidate #3\n"

      "Ballot #11 went to Candidate #3\n"

      "Ballot #12 went to Candidate #5\n"

      "Ballot #13 went to Candidate #5\n"

      "Ballot #14 went to Candidate #5\n"

      "Ballot #15 went to Candidate #5\n"

      "Candidate #1 received 3 vote(s)\n"

      "Candidate #2 received 2 vote(s)\n"

      "Candidate #3 received 6 vote(s)\n"

      "Candidate #4 received 0 vote(s)\n"

      "Candidate #5 received 4 vote(s)\n"

      "No Majority Found with more than 2 Candidates remaining\n"

      "Dropped Candidate Name: B\n"

      "Redistribute Votes\n"

      "Ballot #1 went to Candidate #1\n"

      "Ballot #2 went to Candidate #1\n"

      "Ballot #3 went to Candidate #1\n"

      "Ballot #4 went to Candidate #5\n"

      "Ballot #5 went to Candidate #3\n"

      "Ballot #6 went to Candidate #3\n"

      "Ballot #7 went to Candidate #3\n"

      "Ballot #8 went to Candidate #3\n"

      "Ballot #9 went to Candidate #3\n"

      "Ballot #10 went to Candidate #3\n"

      "Ballot #11 went to Candidate #3\n"

      "Ballot #12 went to Candidate #5\n"

      "Ballot #13 went to Candidate #5\n"

      "Ballot #14 went to Candidate #5\n"

      "Ballot #15 went to Candidate #5\n"

      "Candidate #1 received 3 vote(s)\n"

      "Candidate #2 received 0 vote(s)\n"

      "Candidate #3 received 7 vote(s)\n"

      "Candidate #4 received 0 vote(s)\n"

      "Candidate #5 received 5 vote(s)\n"

      "No Majority Found with more than 2 Candidates remaining\n"

      "Dropped Candidate Name: A\n"

      "Redistribute Votes\n"

      "Ballot #1 went to Candidate #5\n"

      "Ballot #2 went to Candidate #5\n"

      "Ballot #4 went to Candidate #5\n"

      "Ballot #5 went to Candidate #3\n"

      "Ballot #6 went to Candidate #3\n"

      "Ballot #7 went to Candidate #3\n"

      "Ballot #8 went to Candidate #3\n"

      "Ballot #9 went to Candidate #3\n"

      "Ballot #10 went to Candidate #3\n"

      "Ballot #11 went to Candidate #3\n"

      "Ballot #12 went to Candidate #5\n"

      "Ballot #13 went to Candidate #5\n"

      "Ballot #14 went to Candidate #5\n"

      "Ballot #15 went to Candidate #5\n"

      "Candidate #1 received 0 vote(s)\n"

      "Candidate #2 received 0 vote(s)\n"

      "Candidate #3 received 7 vote(s)\n"

      "Candidate #4 received 0 vote(s)\n"

      "Candidate #5 received 7 vote(s)\n"

      "Remaining 2 Candidates with no majority move to popularity\n"

      "Tie Has Occurred and after TieBreaker C has won with 7 Votes\n";

expectedResult1 for audit file:

      "IRElection\n"

      "Number of Candidates: 5\n"

      "Candidate 1: A\n"

      "Candidate 2: B\n"

      "Candidate 3: C\n"

      "Candidate 4: D\n"

      "Candidate 5: E\n"

      "Number of ballots: 15\n"

      "Ballot ID: 1 Ballot Info: 1,,,,2\n"

      "Ballot ID: 2 Ballot Info: 1,,,,2\n"

      "Ballot ID: 3 Ballot Info: 1,,,,\n"

      "Ballot ID: 4 Ballot Info: ,1,,,2\n"

      "Ballot ID: 5 Ballot Info: ,1,2,,\n"

      "Ballot ID: 6 Ballot Info: ,,1,,\n"

      "Ballot ID: 7 Ballot Info: ,,1,,\n"

      "Ballot ID: 8 Ballot Info: ,,1,,\n"

      "Ballot ID: 9 Ballot Info: ,,1,,\n"

      "Ballot ID: 10 Ballot Info: ,,1,,\n"

      "Ballot ID: 11 Ballot Info: ,,2,1,\n"

      "Ballot ID: 12 Ballot Info: ,,,,1\n"

      "Ballot ID: 13 Ballot Info: ,,,,1\n"

      "Ballot ID: 14 Ballot Info: ,,,,1\n"

      "Ballot ID: 15 Ballot Info: ,,,,1\n"

      "Counting Ballots\n"

      "Ballot #1 went to Candidate #1\n"

      "Ballot #2 went to Candidate #1\n"

      "Ballot #3 went to Candidate #1\n"

      "Ballot #4 went to Candidate #2\n"

      "Ballot #5 went to Candidate #2\n"

      "Ballot #6 went to Candidate #3\n"

      "Ballot #7 went to Candidate #3\n"

      "Ballot #8 went to Candidate #3\n"

      "Ballot #9 went to Candidate #3\n"

      "Ballot #10 went to Candidate #3\n"

      "Ballot #11 went to Candidate #4\n"

      "Ballot #12 went to Candidate #5\n"

      "Ballot #13 went to Candidate #5\n"

