**SimFL User Manual**

# I. Overview

This short manual is an explanation and description to help users apply SimFL to debug their Simulink models.

# II. Instructions

1. Once you opened our application SimFL, the following page (Fig-1) will be the first page you will meet. This is a global setting page to collect some basic but important information which might be used quite often in the following several steps. Users only need to fill up these global information once, and these information will not be asked again later on.

    - MATLAB Location: the path to the place where matlab executable file is located;
    - Work Directory: the folder where the user save the Simulink model and related files;
    - Model Location: the path point to the exactly Simulink model which user would like to debug;
    - Workspace File: The information about the workspace file has to be preload for the execution of the Simulink model;

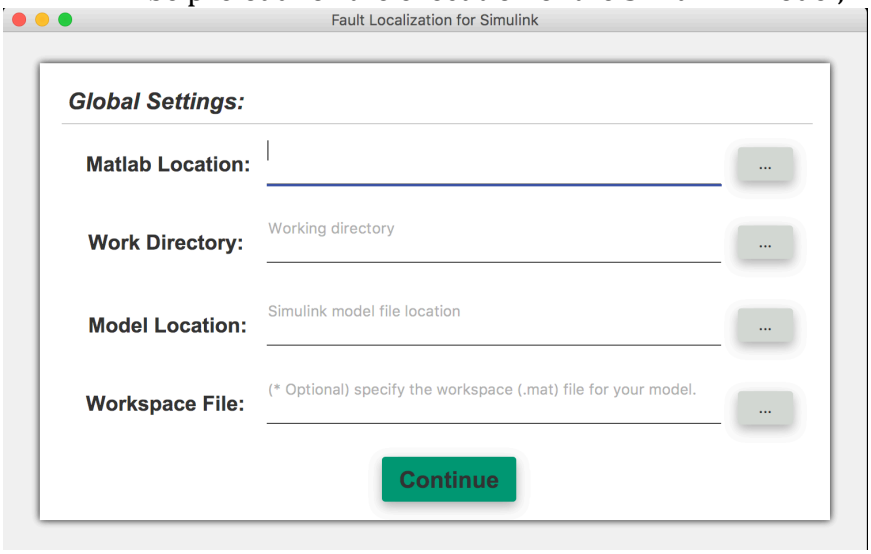


**Fig-1. The global setting page**

Place note that, in our implementation, if users have already save the related files into the work directory. Our application will parse the work directory and automated fill up the blank of Model Location and Workspace File. However, it might not be accurate and user could adjust these information as they wish by click the "…" button at the end of each line.

Once all of these information are ready, click "Continue" to move on.

2. After filling up the global setting information and clicking the "Continue" button, user will come to the main window (Fig -2).

