

User Manual: Partial Order Tool ver: 2.0

September 23, 2020

1 Download and Setup

The following steps need to be followed diligently for the correct setup of the tool in your machine.

STEP-1. Pre-requisite: User must have Java SDK installed in their machine.

STEP-2. Download: User needs to download the following files from the github repository (refer to 1(a)) for using the tool:

- *PO-TOOL-SetupFiles.rar*: It contains the PartialOrderTool installation files (refer to 1(b)).
- *InputDataSet.rar*: It contains some sample data set that the user can use while running the tool.

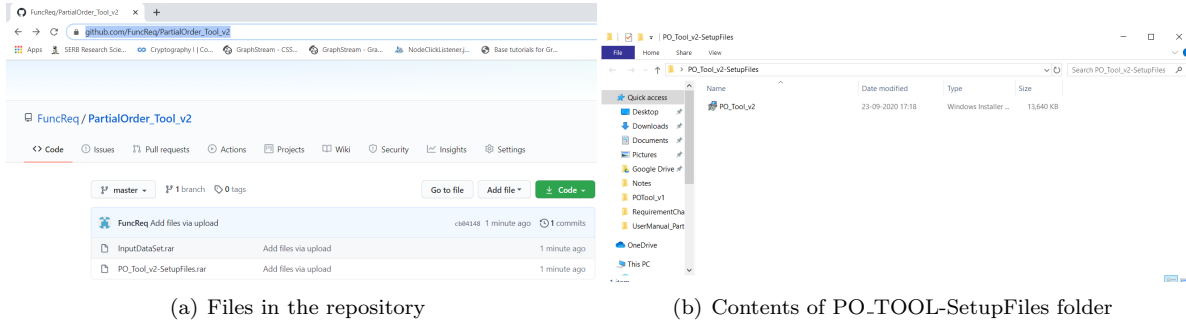


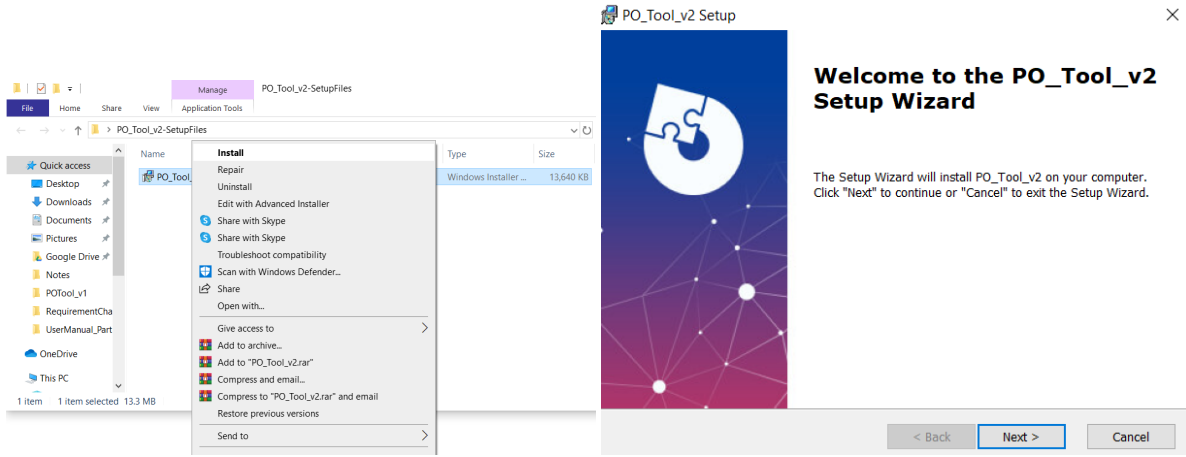
Figure 1: Tool SetUp

STEP-3. Extract: The downloaded RAR files need to be extracted at any suitable location.

