# Software Test Plan

## 1.0 Test Plan Identifier

Turing Machine (TM) in C# 1.0.

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## 2.0 Fault Models

Our fault model includes the following items believed to be high risk in the operation of the Turing Machine in C# 1.0

    2.11       When executing the TM the TM definition file is read into the application it must be received by the parsing algorithm in a specific order of keywords to be a valid TM.  See 4.2.0.4d of the Requirements documentation for the order of the keywords.

    2.12       The Parsing Algorithm checks for validity of each data set related to keywords.  Need to check that the algorithm only accepts valid input for each category, as referenced in the Requirements Document section 4.2.0.

    2.13       Sections of TM that requires users input.  Below outlines all scenarios in which a user interfaces the application, commands that require additional input to function will be labeled sub-commands:

- Help (h)
- Show (w)
- View (v)
- List (l)
- Insert (i)
    - Sub-command (string)
- Delete (d)
    - Sub-command (integer)
- Set (e)
    - Sub-command (integer)
- Truncate (t)
    - Sub-command (integer)
- Run (r)
    - Sub-command (integer)
- Quit (q)
- Exit (x)

## 3.0 Features to be Tested

    3.11       The method of reading a text upon program execution.

    3.12       Ensure that each section of the text file is being handled properly by the parsing algorithm.

    3.13       Test user controlled actions, all menu commands and their subcommands.

# 4.0 Approach

For the parser testing we will be using Fault Model Testing (2.11 & 2.12). For the menu commands (2.13) we will use a black-box / manual testing methodology.

For test 2.11, reading and importing data from the TM definition text file, we will use a test driver that will check the validity of all keywords discovered defined by the Requirements Document section 4.2.0.4d. "(Number of tests i.e. different definition file)" will be used to ensure that errors are discovered at each keyword if an error in formatting is discovered.

For test 2.12, parsing and data handling we will use a test driver that will check that data is being handled correctly by the associated class objects.

For test 2.13 input commands, we will test using a black-box approach testing all menu functions.

# 5.0 Test Cases

## 5.1 TM Definition File Validity

| Unique Test Identifier | 5.1.1 |
|---|---|
| Test Description | This test accomplishes verifying the TM definition file is able to be opened and read by the Application and adheres to the rules of order defined by section 4.2.0.4d of the Requirements Document. |
| Component | Function Name (Enter section of Code this algorithm exists) |
| Input Condition | Input = valid text document formatted to Requirements specification |
| Input State | Values for STATES, INPUT_ALPHABET, TRANSITION_FUNCTION, INITIAL_STATE, BLANK_CHARECTER, and FINAL_STATES contain no data. |
| Expected Result | TM application will open txt file and read keywords in the correct order required for a valid TM application. |

| Unique Test Identifier | 5.1.2 |
|---|---|
| Test Description | This test accomplishes verifying the TM definition file is able to be opened and read by the Application and adheres to the rules of order defined by section 4.2.0.4d of the Requirements Document. |
| Component | Function Name (Enter section of Code this algorithm exists) |
| Input Condition | Input = invalid text document with error in the STATES keyword |
| Input State | Values for STATES, INPUT_ALPHABET, TRANSITION_FUNCTION, INITIAL_STATE, BLANK_CHARECTER, and FINAL_STATES contain no data. |
| Expected Result | TM application will open txt file and read keywords discovering error condition in the STATES keyword resulting in invalid message. |

| Unique Test Identifier | 5.1.3 |
|---|---|
| Test Description | This test accomplishes verifying the TM definition file is able to be opened and read by the Application and adheres to the rules of order defined by section 4.2.0.4d of the Requirements Document. |

| Component | Function Name (Enter section of Code this algorithm exists) |
|---|---|
| Input Condition | Input = invalid text document with error in the INPUT_ALPHABET keyword |
| Input State | Values for STATES, INPUT_ALPHABET, TRANSITION_FUNCTION, INITIAL_STATE, BLANK_CHARECTER, and FINAL_STATES contain no data. |
| Expected Result | TM application will open txt file and read keywords discovering error condition in the INPUT_ALPHABET keyword resulting in invalid message. |