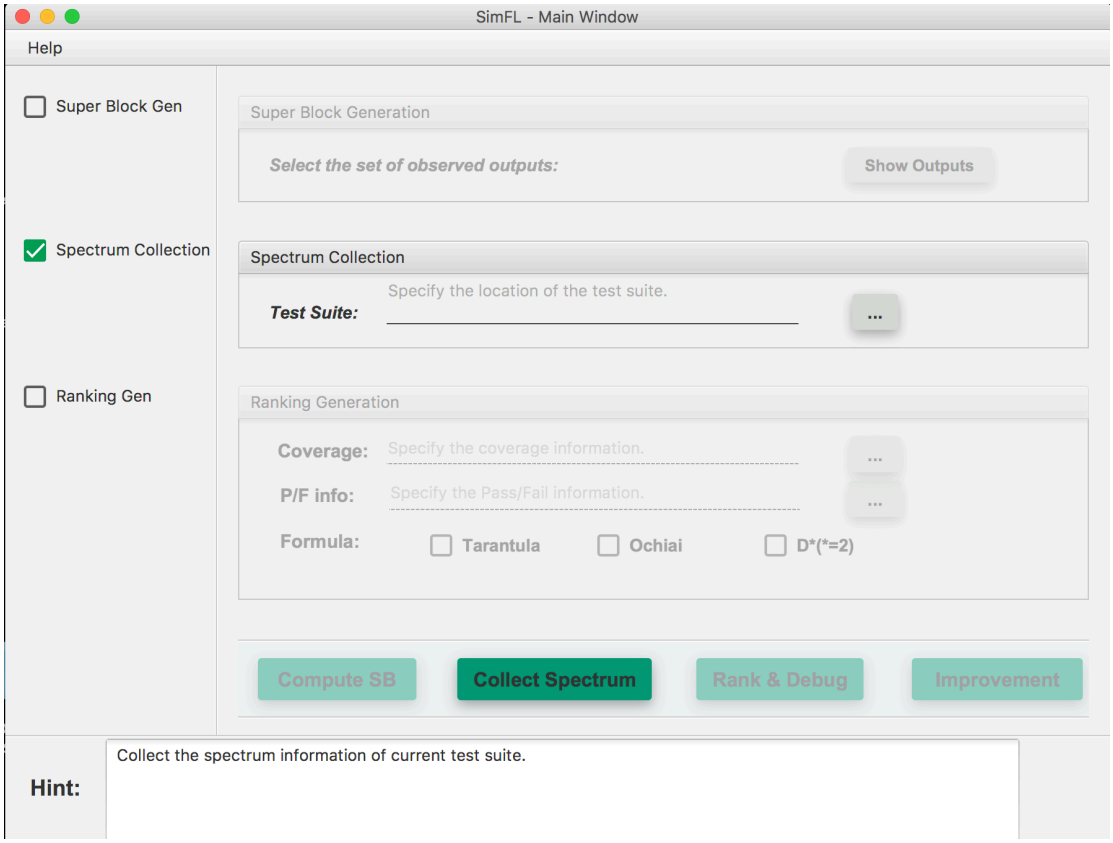


**Fig-2.**

The three checkboxes close to the left border are the three main functions offered in SimFL. If any of the checkbox is selected, the related part will become active, and the rest will become disabled.

The “Spectrum Collection” tab is used to collecting the execution information of the underlying test suite. This execution information is very important for SimFL to compute the execution slices and the suspicious scores. If you already have the test suite execution information, you can skip this step and proceed to next step.

If you want to collect the test suite execution information, you only need to specify the location of the underlying test suite file (.txt) and click the button “Collect Spectrum”.

The output of this action is a .csv file, called CovInfo.csv.