STEP-4. Installing the Tool:

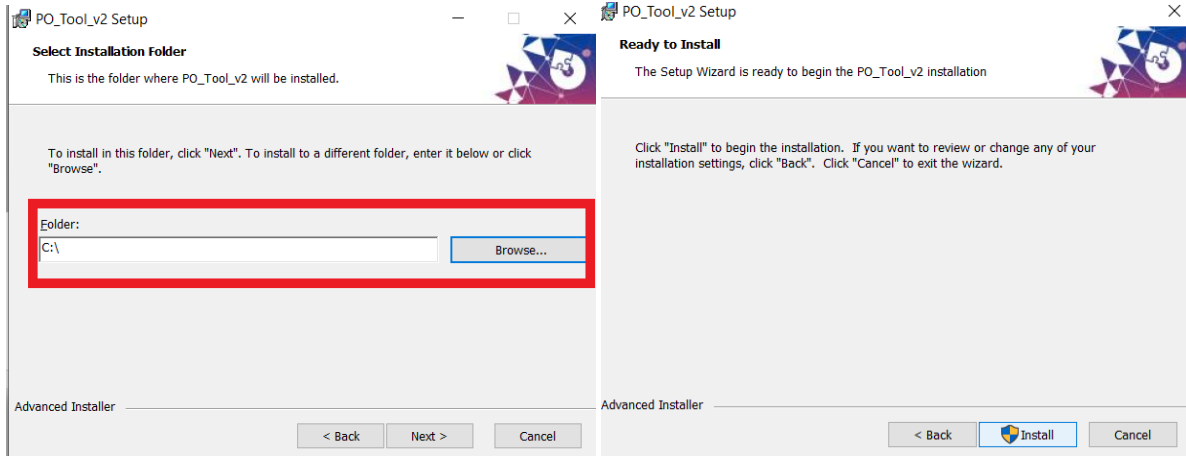
- Open the PO-TOOL-SetupFiles folder.
- Right click on PO_Tool.msi file and select install option (refer to 2(a)).
- The installation wizard appears. Click on the "Next" button at the bottom of the wizard (refer to 2(b)).
- Next select a suitable installation location and click on "Next" button (refer to boxed portion in 2(c)).
- On the next screen of the wizard click on "Install" button at the bottom to start the installation process (refer to 2(d)).
- Finally on completion of the installation click on "Finish" button to exit the wizard (refer to 2(e)).

A folder named PartialOrderTool will be created in the selected location.



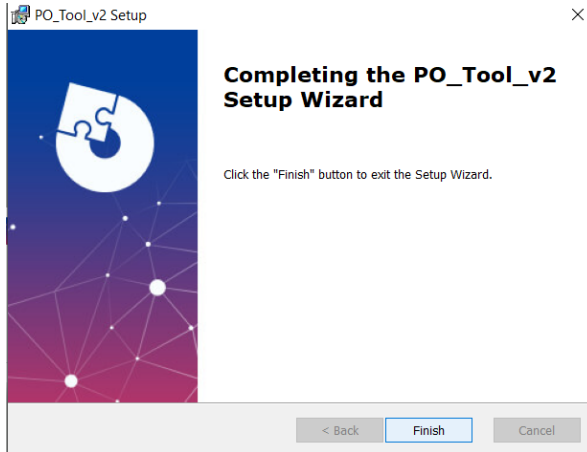
(a) Install Option

(b) Wizard opening screen



(c) Location for installation

(d) Beginning installation



(e) Completion

Figure 2: Installing Partial Order Tool

2 Using the Partial_Order Tool

STEP-1. Right click on the Tool icon (i.e. PartialOrderTool\ver1.exe) and select "*Open*" option (refer to 3(b)).

STEP-2. The tool interface opens (refer to 3(a)).