| Unique Test Identifier | 5.1.4 |
|---|---|
| Test Description | This test accomplishes verifying the TM definition file is able to be opened and read by the Application and adheres to the rules of order defined by section 4.2.0.4d of the Requirements Document. |
| Component | Function Name (Enter section of Code this algorithm exists) |
| Input Condition | Input = invalid text document with error in the TRANSITION_FUNCTION keyword |
| Input State | Values for STATES, INPUT_ALPHABET, TRANSITION_FUNCTION, INITIAL_STATE, BLANK_CHARECTER, and FINAL_STATES contain no data. |
| Expected Result | TM application will open txt file and read keywords discovering error condition in the TRANSITION_FUNCTION keyword resulting in invalid message. |

| Unique Test Identifier | 5.1.5 |
|---|---|
| Test Description | This test accomplishes verifying the TM definition file is able to be opened and read by the Application and adheres to the rules of order defined by section 4.2.0.4d of the Requirements Document. |
| Component | Function Name (Enter section of Code this algorithm exists) |
| Input Condition | Input = invalid text document with error in the INITIAL_STATE keyword |
| Input State | Values for STATES, INPUT_ALPHABET, TRANSITION_FUNCTION, INITIAL_STATE, BLANK_CHARECTER, and FINAL_STATES contain no data. |
| Expected Result | TM application will open txt file and read keywords discovering error condition in the INITIAL_STATE keyword resulting in invalid message. |

| Unique Test Identifier | 5.1.6 |
|---|---|
| Test Description | This test accomplishes verifying the TM definition file is able to be opened and read by the Application and adheres to the rules of order defined by section 4.2.0.4d of the Requirements Document. |
| Component | Function Name (Enter section of Code this algorithm exists) |
| Input Condition | Input = invalid text document with error in the BLANK_CHARECTER keyword |
| Input State | Values for STATES, INPUT_ALPHABET, TRANSITION_FUNCTION, INITIAL_STATE, BLANK_CHARECTER, and FINAL_STATES contain no data. |
| Expected Result | TM application will open txt file and read keywords discovering error condition in the BLANK_CHARECTER keyword resulting in invalid message. |

| Unique Test | 5.1.7 |
|---|---|

| Identifier | |
|---|---|
| Test Description | This test accomplishes verifying the TM definition file is able to be opened and read by the Application and adheres to the rules of order defined by section 4.2.0.4d of the Requirements Document. |
| Component | Function Name (Enter section of Code this algorithm exists) |
| Input Condition | Input = invalid text document with error in the FINAL_STATES keyword |
| Input State | Values for STATES, INPUT_ALPHABET, TRANSITION_FUNCTION, INITIAL_STATE, BLANK_CHARECTER, and FINAL_STATES contain no data. |
| Expected Result | TM application will open txt file and read keywords discovering error condition in the FINAL_STATES keyword resulting in invalid message. |

## 5.2 TM Parsing Algorithm

| Unique Test Identifier | 5.2.1 |
|---|---|
| Test Description | This test accomplishes verifying the TM definition file is able to be opened and read by the Application and adheres to the rules of order defined by section 4.2.0.4d of the Requirements Document. This test will further address the assignment of data related to section to the appropriate class object. |
| Component | Function Name (Enter section of Code this algorithm exists) |
| Input Condition | Input = valid text document formatted to Requirements specification including valid data for each keyword. |
| Input State | Values for STATES, INPUT_ALPHABET, TRANSITION_FUNCTION, INITIAL_STATE, BLANK_CHARECTER, and FINAL_STATES contain no data. |
| Expected Result | TM application will open txt file and read keywords in the correct order and assign data to appropriate class object, return of valid will be derived from each class object receiving data. |