3. Once the test execution information is ready, we can conduct the fault localization function in SimFL.

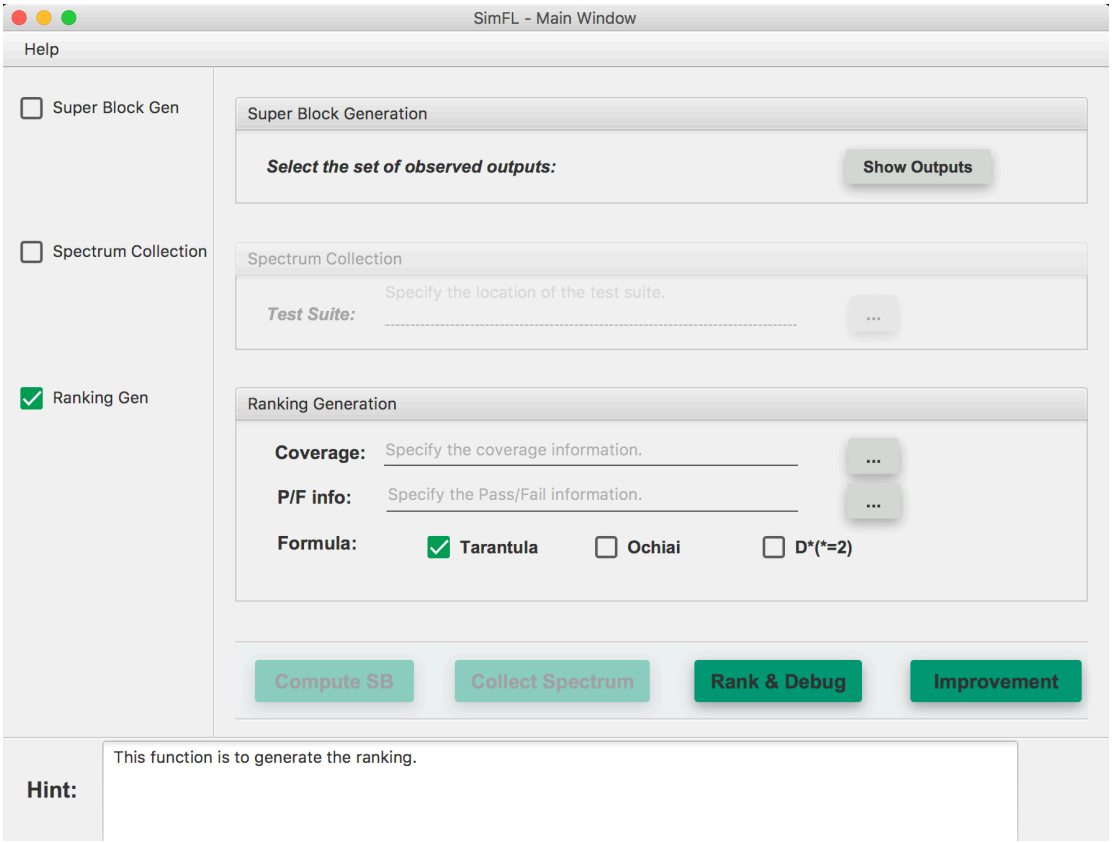


**Fig-3.**

To generate the statistical rankings, we need user specify both the generated test execution information file (.csv) and also the pass/fail information file of the underlying test suite (.txt).

In SimFL, we offered three statistical debugging formulae for user to choose. All of them are studied in fault localization research for program code. You can only select one of the formulae to compute the rankings.

Once all the above places are set, just click the “Rank and Debug” button to proceed.

4. Based on the user’s setting, a statistical ranking will be computed and displayed. The Debug window is designed as shown in Fig-4.

The window has two parts, the left part is the ranking list content, and the right part is the information display area. All the items under RankGroupN are atomic Simulink blocks. When any of the items is selected from the left window, the right information area will be updated accordingly. In the information area, we show the Block Name, Block Type, and pass/fail Info of the selected item. What’s more, we also linked the ranking list with the real Simulink model by the button “Highlight in the model”.

For a selected block, if user click the button, SimFL will call Simulink to open the model and highlight the selected block.