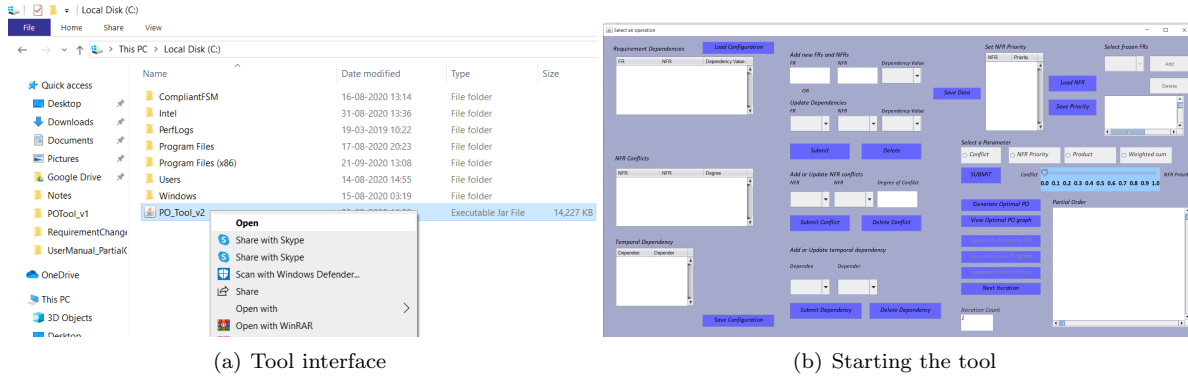


Figure 3: Starting the application

STEP-3. Providing Input Data: The set of functional, non-functional requirements, dependencies and conflicts can be provided in the following ways:

- *Option 1:* The user can choose to use the sample data set (stored in the folder *InputDataSet.rar*) for using the tool. To use the sample data set the following steps needs to be done:
 - (a) *InputDataSet.rar* needs to be extracted at any suitable location.
 - (b) Now all the files in the *InputDataSet* folder (refer to Figure 4(a)) needs to be copied in the same location as that of the tool (refer to Figure 4(b)).
 - (c) Click on the "Load Configuration" (refer to Figure 3(b)) button to load the data of the sample data set in the tool.
 - (d) Figure 5 shows the data sets that are loaded in the tool.

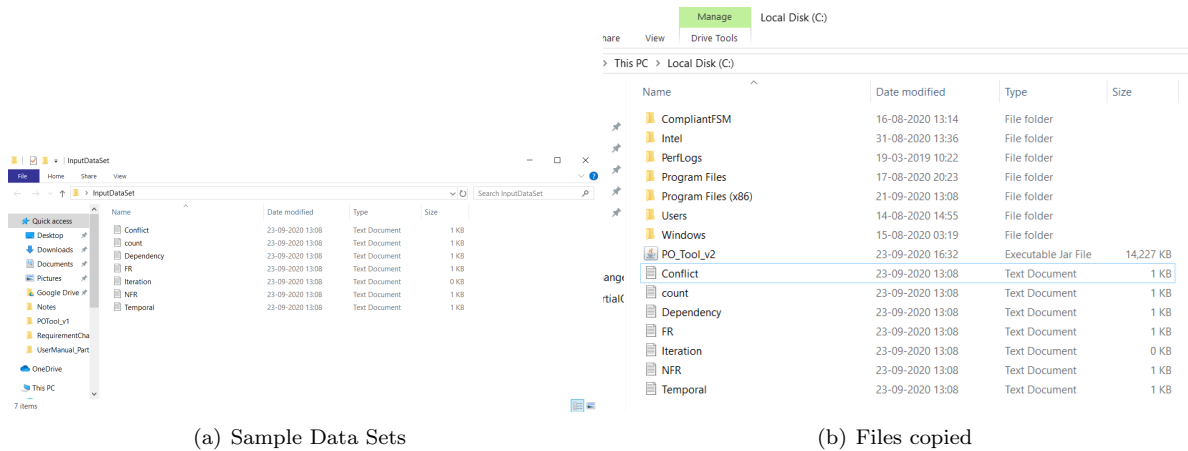


Figure 4: Using sample data set

Requirement Dependencies

Load Configuration

FR	NFR	Dependency Value
f1	nf1	8
f1	nf2	4
f2	nf3	8
f2	nf4	2
f3	nf3	7
f3	nf4	4
f4	nf5	6
f4	nf6	6

