

System Operations Procedures

Relevant to: NYRT-120 16, 20, 21, 35, 36

Users should ensure have been followed and completed prior to operating URCVT:

URCVT v.1.2.0 05-NY Acceptance Test Procedures v. 1.0.0

URCVT v.1.2.0 200-NY Installation Instructions for Universal RCV Tabulator - Windows OS v.1.0.0

URCVT v.1.2.0 230-NY 230-NY HashCode Instructions - Windows OS v. 1.0.0

URCVT v.1.2.0 16-NY System Hardening Procedures v. 1.0.0

URCVT v.1.2.0 300-NY Configuration File Parameters v. 1.0.0

URCVT v. 1.2.0 08-NY System Operations Procedures v. 1.0.0 document is solely for use in the State of New York. This document can be expanded or updated as is necessary or required. Any recommendations listed in this document should not supersede user jurisdiction procedures or other controlling governance entities.

URCVT v.1.2.0 08-NY System Operations Procedures v. 1.0.0

Any interaction with the URCVT, including producing configuration files, running tabulations, hashing results files, and transmission of files from URCVT on USB drives should follow transmission procedures required in jurisdiction, including the use of a bipartisan team.

Launching URCVT:

The vendor recommends the URCVT be installed as part of the pre-election preparation process. In order to determine the appropriate launch procedure for a jurisdiction, users should consider the maximum possible number of votes that could occur in the event all eligible voters presented themselves to vote. Jurisdictions should, as part of their pre-election procedure, launch the URCVT according to the relevant launch instructions described below to ensure they launch the URCVT in accordance with the below requirements. The vendor is available for support with this process. For acceptance testing and L&A procedures to set up use of URCVT, see ***URCVT v.1.2.0, 11-NY L&A Testing v.1.0.0*** and ***URCVT v.1.2.0 05-NY Acceptance Test Procedures v.1.0.0***.

Contests with fewer than 1,000,000 votes

To Launch:

1. Navigate to the rcv folder created when you unzipped the Tabulator.
2. Open the bin folder
3. Double-click the rcv.bat file

Contest with more than 1,000,000 votes

1. Open a Command Prompt by navigating to the start menu and typing in Command

Prompt.

2. Press enter to launch Command Prompt.
3. Change the current directory to the rcv folder created when you unzipped the Tabulator.
4. First, type in cd (note there should be a space after cd).
5. Using File Explorer navigate to the folder where URCVT is installed.
6. Double click on the universal_rcv_tabulator_v1.2.0_windows folder
7. Click and drag the rcv folder over to the command prompt window
8. Your command prompt will now read something like:
 - a. cd
C:\Users\user\Universal_RCV_Tabulator\universal_rcv_tabulator_v1.2.0_windows\rcv
9. Press enter
10. Launch the tabulator by entering the following command:
 - a. `.\bin\java -mx30G -p .\app -m network.brightspots.rcv/network.brightspots.rcv.Main .`

Prepping CVRs for use with URCVT Software

All export of CVR records for use with the URCVT and migration of CVR records for use with URCVT should follow CVR procedures required by the jurisdiction. Users must keep track of the path to each file that is needed to tabulate the RCV contests. You will need it when you configure the URCVT software. You may want to go navigate to the C:/ drive and create a folder for this election and save all the necessary files in that location. All CVR files should also have their hash values checked when used with the URCVT. Follow these instructions to check hash values of CVR files to be used with the URCVT.

1. Open the Start Menu
2. Type in Command Prompt.
3. Press enter to launch the Command Prompt
4. Type in `certutil -hashfile [filename]`
5. Using File Explorer locate the CVR file you want to confirm on your PC
6. Left Click on the CVR file you want to confirm and while continuing to hold the mouse down, drag the file to the Command Prompt window.
7. The filename should appear after `-hashfile`
 - a. Example: `-hashfile C:\Users\user\Contest-Name-CVRs\Contest-CVR-1`
8. At the end of the line add the text: `SHA512`
9. You should have displayed on the Command Prompt:
 - a. `certutil -hashfile C:\Users\user\Contest-Name-CVRs\Contest-CVR-1 SHA512`
10. Press Enter to create the Hash Codes.
11. The screen will display:
12. The text “SHA512” followed by a string of numbers
13. Compare the SHA512 hash code to the SHA512 hash code supplied with the CVR file being confirmed.
14. If SHA512 hash codes match, this CVR can be used with the URCVT. If SHA512 codes

- do not match, retrieve new CVR files using required CVR procedures.
15. Repeat process for all CVR files to be used with URCVT

Setting up a configuration file for URCVT

All settings in the URCVT software are described in technical detail in the Configuration File Parameters document, including brief descriptions of how options impact the operational validity of other options. This document will describe how to set up a configuration for a contest using New York City's ranked choice voting rules. This guide also includes screenshots of interfaces described. The values a user inputs into any of these fields depend upon the relevant laws and regulations in place in their jurisdiction, as well as the voting system vendor used to produce cast-vote records for their elections. Users must understand the requirements of their laws, regulations, and vendor CVR data in order to fill out these fields accurately for their needs.

The URCVT is organized into tabs: the Contest Info Tab, the CVR Files Tab, the Candidates Tab, the Winning Rules Tab, the Voter Error Rules Tab, and the Output Tab. These tabs each include a set of fields that users fill out - some fields are always required, some fields are required based on previous input, and some fields are always optional. This guide will take the user through basic descriptions of each of these tabs and each of these fields. Additional technical information about these fields can be found in the Configuration Parameters guide. As users navigate through each tab they are building a configuration .json file which must be saved when complete. If the URCVT is closed and the configuration is not saved, no information will be stored. The next time the URCVT is opened all fields will be blank. Once a configuration is saved, it can be used by the URCVT to process RCV election results according to the rules laid out in that configuration, provided all rules necessary are filled out.

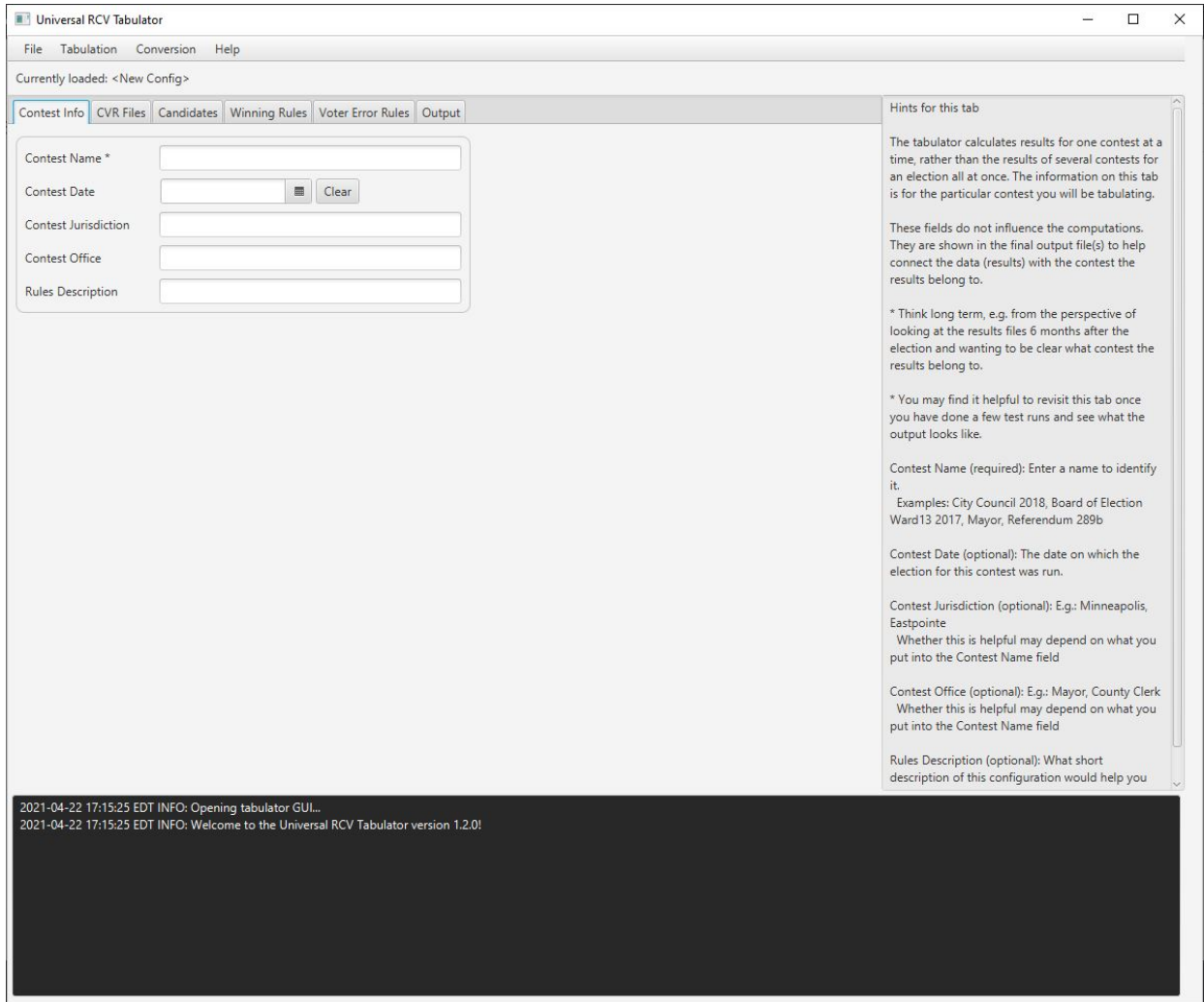
Each individual contest run through the URCVT requires its own configuration with contest-specific information such as contest name and candidate names. This guide will run through setting up the winning rules and voter error rules requirements that will apply in all New York City elections, and will discuss procedures for how to properly fill out other fields in the software. Operation of the URCVT must be conducted by a bipartisan team. Note: Including a % symbol anywhere in a configuration file results in a crash of the software. Do not use % symbols in any portion of a configuration file, including settings such as file paths and candidate names.