| Unique Test Identifier | 5.2.2 |
|---|---|
| Test Description | This test accomplishes verifying the TM definition file is able to be opened and read by the Application and adheres to the rules of order defined by section 4.2.0.4d of the Requirements Document. This test will further address the assignment of data related to section to the appropriate class object. |
| Component | Function Name (Enter section of Code this algorithm exists) |
| Input Condition | Input = valid text document formatted to Requirements specification containing invalid entries of the keyword data. |
| Input State | Values for STATES, INPUT_ALPHABET, TRANSITION_FUNCTION, INITIAL_STATE, BLANK_CHARECTER, and FINAL_STATES contain no data. |
| Expected Result | TM application will open txt file and read keywords in the correct order and return an appropriate error for each class object receiving invalid data. |

## 5.3 User Input

| Unique Test | 5.3.1 |
|---|---|

| Identifier | |
|---|---|
| **Test Description** | This test will be used to test the validity of TM Help command after entering 'h' or 'H' at the command line. |
| **Component** | Function Name (Enter section of Code this algorithm exists) |
| **Input Condition** | Input = TM has loaded a valid input file and is ready to accept user commands. |
| **Input State** | Values for Set, Truncate, and help are set to the default as referenced in section 5.1.2, Configuration Settings, of the Requirements Document. |
| **Expected Result** | The first time 'h' is entered the TM command menu will be displayed and the Boolean value for help will be true for help messages enabled. Upon entering 'H' a second time the Boolean value will be false for help messages. See section 5.2.1 of system requirements for a representation. |

| **Unique Test Identifier** | 5.3.2 |
|---|---|
| **Test Description** | This test will be used to test the validity of TM Show command after entering 'w' or 'W' at the command line. |
| **Component** | Function Name (Enter section of Code this algorithm exists) |
| **Input Condition** | Input = TM has loaded a valid input file and is ready to accept user commands. |
| **Input State** | Values for Set, Truncate, and help are set to the default as referenced in section 5.1.2, Configuration Settings, of the Requirements Document. |
| **Expected Result** | First test will be lower case 'w' is pressed the TM will display the current status. Pressing 'W' will result by displaying the TM current status. See section 5.2.2 of system requirements for a representation. |

| **Unique Test Identifier** | 5.3.3 |
|---|---|
| **Test Description** | This test will be used to test the validity of TM List command after entering 'l' or 'L' at the command line. |
| **Component** | Function Name (Enter section of Code this algorithm exists) |
| **Input Condition** | Input = TM has loaded a valid input file and is ready to accept user commands. |
| **Input State** | Values for Set, Truncate, and help are set to the default as referenced in section 5.1.2, Configuration Settings, of the Requirements Document. |
| **Expected Result** | First test will be lower case 'l' is pressed the TM will display the list of input strings. Pressing 'l' will result by displaying the TM input strings. See section 5.2.4 of system requirements for a representation. |

| **Unique Test Identifier** | 5.3.4 |
|---|---|
| **Test Description** | This test will be used to test the validity of TM Insert command after entering 'i' or 'I' at the command line. |
| **Component** | Function Name (Enter section of Code this algorithm exists) |
| **Input Condition** | Input = TM has loaded a valid input file and is ready to accept user commands. |
| **Input State** | Values for Set, Truncate, and help are set to the default as referenced in section 5.1.2, Configuration Settings, of the Requirements Document. |
| **Expected Result** | First test will be lower case 'i' is pressed the TM will prompt user to enter an |

input string.  Pressing 'I' will result by displaying a prompt to enter input string. See section 5.2.5 of system requirements for a representation.