NFR Conflicts

NFR	NFR	Degree
nf4	nf3	80
nf6	nf7	60
nf8	nf9	80

Temporal Dependency

Dependee	Depender
f1	f4

Save Configuration

Figure 5: Data Loaded

- *Option 2*: User can directly provide input in the tool as follows:
 - (a) **Adding new FR & NFR**: In the "Add new FRs and NFRs" (refer to Figure 6) section type the label of FR, its corresponding NFR and select the dependency value from the drop-down list (refer to the boxed portion in Figure 6). Then click on the "Submit" button. The table at the left portion (refer to Figure 3(b)) displays the input submitted.

Figure 6: Adding FR & corresponding NFR

- (b) **Adding new NFR conflict**: FRs and NFRs has to be added into the list manually or to be loaded from existing set before specifying the conflicts. In the "Add or Update NFR conflicts" (refer to Figure 7) section select the pair of NFR that are in conflict using the drop-down list and also specify the degree of conflict (refer to the boxed portion in Figure 7). Then click on the "Submit Conflict" button.

Figure 7: Adding NFR conflicts

- (c) **Adding temporal dependency between FRs**: Similarly here also FRs has to be added into the list manually or to be loaded from existing set before specifying the dependencies. In the "Add or Update temporal dependency" (refer to Figure 8) section select the dependee and depender FR using the drop-down list (refer to the boxed portion in Figure 8). Then click on the "Submit Dependency" button.

STEP-4. The existing list of inputs can be modified or deleted as follows:

- **Modify FR-NFR dependency Value**: In the "Add new FRs and NFRs" section select a FR, NFR and a new dependency value from the drop-down list (refer to the boxed portion in Figure 9) and click on "Submit" button. The change can be viewed in the table at left.

Add or Update temporal dependency

Dependee Depender

Submit Dependency Delete Dependency

Figure 8: Adding temporal dependency

Add new FRs and NFRs

FR NFR Dependency Value

OR

Update Dependencies

FR NFR Dependency Value

Submit Delete

Figure 9: Update or remove FR-NFR dependency

- **Delete FR-NFR association:** In the "Add new FRs and NFRs" section select the FR and NFR from the drop-down list (refer to the boxed portion in Figure 9) and click on "Delete" button. The change can be viewed in the table at left.
- **Modify NFR conflict value:** In the "Add or Update Conflicts" section select the pair of NFRs from the drop-down list and type the new conflict value (refer to the boxed portion in Figure 7) and click on "Submit Conflict" button. The change can be viewed in the table at left.
- **Delete NFR conflict:** In the "Add or Update Conflicts" section select the the pair of NFRs from the drop-down list (refer to the boxed portion in Figure 7) and click on "Delete Conflict" button. The change can be viewed in the table at left.
- **Delete temporal dependency:** In the "Add or Update temporal dependency" section select the pair of FRs from the drop-down list (refer to the boxed portion in Figure 8) and click on "Delete Dependency" button. The change can be viewed in the table at the left.

STEP-5. Once all the required dependencies and conflicts have been fixed click on "Save Data" button.

STEP-6. Click on "Load NFR" button to load the NFR and set their priority values. Put priority value against each NFR and then click on "Save Priority" button (refer to Figure 10).

STEP-7. Now select any one of the parameters in the "Select a Parameter" section on the right (refer to Figure 11). In the case of parameter Weighted Sum, specify the weight to be assigned by

Set NFR Priority

NFR	Priority
nf1	45
nf2	60
nf3	75
nf4	90
nf5	65
nf6	50
nf8	74
nf7	87
nf9	40

Load NFR

Save Priority

Figure 10: Setting NFR priority

dragging the slider to a position. The value at the left portion of the slider indicates weight assigned to the conflict and the right portion to the NFR priority (refer to the boxed portion in Figure 11). In Figure 11 the slider is at position 0:4 which means weight assigned to conflict is 0:4 and that to NFR priority is 0:6. After selecting the parameter click on the "Submit" button to set the parameter.