The following guide describes how to operate the URCVT. Refer also to the **URCVT v.1.2.0 11-NY L&A Testing v.1.0.0** document for additional detail on system operations.

Contest Info Tab

Below is what the contest info tab looks like when a user first navigates to it. This is also the first screen a user will see upon successfully launching the URCVT. Contest info fields are in the middle of the screen. The black box at the bottom of the screen is called the operation log box. It sends the user messages about the tabulation process, any errors encountered in using a configuration file, any errors in tabulation, and other software errors. Information in this panel is

saved to the rcv_0.log file. Users cannot turn this feature off using the URCVT software. The panel on the right side of the document is the “Hints” tab which includes information for how to fill out each screen successfully.



These settings appear on the “Contest Info” tab in the URCVT.

- Contest Name
- Contest Date
- Contest Jurisdiction
- Contest Office
- Rules Description

The tabulator calculates results for one contest at a time, rather than the results of several contests for an election all at once. The information on this tab is for the particular contest you will be tabulating.

These fields do not influence the computations. Contest Name, Contest Date, Contest

Jurisdiction, and Contest Office are shown in the final output file(s) to help connect the data (results) with the contest the results belong to.

- Think long term, e.g. from the perspective of looking at the results files 6 months after the election and wanting to be clear what contest the results belong to.
- You may find it helpful to revisit this tab once you have done a few test runs and see what the output looks like.

Contest Name (required): Enter a name to identify it.

Examples: City Council 2018, Board of Election Ward 13 2017, Mayor, Referendum 289b

Contest Date (optional): The date on which the election for this contest was run.

- Clear permits user to clear this field
- The calendar button allows a user to navigate through a calendar to select the date of the contest

Contest Jurisdiction (optional): E.g.: Minneapolis, Eastpointe

Whether this is helpful may depend on what you put into the Contest Name field

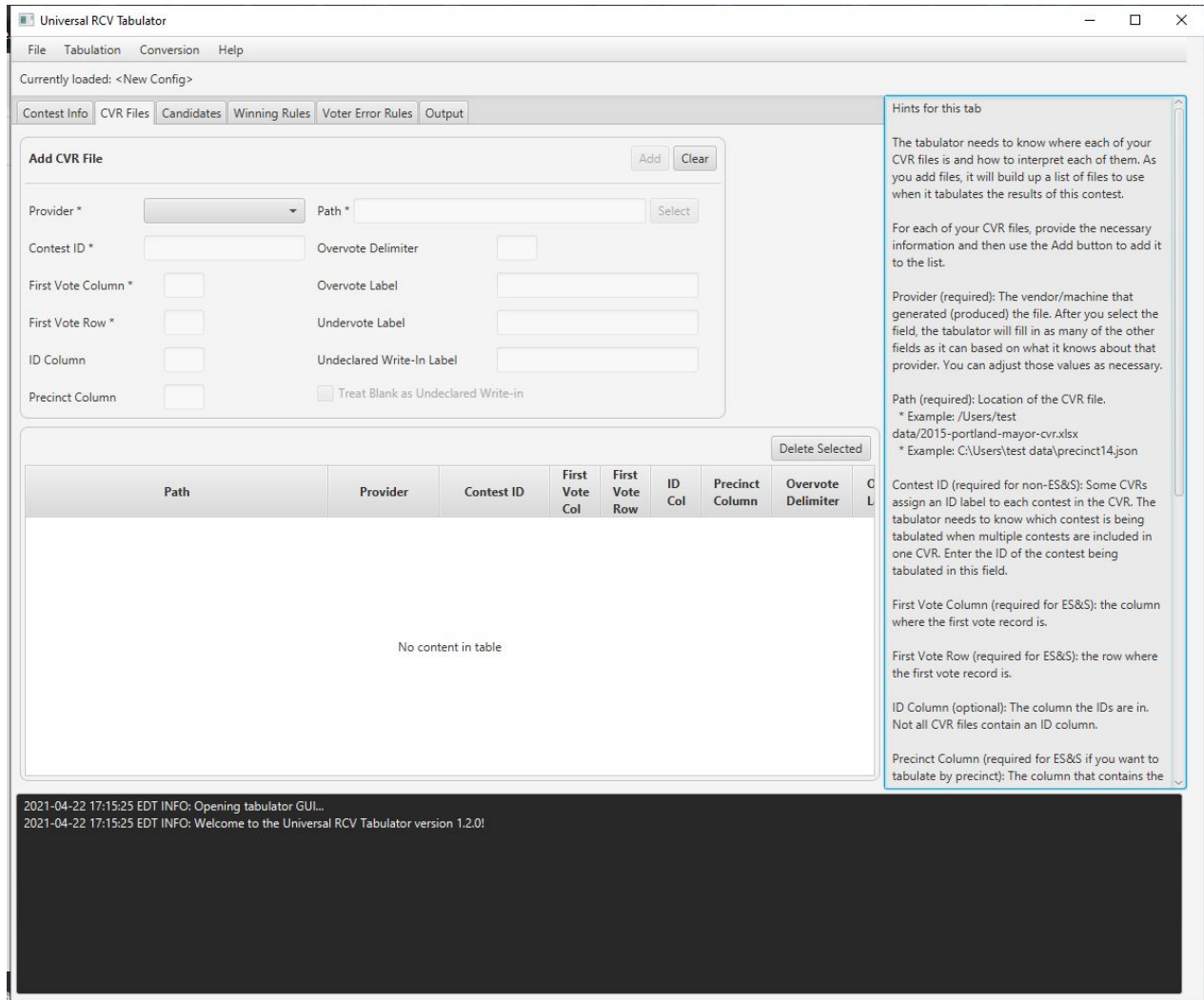
Contest Office (optional): E.g.: Mayor, County Clerk

Whether this is helpful may depend on what you put into the Contest Name field

Rules Description (optional): What short description of this configuration would help you remember in, say, six months what election this specific rule configuration is for? This option's use impacts no other options. It is included in configuration .json files and audit .log files.

CVR Files Options

This is what the CVR Files tab looks like when a user first navigates to it.



The screenshot shows the 'Universal RCV Tabulator' application window. The 'CVR Files' tab is active, displaying configuration options for adding CVR files. The interface includes a menu bar (File, Tabulation, Conversion, Help), a status bar ('Currently loaded: <New Config>'), and a tabbed interface with 'CVR Files' selected. The configuration area has an 'Add CVR File' section with fields for Provider, Path, Contest ID, Overvote/Undervote Labels, First Vote Column/Row, ID Column, and Precinct Column. Below this is a table with columns: Path, Provider, Contest ID, First Vote Col, First Vote Row, ID Col, Precinct Column, Overvote Delimiter, and Contest Label. The table is currently empty, showing 'No content in table'. A 'Hints for this tab' panel on the right provides detailed instructions for each field. A log window at the bottom shows system messages.

Hints for this tab

The tabulator needs to know where each of your CVR files is and how to interpret each of them. As you add files, it will build up a list of files to use when it tabulates the results of this contest.

For each of your CVR files, provide the necessary information and then use the Add button to add it to the list.

Provider (required): The vendor/machine that generated (produced) the file. After you select the field, the tabulator will fill in as many of the other fields as it can based on what it knows about that provider. You can adjust those values as necessary.