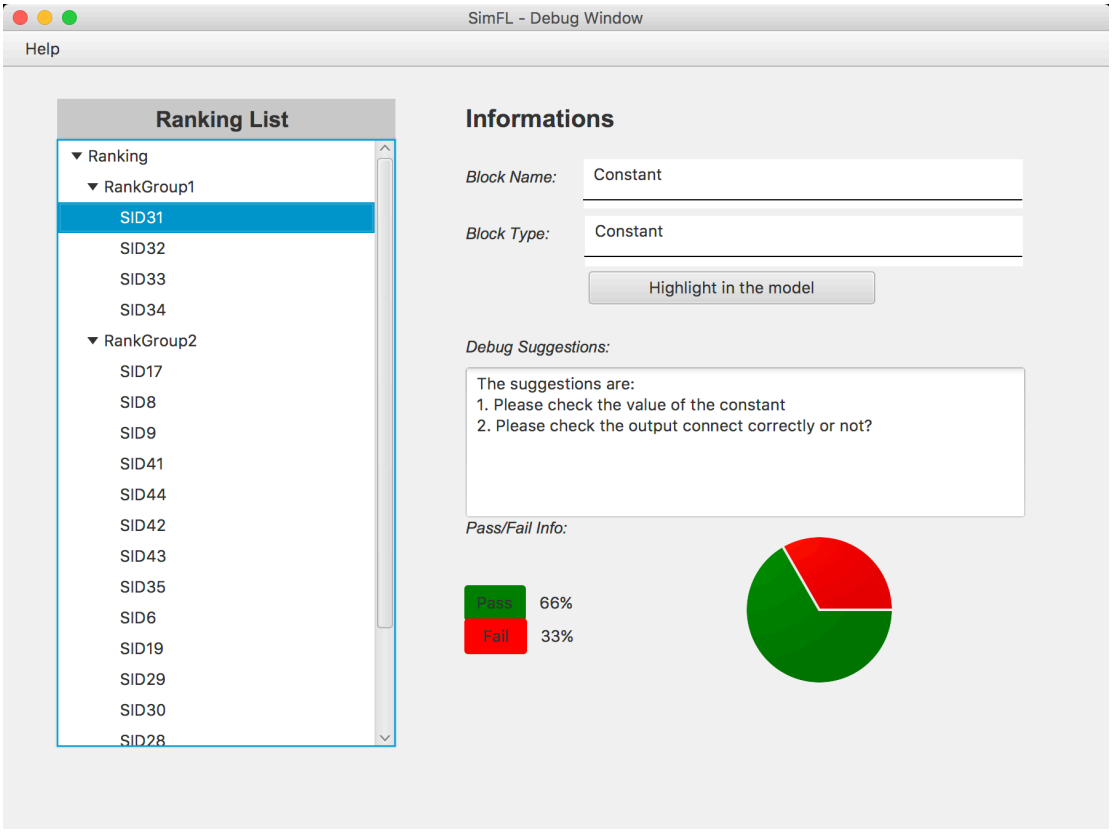


**Fig-4.**

5. If you want to consider "Simulink Super Block" information in the generated ranking, you can generate the Super block information file before you generate the ranking (as shown in Step 4).

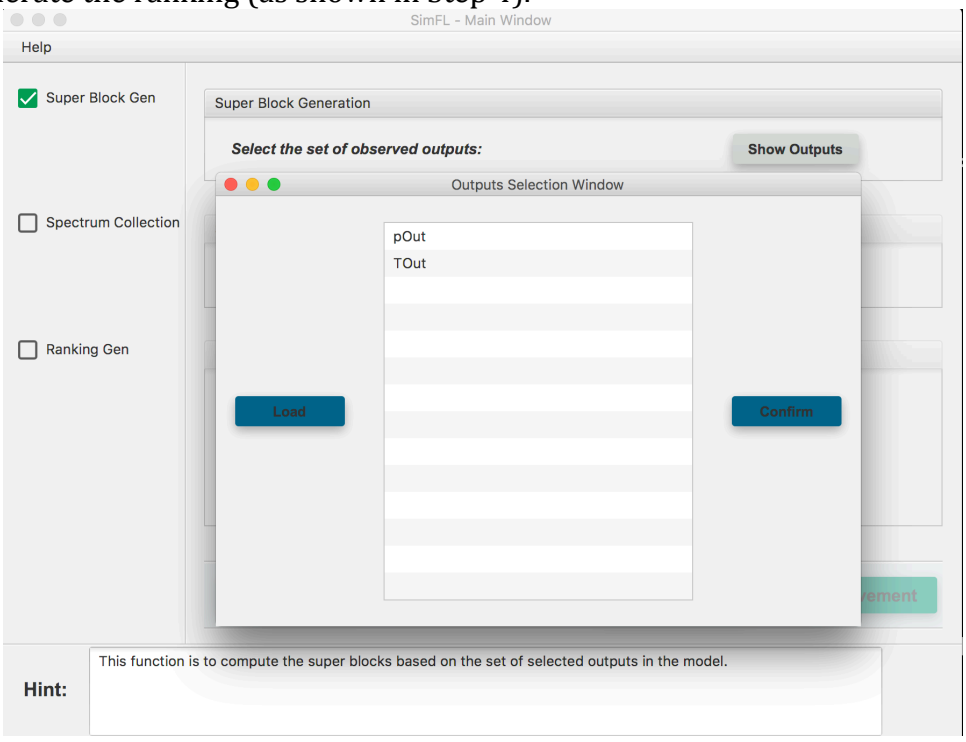


**Fig-5.**

Select the "Super Block Gen" checkbox, and click the "Show Outputs" button. A pop-up window appears. If you click "Load", SimFL will parse the Simulink

model and show you all the available outputs on the top level of the Simulink model, and you just need to select the real outputs that you want to take into your consideration in the computation of Super block.