Select a Parameter

☐ Conflict
 ☐ NFR Priority
 ☐ Product
 ☒ Weighted sum

SUBMIT

Conflict

 NFR Priority

0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

Figure 11: Setting parameter

- STEP-8.** If iteration count is 1 i.e. in the first iteration we do not need to provide any frozen requirements. In the first iteration, only the optimal partial order can be generated. Click on the "Generate Optimal PO" button to generate the Optimal Partial Order. Partial order in the form of linear sequence(s) that will be displayed in the white text area (refer to Figure 12(a)).
- STEP-9.** Click on "View Optimal PO Graph" to see the optimal partial order in the form of a graph (refer to Figure 12(b)).

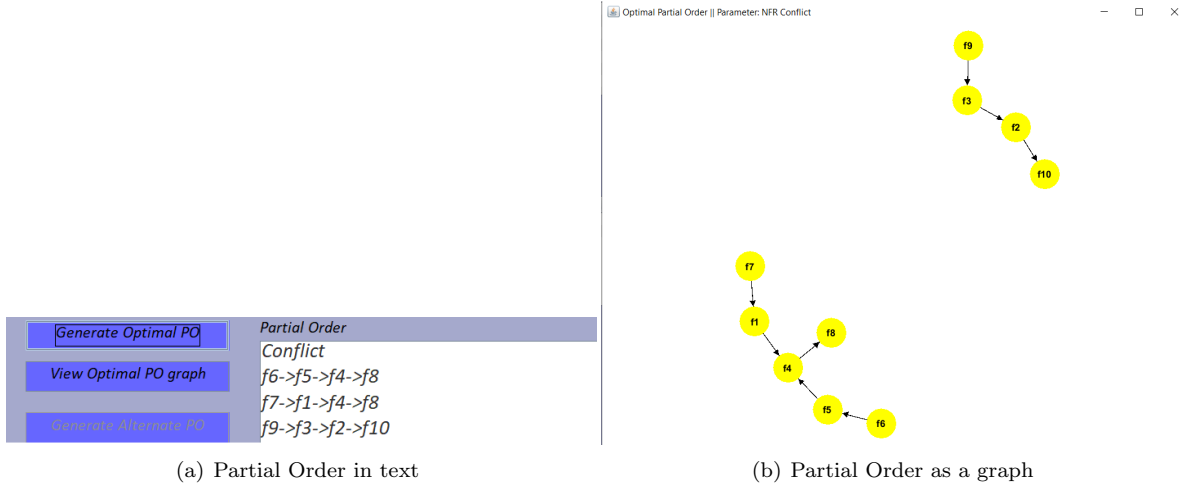


Figure 12: Optimal Partial Order in Iteration 1

- STEP*-10. Then click on the "Next Iteration" button to move to the next iteration of the software development.
- STEP*-11. Add new FR, NFR dependencies, conflicts, or modify them using *STEP* – 3 and *STEP* – 4.
- STEP*-12. If there are new NFRs then repeat *STEP* – 6 to set the priority of the new NFR.
- STEP*-13. Select a set of Frozen FRs in the "Select frozen FRs" section (refer to Figure 13). Click on the drop-down list to select an FR and then click on "Add" button. We will see that the FR is added to the text area (refer to the boxed portion of Figure 13). To remove an FR from the frozen list, select the FR from the drop-down list and click on "Delete" button.