Path (required): Location of the CVR file.
 * Example: /Users/test
 data/2015-portland-mayor-cvr.xlsx
 * Example: C:\Users\test\data\precinct14.json

Contest ID (required for non-ES&S): Some CVRs assign an ID label to each contest in the CVR. The tabulator needs to know which contest is being tabulated when multiple contests are included in one CVR. Enter the ID of the contest being tabulated in this field.

First Vote Column (required for ES&S): the column where the first vote record is.

First Vote Row (required for ES&S): the row where the first vote record is.

ID Column (optional): The column the IDs are in. Not all CVR files contain an ID column.

Precinct Column (required for ES&S if you want to tabulate by precinct): The column that contains the

Path	Provider	Contest ID	First Vote Col	First Vote Row	ID Col	Precinct Column	Overvote Delimiter	Contest Label
No content in table								

2021-04-22 17:15:25 EDT INFO: Opening tabulator GUI.
 2021-04-22 17:15:25 EDT INFO: Welcome to the Universal RCV Tabulator version 1.2.0!

The tabulator needs a configuration file laying out where each of its user's CVR files for the contest to be tabulated are and how to interpret each of them. Only add files to the configuration that contain data for the contest you are tabulating. CVRs that do not include data for the contest to be tabulated will cause tabulation to fail. Fields used to describe CVRs are on the top half of the tab, while the table on the bottom half of the tab will display each CVR file you have added to your configuration file so far. All information in this tab directs the URCVT on where to find files and how to read those files, it does not actually pull in any vote information. Vote information is only used after a user clicks the "Tabulate" button under "Tabulation" as described later in this guide. This guide will now briefly discuss how to set up the URCVT to read an ES&S CVR.

ES&S

Permits user to edit these options:

- Path
- First Vote Column (Default Value: 4)
- First Vote Row (Default Value: 2)
- ID Column (Default Value: 1)
- Precinct Column (Default Value: 2)
- Overvote Delimiter
- Overvote Label (Default Value: overvote)
- Undervote Label (Default Value: undervote)
- Undeclared Write-In Label
- Treat Blank as Undeclared Write-In

Does not permit user to edit this option:

- Contest ID

It is assumed that the ES&S export uses default setting so below are the ES&S default settings. The user will only need to enter the path, but all other default settings are included. If the default settings are not used in the ES&S export file, the user must determine the values to be used. If defaults are not being used, users should confirm the proper values for First Vote Column, First Vote Row, ID Column, Precinct Column, Overvote Label, Undervote Label, and Undeclared Write-In Label by referencing the CVRs files to be used in the Tabulation.

The First Vote Column location depends on the information users choose to export in their CVR exports from ES&S's system. ES&S systems can include individual CVR ID information, Precinct information, and ballot style label information in the first three columns of a CVR, as shown in the below screenshot. Column A (aka Column 1) has CVR ID numbers; Column B (Column 2) has Precinct information, Column C (3) has ballot style information, and Column D (4) includes the first ranking in the RCV contest in this CVR. This is the standard CVR layout for ES&S. More information is available from ES&S.

A	B	C	D	
Cast Vote Record	Precinct	Ballot Style	Rep. to Congress 1st Choice District 2	▼ F
1	Fayette	CAN Ballot Style 130	REP Poliquin, Bruce	F
2	Fayette	CAN Ballot Style 130	REP Poliquin, Bruce	U
3	Fayette	CAN Ballot Style 130	DEM Golden, Jared F.	E
4	Fayette	CAN Ballot Style 130	REP Poliquin, Bruce	I
6	Fayette	CAN Ballot Style 130	REP Poliquin, Bruce	U
8	Fayette	CAN Ballot Style 130	Hoar, William R.S.	F
10	Fayette	CAN Ballot Style 130	undervote	U
15	Fayette	CAN Ballot Style 130	DEM Golden, Jared F.	E
17	Fayette	CAN Ballot Style 130	REP Poliquin, Bruce	U
19	Fayette	CAN Ballot Style 130	REP Poliquin, Bruce	F
20	Fayette	CAN Ballot Style 130	Hoar, William R.S.	E

CVR exports from ES&S contain columns for each ranking in an RCV contest. See the below screenshot for an example. This screenshot includes the five rankings voters had in the contest, arranged in sequential order. This CVR export included only data for the one RCV contest to be run. The setting “Maximum Number of Candidates That Can Be Ranked” (covered below in Winning Rules) instructs the URCVT how many columns to process when running the round-by-round count. If that setting is set to five and the First Vote Column setting is set to four (Column D), the URCVT will process this CVR starting at Column D/4 (column number 4) and continue through columns E/5, F/6, G/7, and H/8 - five columns for the five rankings voters have.

D	E	F	G	H
Rep. to Congress 1st Choice District 2	Rep. to Congress 2nd Choice District 2	Rep. to Congress 3rd Choice District 2	Rep. to Congress 4th Choice District 2	Rep. to Congress 5th Choice District 2
REP Poliquin, Bruce	REP Poliquin, Bruce	REP Poliquin, Bruce	undervote	undervote
REP Poliquin, Bruce	undervote	undervote	undervote	undervote
DEM Golden, Jared F.	Bond, Tiffany L.	undervote	undervote	undervote
REP Poliquin, Bruce	DEM Golden, Jared F.	Bond, Tiffany L.	DEM Golden, Jared F.	Hoar, William R.S.
REP Poliquin, Bruce	undervote	undervote	undervote	undervote
Hoar, William R.S.	REP Poliquin, Bruce	Bond, Tiffany L.	DEM Golden, Jared F.	undervote
undervote	undervote	undervote	undervote	undervote
DEM Golden, Jared F.	Bond, Tiffany L.	Hoar, William R.S.	REP Poliquin, Bruce	undervote
REP Poliquin, Bruce	undervote	undervote	undervote	undervote
REP Poliquin, Bruce	Hoar, William R.S.	Bond, Tiffany L.	DEM Golden, Jared F.	undervote
Hoar, William R.S.	Bond, Tiffany L.	REP Poliquin, Bruce	DEM Golden, Jared F.	undervote
DEM Golden, Jared F.	undervote	undervote	undervote	undervote
DEM Golden, Jared F.	Bond, Tiffany L.	Hoar, William R.S.	REP Poliquin, Bruce	undervote
Hoar, William R.S.	REP Poliquin, Bruce	DEM Golden, Jared F.	Bond, Tiffany L.	undervote
DEM Golden, Jared F.	Bond, Tiffany L.	Hoar, William R.S.	REP Poliquin, Bruce	undervote
REP Poliquin, Bruce	undervote	undervote	undervote	undervote
REP Poliquin, Bruce	undervote	undervote	undervote	undervote
REP Poliquin, Bruce	undervote	undervote	undervote	undervote
DEM Golden, Jared F.	overvote	Hoar, William R.S.	REP Poliquin, Bruce	undervote
REP Poliquin, Bruce	undervote	undervote	undervote	undervote
DEM Golden, Jared F.	Bond, Tiffany L.	Hoar, William R.S.	undervote	undervote

It is suggested that users include only the ranking data from a single RCV contest in their CVR export. This eases use of the CVR files setting, as the first vote column will be the same in every contest provided all other export settings from the CVR producing system remain the same. This also will speed up tabulation; URCVT when first reading in CVR files reads every row and column of data in a CVR. The more extraneous information in a CVR, the longer a round-by-round count/tabulation will take. If multiple RCV contests are included in a CVR export, they will appear in order as exported from ES&S's system. First Vote Column numbers for additional contests will depend upon how many other rankings/contests are included ahead of those contests in any CVR export. More information about CVR export settings and operation available from ES&S.

Default settings in ES&S systems are for overvotes to be labeled "overvote" and undervotes (in the case of ranked-choice voting, rankings that have been skipped) as "undervotes." Users should use default settings for these labels and recommended labels per their voting system. Examples of undervote and overvote labels are both seen in the above screenshot (undervotes appear throughout, overvote appears in Column E three rows up from the bottom). Information in the undervote and overvote label fields must match information in the CVR exactly (including case). Undeclared write-in labels are determined by the jurisdiction/user during adjudication.

Once CVR information is complete, click Add to add to CVR table. Repeat until all CVRs for the contest are added.

For each of your CVR files, provide the necessary information and then use the Add button to add it to the list. All CVRs in New York City will be provided by ES&S.

Provider (required): This must be set to ES&S. Click on the drop-down menu and select ES&S.

Path (required): Location of the CVR file. This will depend on the contest being configured.

- Example: /Users/test data/2015-portland-mayor-cvr.xlsx
- Select allows a user to navigate using Windows Explorer to select a location.

First Vote Column (required for ES&S): the column where the first vote record is. Set to the column where the first vote for the contest you are tabulating appears.

Contest ID (required for non-ES&S): Not used in New York City, uneditable under ES&S.

First Vote Row (required for ES&S): the row where the first vote record is. Set to the row where the first vote for the contest you are tabulating appears.