| Unique Test Identifier | 5.3.4b |
|---|---|
| Test Description | This test will be used to test the validity of TM Insert command by prompting user to enter an input string. |
| Component | Function Name (Enter section of Code this algorithm exists) |
| Input Condition | Input = TM has loaded a valid input file and is ready to accept user commands. |
| Input State | Values for Set, Truncate, and help are set to the default as referenced in section 5.1.2, Configuration Settings, of the Requirements Document.  User has already pressed 'I' to execute the insert command. |
| Expected Result | User entering a valid string that is not currently in input string list will result in no prompt to the use and return to the main command input screen. See section 5.2.5 of system requirements for a representation. |

| Unique Test Identifier | 5.3.5 |
|---|---|
| Test Description | This test will be used to test the validity of TM Delete command after entering 'd' or 'D' at the command line. |
| Component | Function Name (Enter section of Code this algorithm exists) |
| Input Condition | Input = TM has loaded a valid input file and is ready to accept user commands. |
| Input State | Values for Set, Truncate, and help are set to the default as referenced in section 5.1.2, Configuration Settings, of the Requirements Document. |
| Expected Result | First test will be lower case 'd' is pressed the TM will prompt user to enter the number for the string to delete.  Pressing 'D' will result prompting user to enter the number for the string to delete. See section 5.2.6 of system requirements for a representation. |

| Unique Test Identifier | 5.3.5b |
|---|---|
| Test Description | This test will be used to test the validity of TM Delete command after entering 'd' or 'D' at the command line. |
| Component | Function Name (Enter section of Code this algorithm exists) |
| Input Condition | Input = TM has loaded a valid input file and is ready to accept user commands. |
| Input State | Values for Set, Truncate, and help are set to the default as referenced in section 5.1.2, Configuration Settings, of the Requirements Document.  User has already pressed 'd' to execute the delete command. |
| Expected Result | User entering a number corresponding with a valid string that is currently in input string list will result in the removal of the string from the list and no prompt to the use and return to the main command input screen. See section 5.2.6 of system requirements for a representation. |

| Unique Test Identifier | 5.3.6 |
|---|---|
| Test Description | This test will be used to test the validity of TM Set command after entering 'e' |

|   |   |
|---|---|
| | or 'E' at the command line. |
| **Component** | Function Name (Enter section of Code this algorithm exists) |
| **Input Condition** | Input = TM has loaded a valid input file and is ready to accept user commands. |
| **Input State** | Values for Set, Truncate, and help are set to the default as referenced in section 5.1.2, Configuration Settings, of the Requirements Document.  User has already pressed 'e' to execute the Set command. |
| **Expected Result** | Used to set the maximum number of transitions to complete.  User will be prompted for an integer of transitions. See section 5.2.7 of system requirements for a representation. |

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|---|---|
| **Unique Test Identifier** | 5.3.6b |
| **Test Description** | This test will be used to test the validity of TM Set command after 'e' has been invoked at the command line.  User enters new value. |
| **Component** | Function Name (Enter section of Code this algorithm exists) |
| **Input Condition** | Input = TM has loaded a valid input file and is ready to accept user commands. |
| **Input State** | Values for Set, Truncate, and help are set to the default as referenced in section 5.1.2, Configuration Settings, of the Requirements Document.  User has already pressed 'e' to execute the Set command. |
| **Expected Result** | Used to set the maximum number of transitions to complete.  User will be prompted for an integer of transitions. Successful modification the variable Transitions. See section 5.2.7 of system requirements for a representation. |

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| | |
|---|---|
| **Unique Test Identifier** | 5.3.7 |
| **Test Description** | This test will be used to test the validity of TM Truncate command after entering 't' or 'T' on the command line. |
| **Component** | Function Name (Enter section of Code this algorithm exists) |
| **Input Condition** | Input = TM has loaded a valid input file and is ready to accept user commands. |
| **Input State** | Values for Set, Truncate, and help are set to the default as referenced in section 5.1.2, Configuration Settings, of the Requirements Document. |
| **Expected Result** | Used to set the maximum number of cells to display out.  User will be prompted for an integer of cells to show. Successful modification of the variable number_of_cells. See section 5.2.8 of system requirements for a representation. |