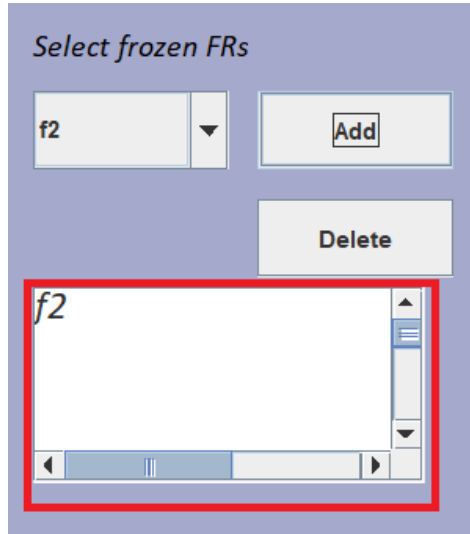


Figure 13: Selecting Frozen Requirements

- STEP*-14. To set a new parameter follow the instruction in *STEP* – 7, otherwise one can also continue with the already set parameter in the previous iteration.
- STEP*-15. Now repeat *STEP* – 8 and *STEP* – 9 to generate and view the optimal partial order in the text and graphical form.
- STEP*-16. Click on the "Generate Alternate PO" button to generate the Alternate Partial Order. Partial order in the form of linear sequence(s) that will be displayed in the white text area (refer to boxed portion Figure 14(a)).
- STEP*-17. Click on "View Alternate PO Graph" to see the alternate partial order in the form of a graph (refer to Figure 14(b)).

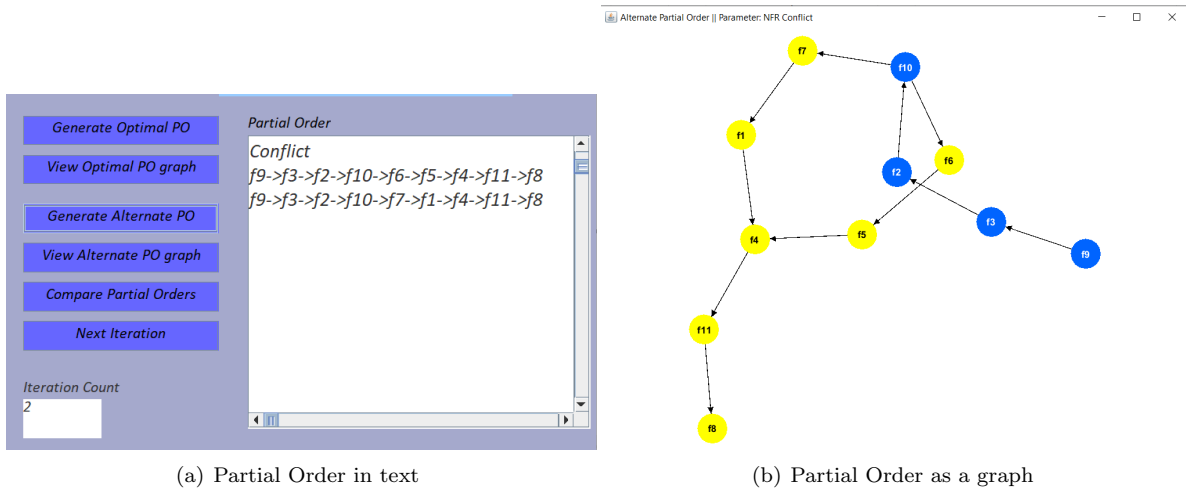


Figure 14: Alternate Partial Order in Iteration 2

- STEP*-18. Click on the "Compare Partial Order" button to see the set of conflicting precedences (refer to the boxed portion in Figure 15).

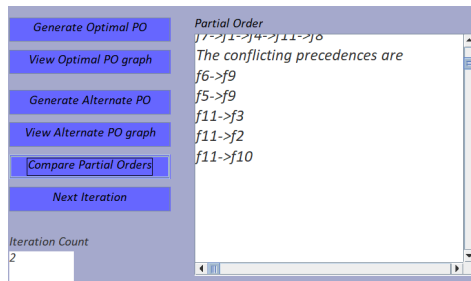


Figure 15: Comparing Partial Orders

- STEP*-19. User can again click on "Next Iteration" button and repeat from *STEP* – 11 to *STEP* – 18.
- STEP*-20. "Save Configuration" button is used to store the updated set of requirements (as the requirements undergo changes in the successive iteration) and also the NFR priorities and requirements that are added to the frozen list before closing the application. When the interface is reloaded user can click on "Load Configuration" button to resume work from where it was left.