ID Column (optional): The column the individual CVR IDs are in. Not all CVR files contain an ID column. Set to the column where the ID column, if any, in your CVR file appears. It is not required if ID appears in a CVR, but, if so, it will associate each line in the CVR (the digital representation of a ballot) with the ID number assigned to it in the CVR file. This will be reflected in the audit .log file, which will make review of the audit .log file in comparison with CVRs easier to do.

Precinct Column (required for ES&S if you want to tabulate by precinct): The column that contains the precinct. Set to the column where the precinct column in your CVR file appears.

Overvote Delimiter (optional, but must be blank if "Overvote Label" is provided): Leave blank. Not used in New York City.

Overvote Label (required) Set to the label used for overvotes in your CVR.

Undervote Label (required): Set to the label used for undervotes in your CVR.

Undeclared Write-in Label (optional): Some CVRs use a particular word/phrase to indicate a write-in. Set to the label used for undeclared write-ins in your CVR.

Treat Blank as Undeclared Write-in (optional for ES&S): When checked, the tabulator will interpret blank cells in this ES&S CVR as votes for undeclared write-ins.

Add: Adds CVR to configuration file. Impacts no other option. Operation impacted by whether required fields (depending on Provider selected) are filled in.

Clear: Clears all fillable values in CVR Files tab above the CVR Files table.

Delete Selected: Deletes CVR file information listed in the CVR table.

Below is a screenshot of the URCVT with one CVR file added in the CVR Table.

Universal RCV Tabulator

File Tabulation Conversion Help

Currently loaded: C:\RCV Windows Download\RCV Homework and Practice\Jan 22,Minneapolis 2013 Council W13.json

Contest Info CVR Files Candidates Winning Rules Voter Error Rules Output

Add CVR File Add Clear

Provider * Path * Select

Contest ID * Overvote Delimiter

First Vote Column * Overvote Label

First Vote Row * Undervote Label

ID Column Undeclared Write-In Label

Precinct Column Treat Blank as Undeclared Write-in

Path	Provider	Contest ID	First Vote Col	First Vote Row	ID Col	Precinct Column	Overvote Delimiter	Overvote Label	Undervote Label	Undeclared Write-In Label
C:\RCV Windows Download\RCV Homework and Prac...	ES&S		2	2		1				

Hints for this tab

The tabulator needs to know where each of your CVR files is and how to interpret each of them. As you add files, it will build up a list of files to use when it tabulates the results of this contest.

For each of your CVR files, provide the necessary information and then use the Add button to add it to the list.

Provider (required): The vendor/machine that generated (produced) the file. After you select the field, the tabulator will fill in as many of the other fields as it can based on what it knows about that provider. You can adjust those values as necessary.

Path (required): Location of the CVR file.
 * Example: /Users/test data/2015-portland-mayor-cvr.xlsx
 * Example: C:\Users\test data\precinct14.json

Contest ID (required for non-ES&S): Some CVRs assign an ID label to each contest in the CVR. The tabulator needs to know which contest is being tabulated when multiple contests are included in one CVR. Enter the ID of the contest being tabulated in this field.

First Vote Column (required for ES&S): the column where the first vote record is.

First Vote Row (required for ES&S): the row where the first vote record is.

ID Column (optional): The column the IDs are in. Not all CVR files contain an ID column.

Precinct Column (required for ES&S if you want to tabulate by precinct): The column that contains the

See config_file_documentation.txt for more details.

2021-04-22 18:45:34 EDT INFO: Validating contest config...

2021-04-22 18:45:34 EDT SEVERE: contestName is required!

2021-04-22 18:45:34 EDT SEVERE: Contest config must contain at least 1 cast vote record file!

2021-04-22 18:45:34 EDT SEVERE: Contest config must contain at least 1 declared candidate!

2021-04-22 18:45:34 EDT SEVERE: numberOfWinners must be an integer from 0 to 2147483647!

2021-04-22 18:45:34 EDT SEVERE: Contest config validation failed! Please modify the contest config file and try again.

See config_file_documentation.txt for more details.

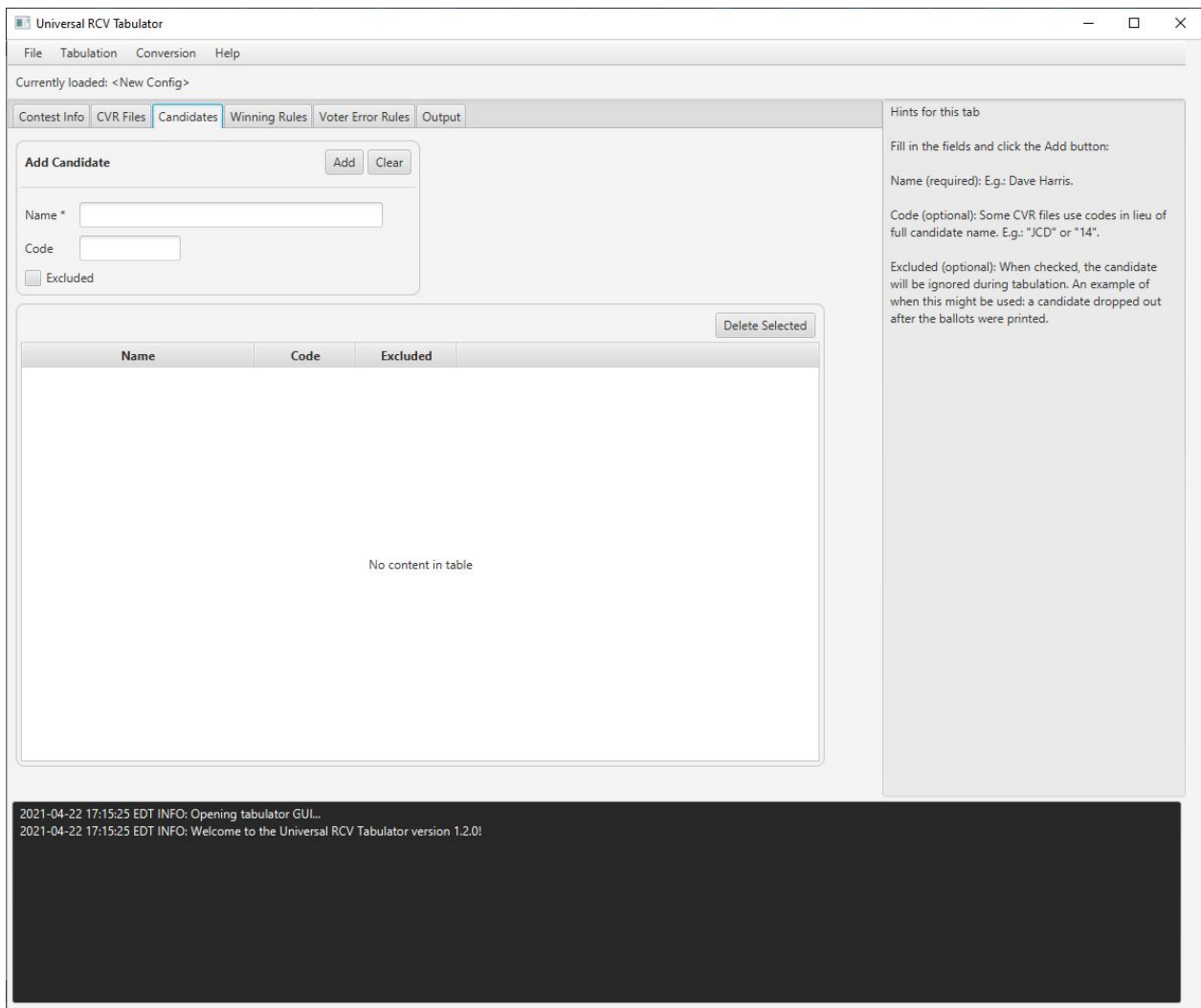
2021-04-22 18:46:18 EDT INFO: Creating new contest config...

2021-04-22 18:46:24 EDT WARNING: Please load a contest config file before attempting to convert to CDF!

2021-04-22 18:48:41 EDT INFO: Successfully loaded contest config: C:\RCV Windows Download\RCV Homework and Practice\Jan 22,Minneapolis 2013 Council W13.json

Candidates Tab

The candidates tab allows users to put in information about how candidates are referred to in cast-vote record files. These settings impact how CVR files are read. Candidate names entered on this tab will also be used to display candidate names in results files. Below is a screenshot of the Candidates Tab when a user first navigates to it. Candidate Names must match names as represented in CVR files. Users should record all candidate names as recorded in the CVR file in order to successfully input them on this tab. Users should export a candidate listing from the election management system and refer to it when filling out this tab.