6. Click the “Compute SB” button to conduct the computation of Super block. The generated file in default is SuB.csv.

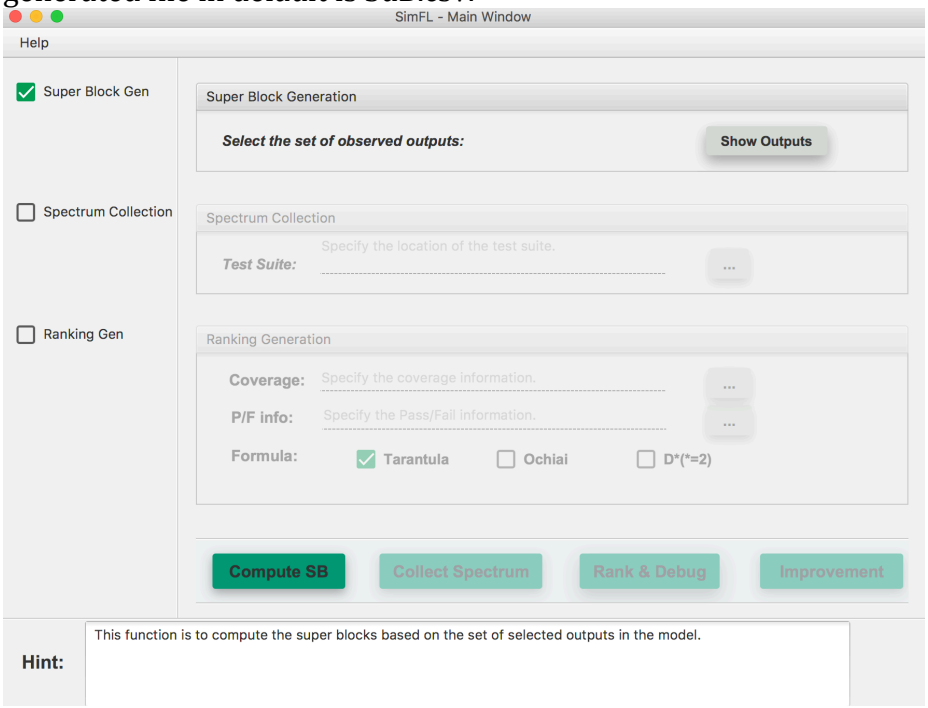


**Fig-6.**

7. With the generation of Super block information, the display of the generate ranking list will be slightly different from what we show in Step 4.