      "Ballot #14 went to Candidate #5\n"

      "Ballot #15 went to Candidate #5\n"

      "Candidate #1 received 3 vote(s)\n"

      "Candidate #2 received 2 vote(s)\n"

      "Candidate #3 received 5 vote(s)\n"

      "Candidate #4 received 1 vote(s)\n"

      "Candidate #5 received 4 vote(s)\n"

      "No Majority Found with more than 2 Candidates remaining\n"

      "Dropped Candidate Name: D\n"

      "Redistribute Votes\n"

      "Ballot #1 went to Candidate #1\n"

      "Ballot #2 went to Candidate #1\n"

      "Ballot #3 went to Candidate #1\n"

      "Ballot #4 went to Candidate #2\n"

      "Ballot #5 went to Candidate #2\n"

      "Ballot #6 went to Candidate #3\n"

      "Ballot #7 went to Candidate #3\n"

      "Ballot #8 went to Candidate #3\n"

      "Ballot #9 went to Candidate #3\n"

      "Ballot #10 went to Candidate #3\n"

      "Ballot #11 went to Candidate #3\n"

      "Ballot #12 went to Candidate #5\n"

      "Ballot #13 went to Candidate #5\n"

      "Ballot #14 went to Candidate #5\n"

      "Ballot #15 went to Candidate #5\n"

      "Candidate #1 received 3 vote(s)\n"

      "Candidate #2 received 2 vote(s)\n"

      "Candidate #3 received 6 vote(s)\n"

      "Candidate #4 received 0 vote(s)\n"

      "Candidate #5 received 4 vote(s)\n"

      "No Majority Found with more than 2 Candidates remaining\n"

      "Dropped Candidate Name: B\n"

      "Redistribute Votes\n"

      "Ballot #1 went to Candidate #1\n"

      "Ballot #2 went to Candidate #1\n"

      "Ballot #3 went to Candidate #1\n"

      "Ballot #4 went to Candidate #5\n"

      "Ballot #5 went to Candidate #3\n"

      "Ballot #6 went to Candidate #3\n"

      "Ballot #7 went to Candidate #3\n"

      "Ballot #8 went to Candidate #3\n"

      "Ballot #9 went to Candidate #3\n"

      "Ballot #10 went to Candidate #3\n"

      "Ballot #11 went to Candidate #3\n"

      "Ballot #12 went to Candidate #5\n"

      "Ballot #13 went to Candidate #5\n"

      "Ballot #14 went to Candidate #5\n"

      "Ballot #15 went to Candidate #5\n"

      "Candidate #1 received 3 vote(s)\n"

      "Candidate #2 received 0 vote(s)\n"

      "Candidate #3 received 7 vote(s)\n"

      "Candidate #4 received 0 vote(s)\n"

      "Candidate #5 received 5 vote(s)\n"

      "No Majority Found with more than 2 Candidates remaining\n"

      "Dropped Candidate Name: A\n"

      "Redistribute Votes\n"

      "Ballot #1 went to Candidate #5\n"

      "Ballot #2 went to Candidate #5\n"

      "Ballot #4 went to Candidate #5\n"

      "Ballot #5 went to Candidate #3\n"

      "Ballot #6 went to Candidate #3\n"

      "Ballot #7 went to Candidate #3\n"

      "Ballot #8 went to Candidate #3\n"

      "Ballot #9 went to Candidate #3\n"

      "Ballot #10 went to Candidate #3\n"

      "Ballot #11 went to Candidate #3\n"

      "Ballot #12 went to Candidate #5\n"

      "Ballot #13 went to Candidate #5\n"

      "Ballot #14 went to Candidate #5\n"

      "Ballot #15 went to Candidate #5\n"

      "Candidate #1 received 0 vote(s)\n"

      "Candidate #2 received 0 vote(s)\n"

      "Candidate #3 received 7 vote(s)\n"

      "Candidate #4 received 0 vote(s)\n"

      "Candidate #5 received 7 vote(s)\n"

      "Remaining 2 Candidates with no majority move to popularity\n"

      "Tie Has Occurred and after TieBreaker E has won with 7 Votes\n";

expectedResult1 for terminal output:

      "Election type: IR\n"

      "Number of candidates: 5\n"

      "Number of ballots cast: 15\n"

      "IR Election results in last round: \n"

      "Number of votes for candidate number 1: 0 (0.00%)\n"

      "Number of votes for candidate number 2: 0 (0.00%)\n"

      "Number of votes for candidate number 3: 7 (46.67%)\n"

      "Number of votes for candidate number 4: 0 (0.00%)\n"

      "Number of votes for candidate number 5: 7 (46.67%)\n"

      "Winner: C\n"

expectedResult2 for terminal output:

      "Election type: IR\n"

      "Number of candidates: 5\n"

      "Number of ballots cast: 15\n"

      "IR Election results in last round: \n"

      "Number of votes for candidate number 1: 0 (0.00%)\n"

      "Number of votes for candidate number 2: 0 (0.00%)\n"

      "Number of votes for candidate number 3: 7 (46.67%)\n"

      "Number of votes for candidate number 4: 0 (0.00%)\n"

      "Number of votes for candidate number 5: 7 (46.67%)\n"

      "Winner: E\n"