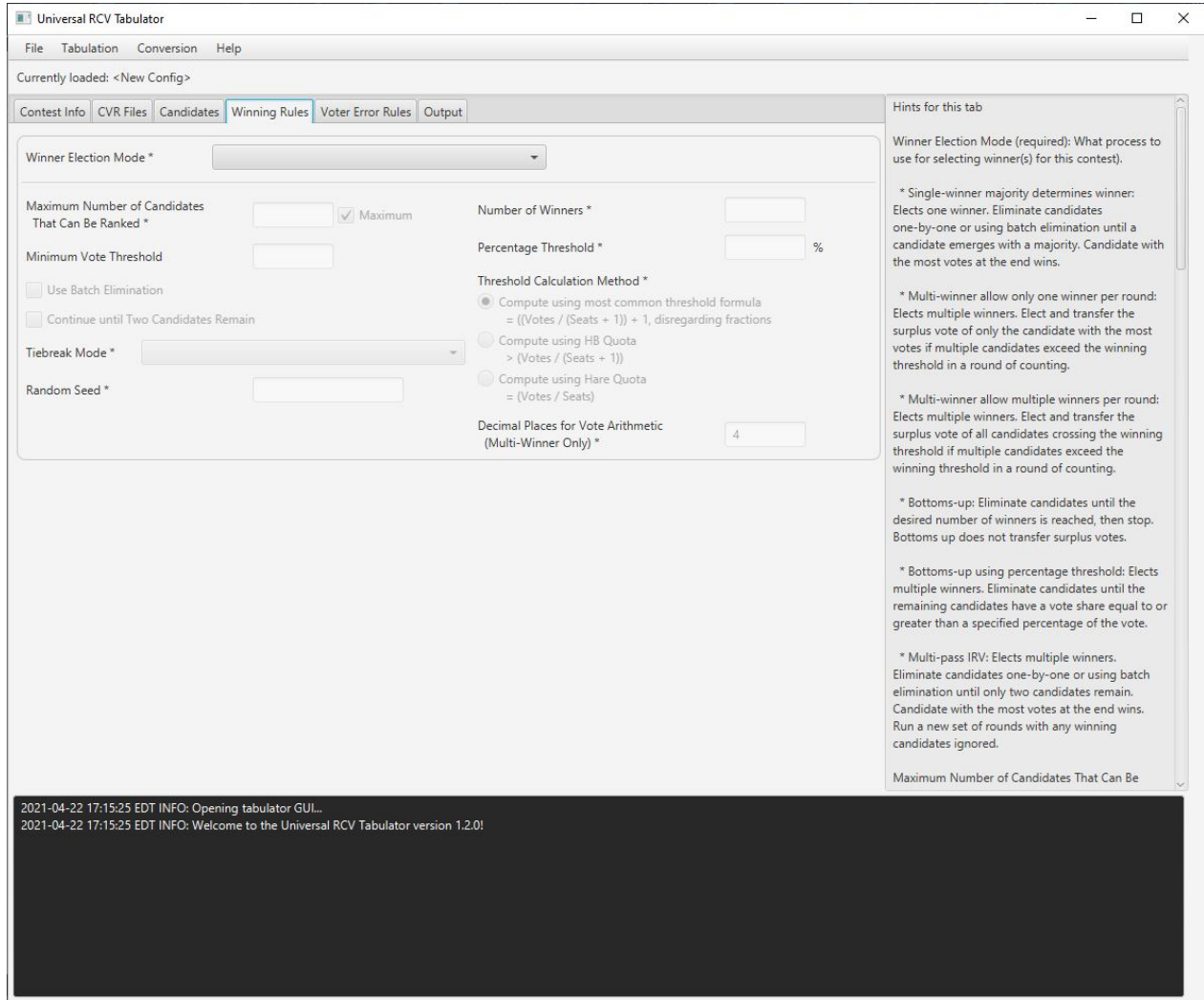
Fill in the fields and click the Add button:

Name (required): E.g.: Dave Harris. This information is used to display candidate names in results files. Fill in with correct names for candidates in this contest.

Winning Rules Options

Winning Rules options tell the URCVT what kind of ranked-choice voting election to run and how to handle details required for each kind of ranked-choice voting the URCVT can run.

This is a screenshot of what winning rules looks like when a user first navigates to it.



There are two main sets of options on the Winning Rules tab: Winner Election Mode options and Tiebreak Mode options.

Winner Election Mode (required): Users must select the “Single-winner majority determines winner” mode. Click on the drop-down menu and select “Single-winner majority determines winner.”

Maximum Number of Candidates That Can Be Ranked (required): All New York City voters will have five rankings at most. Users must unselect the checkbox and enter the correct number of rankings in the text box. This setting should be set to 5 unless a contest has only three or four rankings available to a voter. In that case, the setting should be set to the correct number of rankings.

Minimum Vote Threshold (optional): This setting may be left blank or set to 0 unless jurisdiction rules specify otherwise.

Use Batch Elimination: This setting must be selected. Click on the box to check the box.

Continue until Two Candidates Remain: This setting must be selected. Click on the box to check the box.

Number of Winners: The number of seats to be filled in the contest. The URCVT automatically sets this value to 1 when “Single-winner majority determines winner.”

Percentage Threshold, Threshold Calculation Method, and Decimal Places for Vote Arithmetic are locked and cannot be used with the “Single-winner majority determines winner” mode.

Tiebreaking

Tiebreak Mode: Users must select “Stop counting and ask.”

Random Seed is locked and cannot be used with “Stop counting and ask.”

Following are screenshots of possible correct winning rules tabs in the URCVT interface.

Single-winner majority determines winner - Five Rankings

The screenshot shows the 'Universal RCV Tabulator' application window. The 'Winning Rules' tab is active, displaying configuration options for a 'Single-winner majority determines winner' election mode. The interface includes a menu bar (File, Tabulation, Conversion, Help), a status bar ('Currently loaded: <New Config>'), and a tabbed interface with 'Contest Info', 'CVR Files', 'Candidates', 'Winning Rules', 'Voter Error Rules', and 'Output'. The 'Winning Rules' tab contains the following settings:

- Winner Election Mode ***: Single-winner majority determines winner
- Maximum Number of Candidates That Can Be Ranked ***: 5 (with a 'Maximum' checkbox)
- Number of Winners ***: 1
- Minimum Vote Threshold**: (empty field)
- Percentage Threshold ***: (empty field) %
- Use Batch Elimination
- Continue until Two Candidates Remain
- Tiebreak Mode ***: Stop counting and ask
- Random Seed ***: (empty field)
- Threshold Calculation Method ***:
 - Compute using most common threshold formula = $((\text{Votes} / (\text{Seats} + 1)) + 1, \text{disregarding fractions})$
 - Compute using HB Quota > $(\text{Votes} / (\text{Seats} + 1))$
 - Compute using Hare Quota = $(\text{Votes} / \text{Seats})$
- Decimal Places for Vote Arithmetic (Multi-Winner Only) ***: 4

On the right side, a 'Hints for this tab' panel provides detailed explanations for various election modes:

- Winner Election Mode (required):** What process to use for selecting winner(s) for this contest.
- * Single-winner majority determines winner:** Elects one winner. Eliminate candidates one-by-one or using batch elimination until a candidate emerges with a majority. Candidate with the most votes at the end wins.
- * Multi-winner allow only one winner per round:** Elects multiple winners. Elect and transfer the surplus vote of only the candidate with the most votes if multiple candidates exceed the winning threshold in a round of counting.
- * Multi-winner allow multiple winners per round:** Elects multiple winners. Elect and transfer the surplus vote of all candidates crossing the winning threshold if multiple candidates exceed the winning threshold in a round of counting.
- * Bottoms-up:** Eliminate candidates until the desired number of winners is reached, then stop. Bottoms up does not transfer surplus votes.
- * Bottoms-up using percentage threshold:** Elects multiple winners. Eliminate candidates until the remaining candidates have a vote share equal to or greater than a specified percentage of the vote.
- * Multi-pass IRV:** Elects multiple winners. Eliminate candidates one-by-one or using batch elimination until only two candidates remain. Candidate with the most votes at the end wins. Run a new set of rounds with any winning candidates ignored.