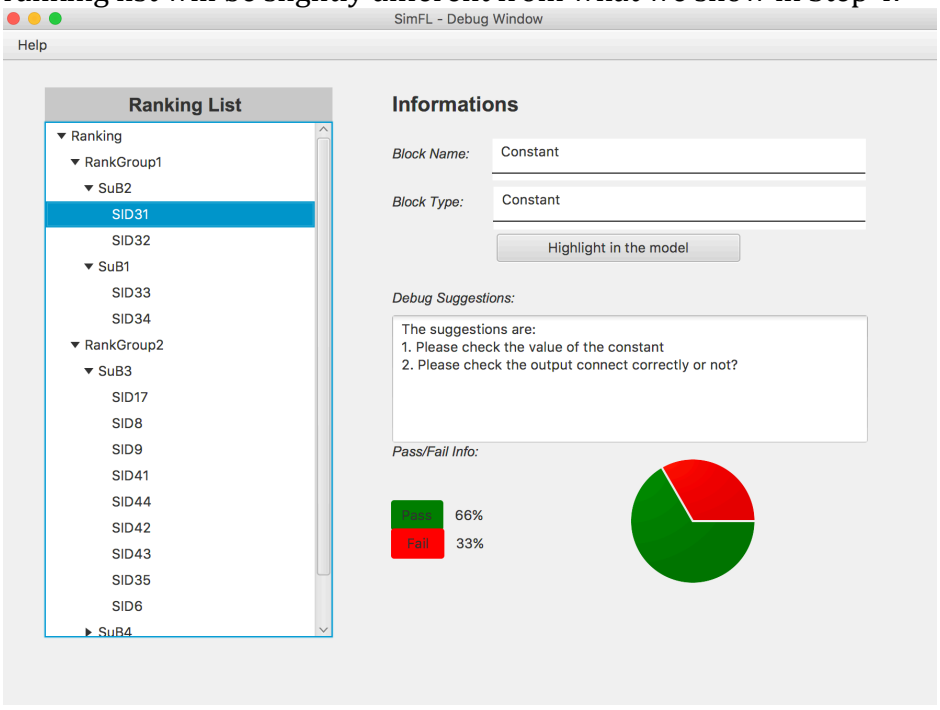


**Fig-7.**

There will be a new item between Rank group and each rank item, known as "SuB*". It means the ranking display is taking the super block information into account. This super block information is important especially for engineers to make the decision whether they should improve their ranking by considering more test cases or intermediary outputs.

8. The last feature provided in SimFL is improving fault localization by considering more test cases.

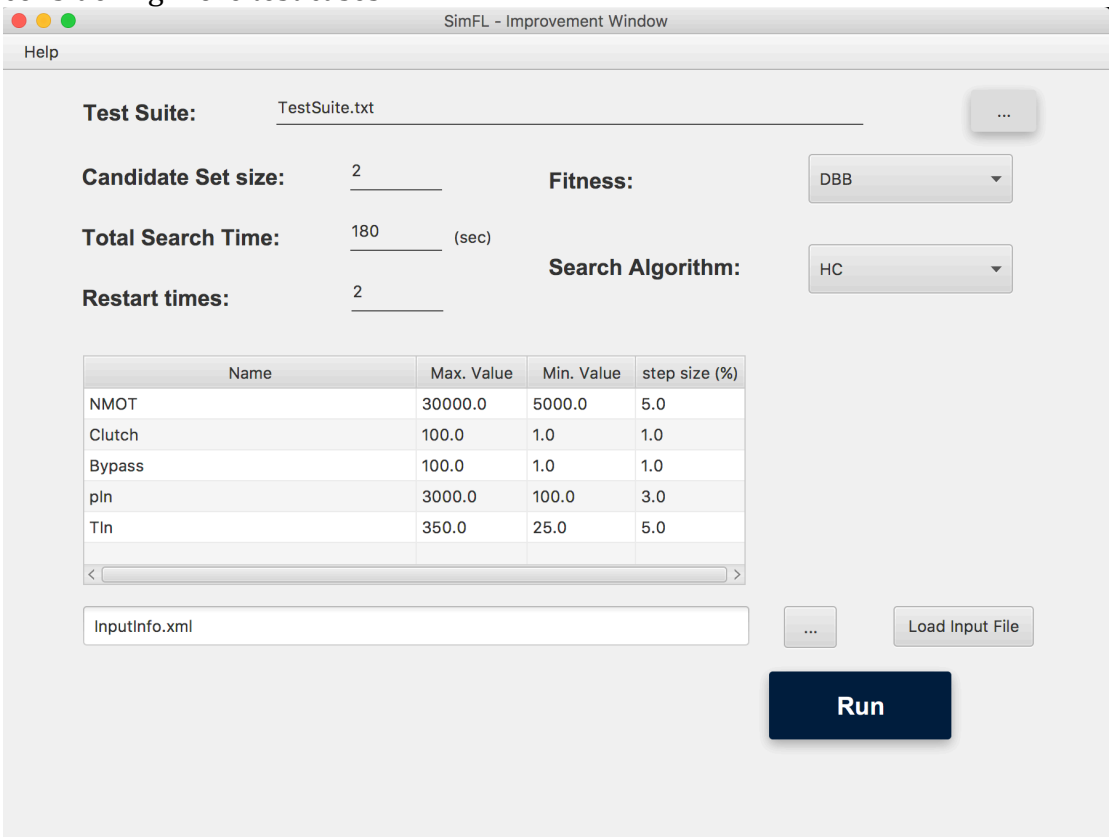


**Fig-8**

This window in Fig-8 are the window to configure the test generation process. Based on our implementation, we need the underlying test suite, the target number of new test cases, the total search time, the fitness function, as well as the input information to generate the candidate test cases.

Once all the information are all well-defined, SimFL will start generate new test cases after you click "Run" button. The generation process will not have any graphical notifications and just run in the background.