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| | |
|---|---|
| **Unique Test Identifier** | 5.3.7b |
| **Test Description** | This test will be used to test the validity of TM Truncate command after 't' has been invoked at the command line.  User enters new value. |
| **Component** | Function Name (Enter section of Code this algorithm exists) |
| **Input Condition** | Input = TM has loaded a valid input file and is ready to accept user commands. |
| **Input State** | Values for Set, Truncate, and help are set to the default as referenced in section 5.1.2, Configuration Settings, of the Requirements Document.  . User has already pressed 't' to execute the Truncate command. |
| **Expected Result** | Used to set the maximum number of cells to display out.  User will be |

| | prompted for an integer of cells to show. Successful modification of the variable number_of_cells. See section 5.2.8 of system requirements for a representation. |
|---|---|

# 6.0 Test Results

Below is a summary of results with references to any unresolved problem reports.  See document entitled Defect Report attached this this Test Plan.

### 6.1 TM Definition File Validity Test Results

| Unique Test Identifier | 5.1.1 |
|---|---|
| Result | |

| Unique Test Identifier | 5.1.2 |
|---|---|
| Result | |

| Unique Test Identifier | 5.1.3 |
|---|---|
| Result | |

| Unique Test Identifier | 5.1.4 |
|---|---|
| Result | |

| Unique Test Identifier | 5.1.5 |
|---|---|
| Result | |

| Unique Test Identifier | 5.1.6 |
|---|---|
| Result | |

| Unique Test Identifier | 5.1.7 |
|---|---|
| Result | |

### 6.2 TM Parsing Algorithm Validity Test Results

| Unique Test Identifier | 5.2.1 |
|---|---|
| Result | |

| Unique Test | 5.2.2 |
|---|---|

| Identifier | |
|---|---|
| Result | |

## 6.3 TM User Input Validity Test Results

| Unique Test Identifier | 5.3.1 |
|---|---|
| Result | The first time 'h' is entered the TM command menu was displayed and the Boolean value for help was set to true for help messages enabled.  Upon entering 'H' a second time the Boolean value was false for help messages. |

| Unique Test Identifier | 5.3.2 |
|---|---|
| Result | First test will be lower case 'w' is pressed the TM displayed the current status.  Pressing 'W' resulted in displaying the TM current status. |

| Unique Test Identifier | 5.3.3 |
|---|---|
| Result | First test will be lower case 'l' is pressed the TM displayed the list of input strings.  Pressing 'I' resulted in displaying the TM input strings. |

| Unique Test Identifier | 5.3.4 |
|---|---|
| Result | First test will be lower case 'i' is pressed the TM prompted user to enter an input string.  Pressing 'I' resulted in displaying a prompt to enter input string. |

| Unique Test Identifier | 5.3.4b |
|---|---|
| Result | Entering a valid string not currently in input string list resulted in no prompt to the use and returned to the main command input screen. |

| Unique Test Identifier | 5.3.5 |
|---|---|
| Result | First test will be lower case 'd' is pressed the TM prompted user to enter the number for the string to delete.  Pressing 'D' resulted in prompting user to enter the number for the string to delete. |

| Unique Test Identifier | 5.3.5b |
|---|---|
| Result | Entering a number corresponding with a valid string that is currently in input string list resulted in the removal of the string from the list and no prompt to the use and returned to the main command input screen. |

| Unique Test Identifier | 5.3.6 |
|---|---|
| Result | Used to set the maximum number of transitions to complete. User was prompted for an integer of transitions. |

| Unique Test Identifier | 5.3.6b |
|---|---|
| Result | Used to set the maximum number of transitions to complete.  User was prompted for an integer of transitions. Successful modification of the variable Transitions. |

| Unique Test Identifier | 5.3.7 |
|---|---|
| Result | Used to set the maximum number of cells to display out.  User was prompted for an integer of cells to show. |

| Unique Test Identifier | 5.3.7b |
|---|---|
| Result | Used to set the maximum number of cells to display out.  User was prompted for an integer of cells to show. Successful modification of the variable number_of_cells after entered. |