At the bottom of the window, a log shows the following messages:

```
2021-04-24 18:35:01 EDT INFO: Opening tabulator GUI...
2021-04-24 18:35:01 EDT INFO: Welcome to the Universal RCV Tabulator version 1.2.0!
```

Single-winner majority determines winner - Four Rankings

The screenshot shows the 'Universal RCV Tabulator' application window. The 'Winning Rules' tab is active, displaying the following configuration:

- Winner Election Mode ***: Single-winner majority determines winner
- Maximum Number of Candidates That Can Be Ranked ***: 4 (with a 'Maximum' checkbox)
- Number of Winners ***: 1
- Minimum Vote Threshold**: (empty input field)
- Percentage Threshold ***: (empty input field) %
- Use Batch Elimination
- Continue until Two Candidates Remain
- Tiebreak Mode ***: Stop counting and ask
- Random Seed ***: (empty input field)
- Threshold Calculation Method ***:
 - Compute using most common threshold formula = $((\text{Votes} / (\text{Seats} + 1)) + 1)$, disregarding fractions
 - Compute using HB Quota > $(\text{Votes} / (\text{Seats} + 1))$
 - Compute using Hare Quota = $(\text{Votes} / \text{Seats})$
- Decimal Places for Vote Arithmetic (Multi-Winner Only) ***: 4

On the right side, the 'Hints for this tab' panel provides detailed explanations for various election modes:

- Winner Election Mode (required):** What process to use for selecting winner(s) for this contest.
 - * Single-winner majority determines winner:** Elects one winner. Eliminate candidates one-by-one or using batch elimination until a candidate emerges with a majority. Candidate with the most votes at the end wins.
 - * Multi-winner allow only one winner per round:** Elects multiple winners. Elect and transfer the surplus vote of only the candidate with the most votes if multiple candidates exceed the winning threshold in a round of counting.
 - * Multi-winner allow multiple winners per round:** Elects multiple winners. Elect and transfer the surplus vote of all candidates crossing the winning threshold if multiple candidates exceed the winning threshold in a round of counting.
 - * Bottoms-up:** Eliminate candidates until the desired number of winners is reached, then stop. Bottoms up does not transfer surplus votes.
 - * Bottoms-up using percentage threshold:** Elects multiple winners. Eliminate candidates until the remaining candidates have a vote share equal to or greater than a specified percentage of the vote.
 - * Multi-pass IRV:** Elects multiple winners. Eliminate candidates one-by-one or using batch elimination until only two candidates remain. Candidate with the most votes at the end wins. Run a new set of rounds with any winning candidates ignored.

At the bottom of the window, a log shows the following messages:

```
2021-04-24 18:35:01 EDT INFO: Opening tabulator GUI...
2021-04-24 18:35:01 EDT INFO: Welcome to the Universal RCV Tabulator version 1.2.0!
```

Single-winner majority determines winner - Three Rankings

Universal RCV Tabulator
File Tabulation Conversion Help

Currently loaded: <New Config>

Contest Info | CVR Files | Candidates | Winning Rules | Voter Error Rules | Output

Winner Election Mode * Single-winner majority determines winner

<p>Maximum Number of Candidates That Can Be Ranked * <input style="width: 40px;" type="text" value="3"/> <input type="checkbox"/> Maximum</p> <p>Minimum Vote Threshold <input style="width: 40px;" type="text"/></p> <p><input checked="" type="checkbox"/> Use Batch Elimination</p> <p><input checked="" type="checkbox"/> Continue until Two Candidates Remain</p> <p>Tiebreak Mode * Stop counting and ask</p> <p>Random Seed * <input style="width: 80px;" type="text"/></p>	<p>Number of Winners * <input style="width: 40px;" type="text" value="1"/></p> <p>Percentage Threshold * <input style="width: 40px;" type="text"/> %</p> <p>Threshold Calculation Method *</p> <p><input checked="" type="radio"/> Compute using most common threshold formula = $((\text{Votes} / (\text{Seats} + 1)) + 1)$, disregarding fractions</p> <p><input type="radio"/> Compute using HB Quota > $(\text{Votes} / (\text{Seats} + 1))$</p> <p><input type="radio"/> Compute using Hare Quota = $(\text{Votes} / \text{Seats})$</p> <p>Decimal Places for Vote Arithmetic (Multi-Winner Only) * <input style="width: 40px;" type="text" value="4"/></p>
---	--

Hints for this tab

Winner Election Mode (required): What process to use for selecting winner(s) for this contest.

* Single-winner majority determines winner: Elects one winner. Eliminate candidates one-by-one or using batch elimination until a candidate emerges with a majority. Candidate with the most votes at the end wins.

* Multi-winner allow only one winner per round: Elects multiple winners. Elect and transfer the surplus vote of only the candidate with the most votes if multiple candidates exceed the winning threshold in a round of counting.

* Multi-winner allow multiple winners per round: Elects multiple winners. Elect and transfer the surplus vote of all candidates crossing the winning threshold if multiple candidates exceed the winning threshold in a round of counting.

* Bottoms-up: Eliminate candidates until the desired number of winners is reached, then stop. Bottoms up does not transfer surplus votes.

* Bottoms-up using percentage threshold: Elects multiple winners. Eliminate candidates until the remaining candidates have a vote share equal to or greater than a specified percentage of the vote.

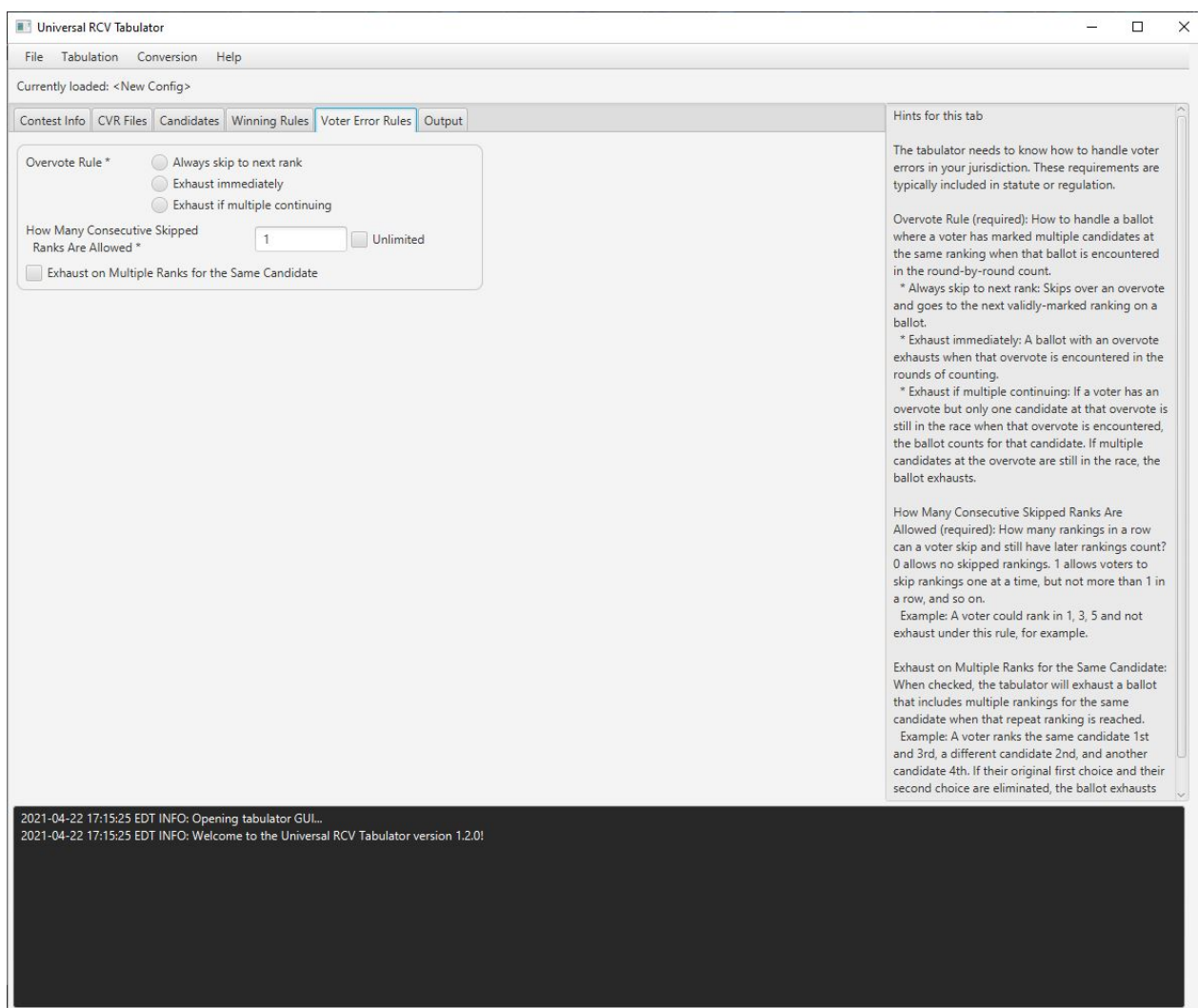
* Multi-pass IRV: Elects multiple winners. Eliminate candidates one-by-one or using batch elimination until only two candidates remain. Candidate with the most votes at the end wins. Run a new set of rounds with any winning candidates ignored.

2021-04-24 18:35:01 EDT INFO: Opening tabulator GUI...

2021-04-24 18:35:01 EDT INFO: Welcome to the Universal RCV Tabulator version 1.2.0!

Voter Error Rules

The tabulator needs to know how to handle voter errors in your jurisdiction. These requirements are typically included in statute or regulation. This is a screenshot of what winning rules looks like when a user first navigates to it.



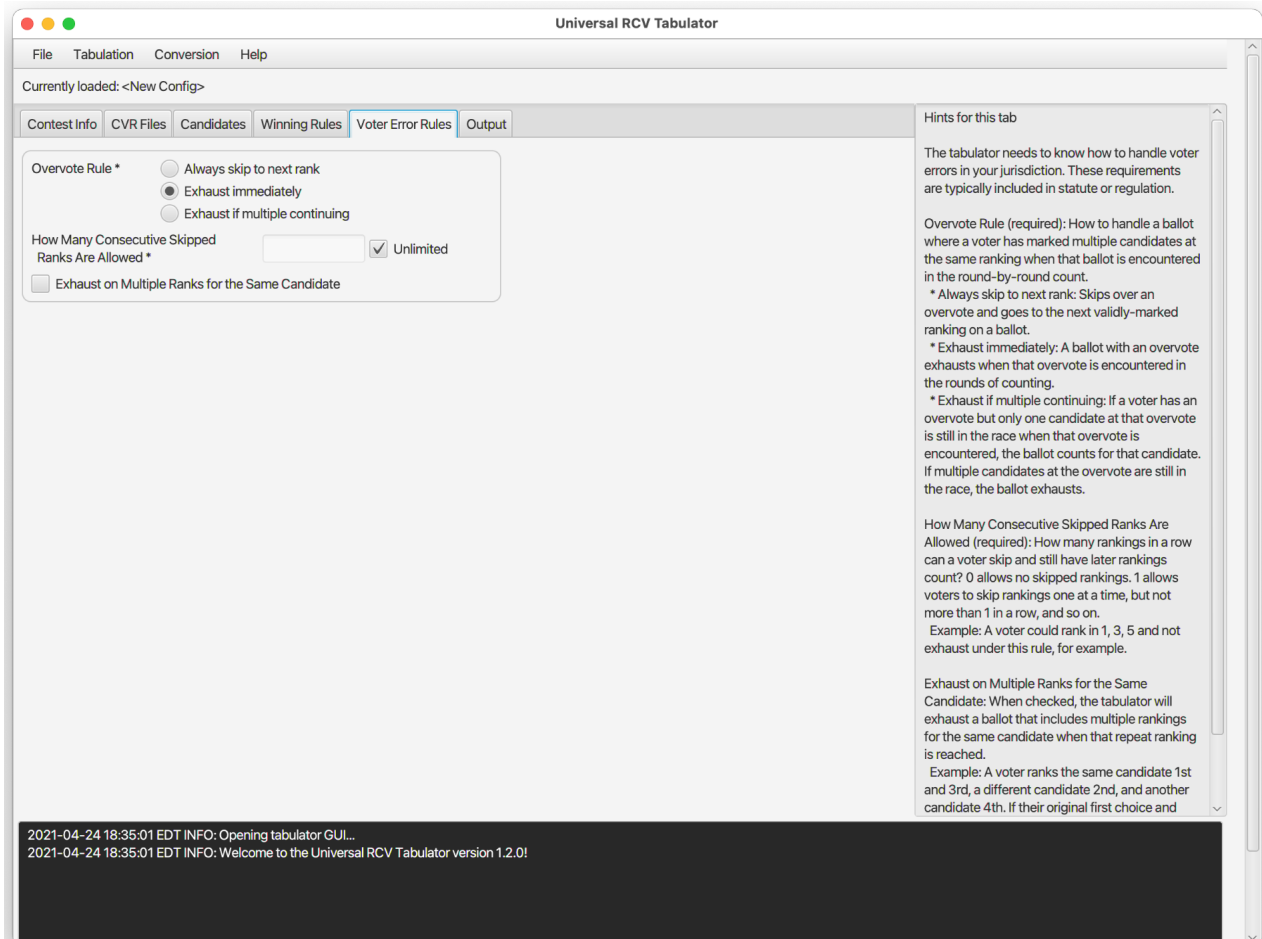
Overvote Rule (required): User must set to Exhaust Immediately. Click bubble next to Exhaust Immediately to set.

- Requires Overvote Label to be supplied for each CVR file

How Many Consecutive Skipped Ranks Are Allowed (required): User must set to Unlimited. Click the box to set to Unlimited.

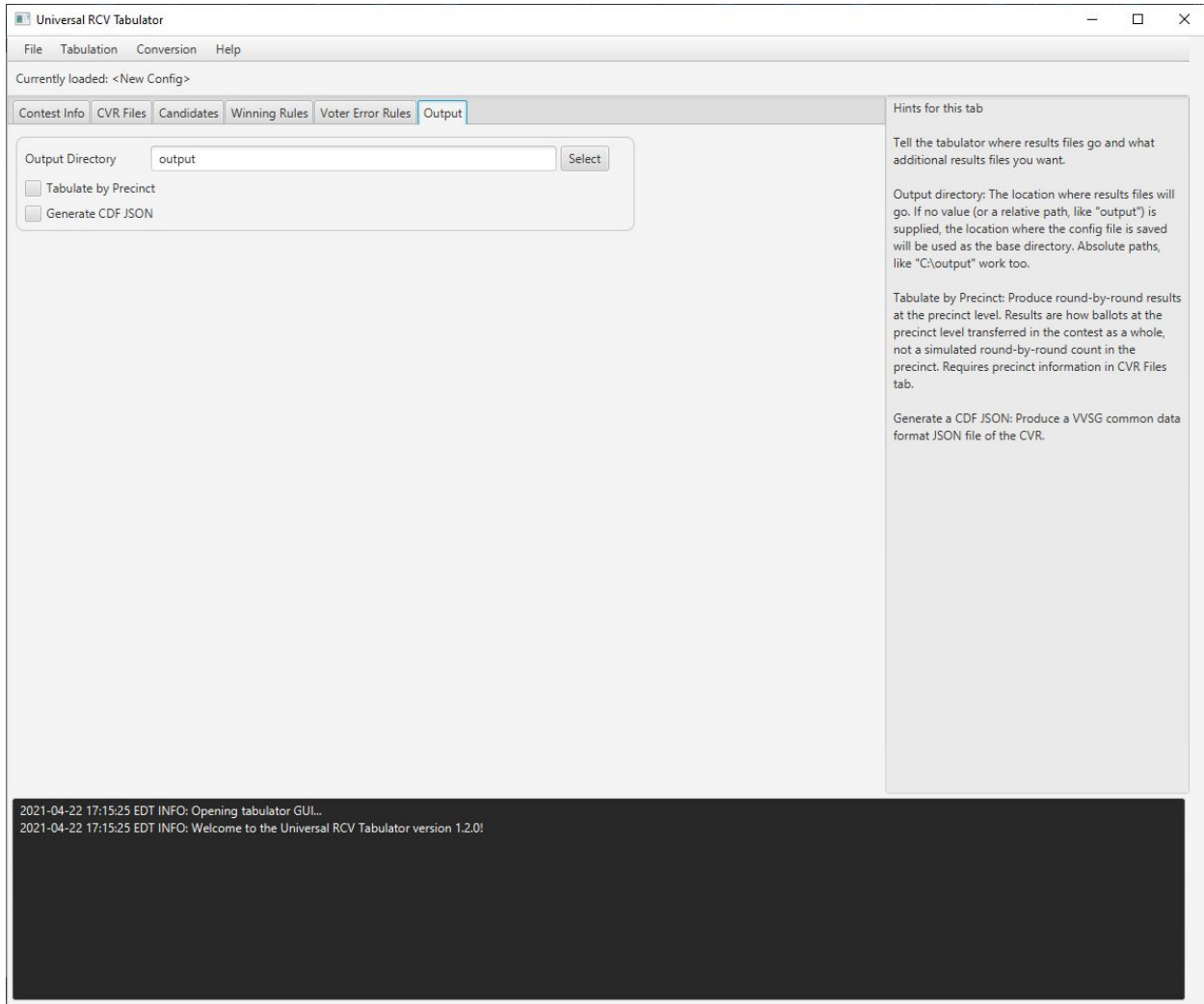
Exhaust on Multiple Ranks for the Same Candidate (optional): User must leave unchecked.

Below is a screenshot of a properly filled-out voter error rules tab. The user has selected Exhaust immediately for Overvote, has selected unlimited for How Many Consecutive Skipped Ranks Are Allowed (making the text box inoperable) and has left Exhaust on Multiple Ranks for the Same Candidate blank.



Output Tab

Tell the tabulator where results files go and what additional results files you want. This is a screenshot of what output looks like when a user first navigates to it.



Output directory: Vendor suggests that users write to a folder on the Desktop of the computer used for tabulation. One folder per contest tabulated should be created. Output directory instructs the URCVT where to save any output files from successful URCVT tabulations. The location where results files will go. If no value (or a relative path, like "output") is supplied, the location where the config file is saved will be used as the base directory. Absolute paths, like "C:\output" work too. Select allows users to navigate through Explorer to select a location.

Tabulate by Precinct: User must leave this blank.

Generate a CDF JSON: User must leave this blank.

Generating Results Files

Validating Configuration files

Once a configuration file is successfully created, the user must validate the configuration file.

1. Click on “Tabulation” at the top of the software window
2. Click on “Validate”
3. Refer to the log box at the bottom of the application. If the message “Contest config validation successful.” appears, your contest configuration has been successfully completed.
4. If any error messages appear in the log box, refer to 430-NY Universal RCV Tabulator Operator Log Messages and messages in the log box for how to resolve errors. If error persists, restart URCVT software

Saving Configuration Files

Once ready to run a tabulation, the user must first save the configuration file.

1. Click on “File” at the top of the software window
2. Click on “Save...”
3. Select a location to save the configuration file. Vendor suggests users save the configuration file to the same location set in the Output Directory setting.
4. Refer to the log box at the bottom of the application. If the message “Successfully saved file: Filepath” your configuration .json file has been successfully saved.
5. If any error messages appear in the log box, refer to 430-NY Universal RCV Tabulator Operator Log Messages documentation and messages in the log box for how to resolve errors. If error persists, restart URCVT software.

Running a Tabulation

Once a configuration is saved, the user is ready to run a tabulation.

1. Click on “Tabulation” at the top of the software window
2. Click on “Tabulate”
3. Tabulation will begin.
4. If all above steps were successfully completed, Tabulation will run until complete.
5. Tabulator log box will update with messages as Tabulation proceeds.
6. Once complete, Tabulator log box will display message stating “Results written to: [filepath from Output Directory]”

Output files will be:

- .csv contest summary files
 - Whole-contest summary files

- .json contest summary files
 - Whole-contest summary files
- .log audit files
 - .log audit files are exported in 50MB sections. If a .log file exceeds 50MB an additional .log file is started by the URCVT

More information about results files is available in URCVT v1.2.0 02-NY Software Design and Specifications v1.0.0.

Users can then navigate to “File” and click “Exit” if all contests are tabulated.

Securing results files

Users should produce and record hash codes for results files and configuration files from each successful use of the URCVT.

1. Open the Start Menu
2. Type in Command Prompt. Press enter to launch the Command Prompt
3. Type in `certutil -hashfile [filename]`
4. To insert the file name: locate the folder in Windows Explorer including the files you want to produce hash files for.
5. Click on the file you want to produce a hash for and while continuing to hold the mouse down, drag the file to the Command Prompt window and place after `-hashfile`.
 - a. Example: `certutil -hashfile C:\Users\user\Desktop\RCV-Results\2021-04-24_20-13-56_summary.csv`
6. Type in SHA512 at the end of the line
 - a. Example: `certutil -hashfile C:\Users\user\Desktop\RCV-Results\2021-04-24_20-13-56_summary.csv SHA512`
7. Press enter. A hash file will appear in the Command Prompt.
8. Record this hash file value

If more contests remain to be tabulated, and contests will contain fewer than 1,000,000 total votes, user can navigate to “File” and click “New.” This will clear all fields in the URCVT and permit the user to create a new configuration file.

If contests to be tabulated will contain more than 1,000,000 total votes, return to start of guide and re-launch tabulator according to large configuration launch requirements. Then follow the guide to set up a configuration file.

If any errors arise in the use of URCVT, refer to the URCVT v1.2.0 430-NY Universal RCV Tabulator Operator Log Messages v1.0.0 document. Errors arising out of any hardware or software other than the URCVT should refer to the URCVT v1.2.0 09-NY System Maintenance Procedures v1.0.0 and any relevant user and maintenance manuals.

Before publishing results, jurisdictions should use their established reconciliation procedures to ensure total votes counted in each round equals total ballots cast in the contest. If numbers in the reconciliation process do not match, user should double-check that all CVRs for that contest exported successfully from voting system and run URCVT process for that contest again. Rely on user jurisdiction CVR handling procedures for transmitting CVRs.

Any interaction with the URCVT, including producing configuration files, running tabulations, hashing results files, and transmission of files from URCVT on USB drives should follow transmission procedures required in jurisdiction, including the use of a bipartisan team.

Required capabilities that may be bypassed or deactivated during installation or operation by the user shall be clearly indicated.

Additional capabilities that function only when activated during installation or operation by the user shall be clearly indicated.

Additional capabilities that normally are active but may be bypassed or deactivated during installation or operation by the user shall be clearly indicated.

Installation process for URCVT software does not give users the opportunity to bypass or deactivate options or settings.

Capabilities that are active or inactive in software operation depend on various factors. Many of these factors are laid out above. Configuration files determine which system capabilities apply to a given set of voting data. More information about operations that users can set through the user interface is provided in ***URCVT v.1.2.0 300-NY Configuration File Parameters v.1.0.0***. Information about operation of those settings is also provided in ***URCVT v.1.2.0 02-NY Software Design and Specifications v.1.0.0***.

Configuration File Parameters and UI Label Match Sheet

Below is a list of all configuration file parameter labels and their corresponding labels in the URCVT UI. Labels are organized by the order of their appearance in the URCVT UI.

Configuration File Parameters Name/Label	UI Name/Label
contestName	Contest Name
contestDate	Contest Date
contestJurisdiction	Contest Jurisdiction
contestOffice	Contest Office
rulesDescription	Rules Description
provider	Provider
cdf	CDF
clearBallot	Clear Ballot
Dominion	Dominion
ess	ES&S
hart	Hart
filePath	Path
contestId	Contest ID
firstVoteColumnIndex	First Vote Column
firstVoteRowIndex	First Vote Row
idColumnIndex	ID Column
precinctColumnIndex	Precinct Column
overvoteDelimiter	Overvote Delimiter
overvoteLabel	Overvote Label
undervoteLabel	Undervote Label
undeclaredWriteInLabel	Undeclared Write-in Label
treatBlankAsUndeclaredWriteIn	Treat Blank as Undeclared Write-In
name	Name
code	Code
excluded	Excluded
winnerElectionMode	Winner Election Mode
singleWinnerMajority	Single-Winner Majority Determines Winner
multiWinnerAllowOnlyOneWinnerPerRound	Multi-Winner Allow Only One Winner Per Round
multiWinnerAllowMultipleWinnersPerRound	Multi-Winner Allow Multiple Winners Per Round
bottomsUp	Bottoms-up
bottomsUpUsingPercentageThreshold	Bottoms-up using Percentage Threshold
multiPassIrv	Multi-Pass IRV
maxRankingsAllowed	Maximum Number of Candidates That Can Be Ranked
minimumVoteThreshold	Minimum Vote Threshold
batchElimination	Use Batch Elimination
continueUntilTwoCandidatesRemain	Continue Until Two Candidates Remain
tiebreakMode	Tiebreak Mode
random	Random
stopCountingAndAsk	Stop counting and ask

previousRoundCountsThenRandom		Previous Round Counts (then random)
previousRoundCountsThenAsk		Previous Round Counts (then stop counting and ask)
useCandidateOrder		Use candidate order in config file
generatePermutation		Generate permutation
randomSeed		Random Seed
numberOfWinners		Number of Winners
multiSeatBottomsUpPercentageThreshold		Percentage Threshold
nonIntegerWinningThreshold		Compute using HB Quota $>(\text{Votes}/(\text{Seats} + 1))$
hareQuota		Compute using Hare Quota $=(\text{Votes}/\text{Seats})$ - see note on
Hare Quota		
decimalPlacesForVoteArithmetic		Decimal Places for Vote Arithmetic (Multi-
Winner Only)		
overvoteRule		Overvote Rule
alwaysSkipToNextRank		Always skip to next rank
ExhaustImmediately		Exhaust Immediately
exhaustIfMultipleContinuing		Exhaust if multiple continuing
maxSkippedRanksAllowed		How Many Consecutive Skipped Ranks Are
Allowed		
exhaustOnDuplicateCandidate		Exhaust on Multiple Ranks for the Same
Candidate		
outputDirectory		Output Directory
tabulateByPrecinct		Tabulate by Precinct
generateCdfJson		Generate CDF JSON

Document Revision History

Date	Version	Description	Author
04/27/2021	1.0.0	System Operations Procedures	Chris Hughes