How to Use the Test Case Generation Tool For Boolean Expressions

This document contains information about Test Case Generation Tool For Boolean Expresssions.

Contents

Overview
Glossary
System Prerequisites
Launch Instructions
Step-by-Step User Guideline

Overview:

Given an expression or a set of expressions which can be in the form of General Form or Disjunctive Normal Form or Conjunctive Normal Form, in order to detect the 9 simple fault types that defined in the Lau and Yu's Fault Hierarchy and some other complex fault types, the Test Case Generation Tool For Boolean Expressions can automatically generate test cases. Meanwhile, related information with respect to the test case generation process can also be displayed on the screen.

Glossary:

GF: general form
DNF: disjunctive normal form
CNF: conjunctive normal form
IDNF: irreducible disjunctive normal form
ICNF: irreducible conjunctive normal form
OTP: overlapping true point
UTP: unique true point
OFP: overlapping false point
UFP: unique false point
LIF: literal insertion fault
LOF: literal omission fault
LRF: literal reference fault
TIF+: term insertion fault detected in DNF expressions
TIF. : term insertion fault detected in CNF expressions
EIF. : expression insertion fault in DNF expressions
EIF+: expression insertion fault in CNF expressions
TRF: term reference fault
ERF: expression reference fault
TOF: term omission fault
LNF: literal negation fault
ORF+: can also be recorded as DORF, disjunctive operator reference fault
ORF. : can also be recorded as CORF, conjunctive operator reference fault

System Prerequisites:

- This tool should be installed on Windows7 and Windows8.
- This tool requires approximately 50 MB of free RAM and 4 MB of free disk space.
- This tool requires the frequency of CPU should be above 2G Hz.

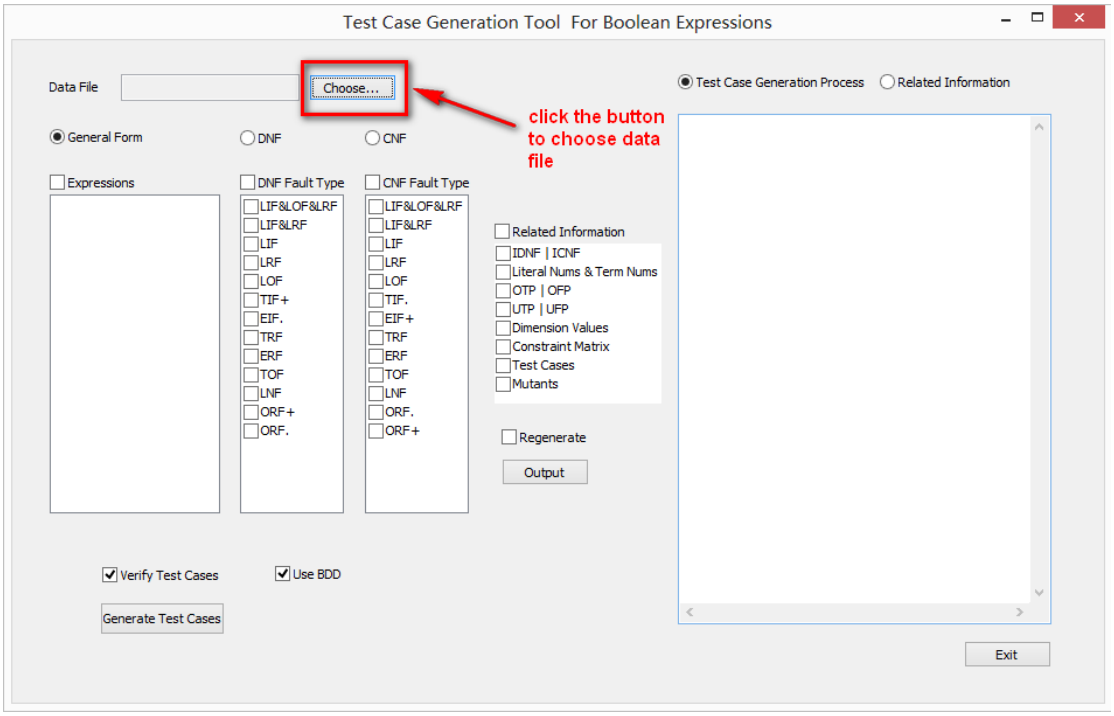
Launch Instructions:

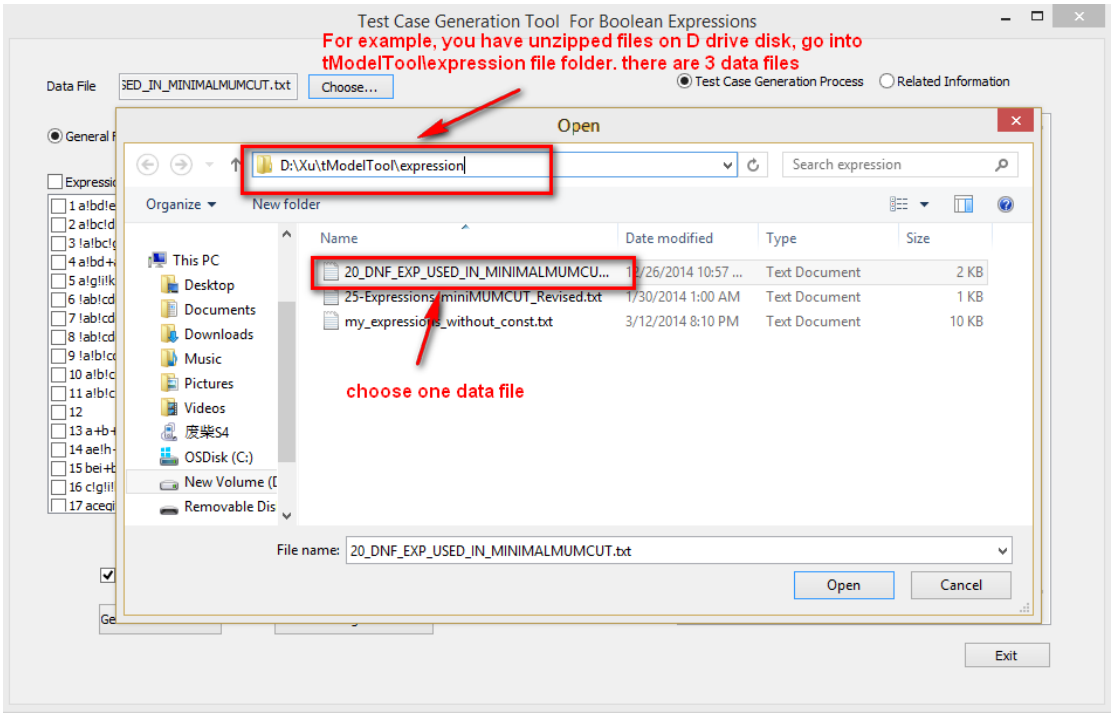
Note: You can obtain the Test Case Generation Tool For Boolean Expressions from our website.

- After downloading , unzip the compression file and make sure that tModelTool.exe and glpk_4_52.dll be placed in the same file folder on the disk.
- To launch the application, just double click the tModelTool.exe icon.

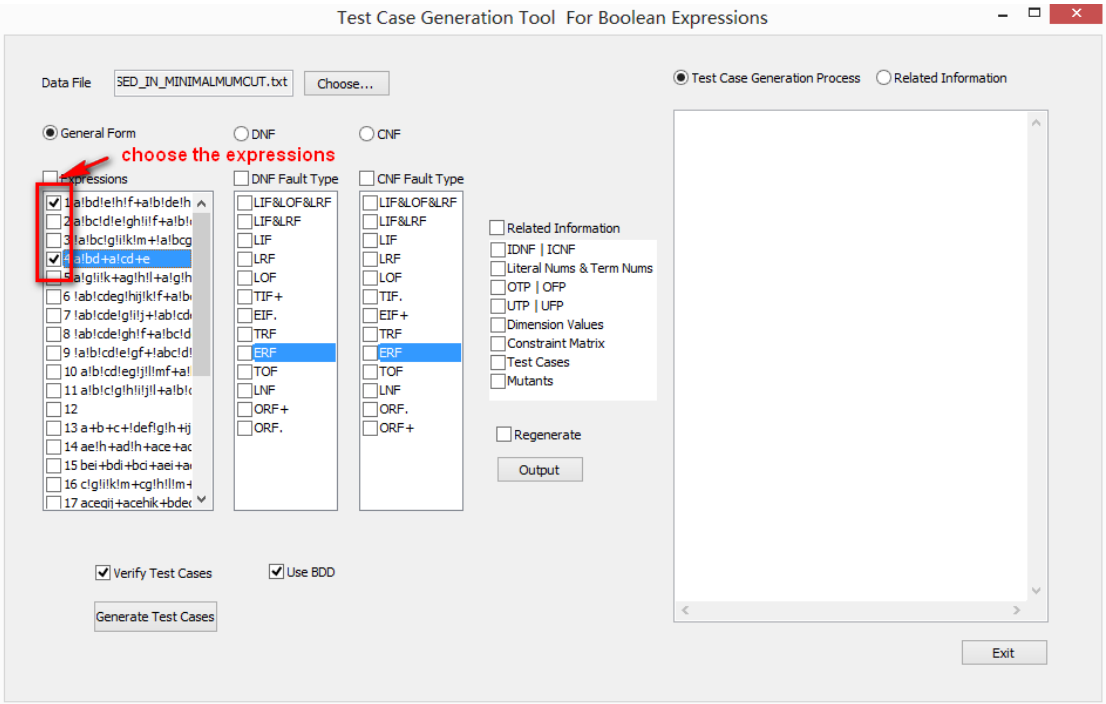
Step-by-Step User Guideline:

1. Choose the data file which contains the expressions to be examined. For example, you have unzipped the files on D drive disk. Go into tModelTool \ expression file folder which contains 3 data files and double-click any file. Notice, data files that contain 19 expressions, 25 expressions and 88 expressions can be located anywhere on the disk after unzipping the compression package and thus you should change your corresponding directory when choosing data files.

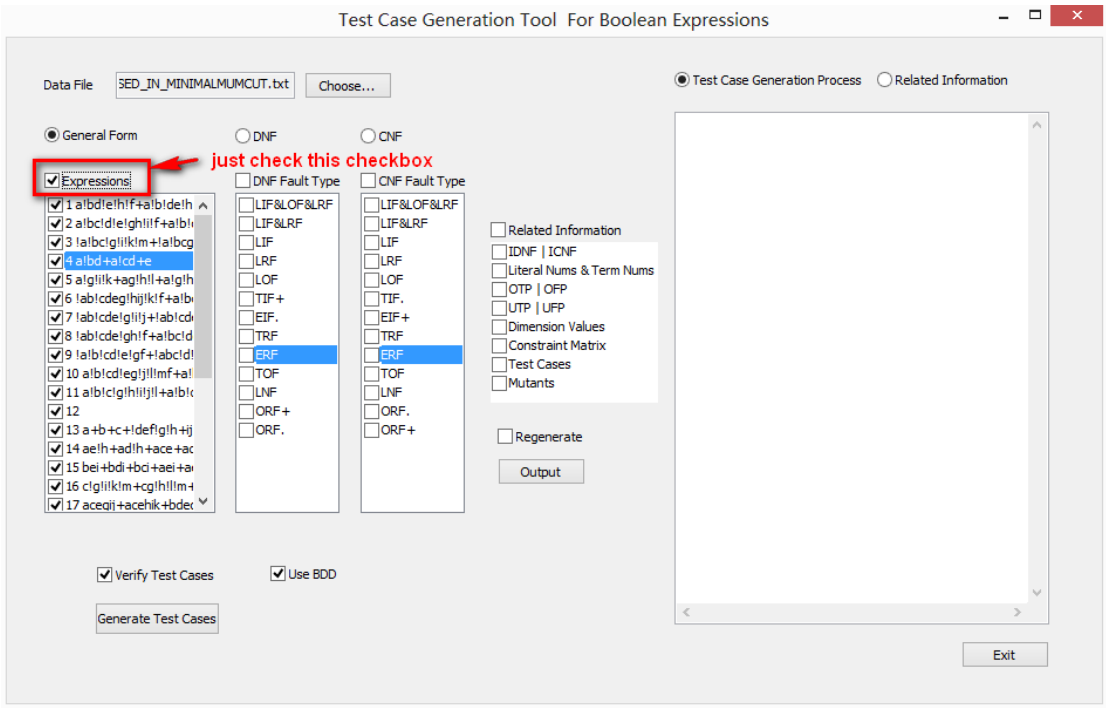




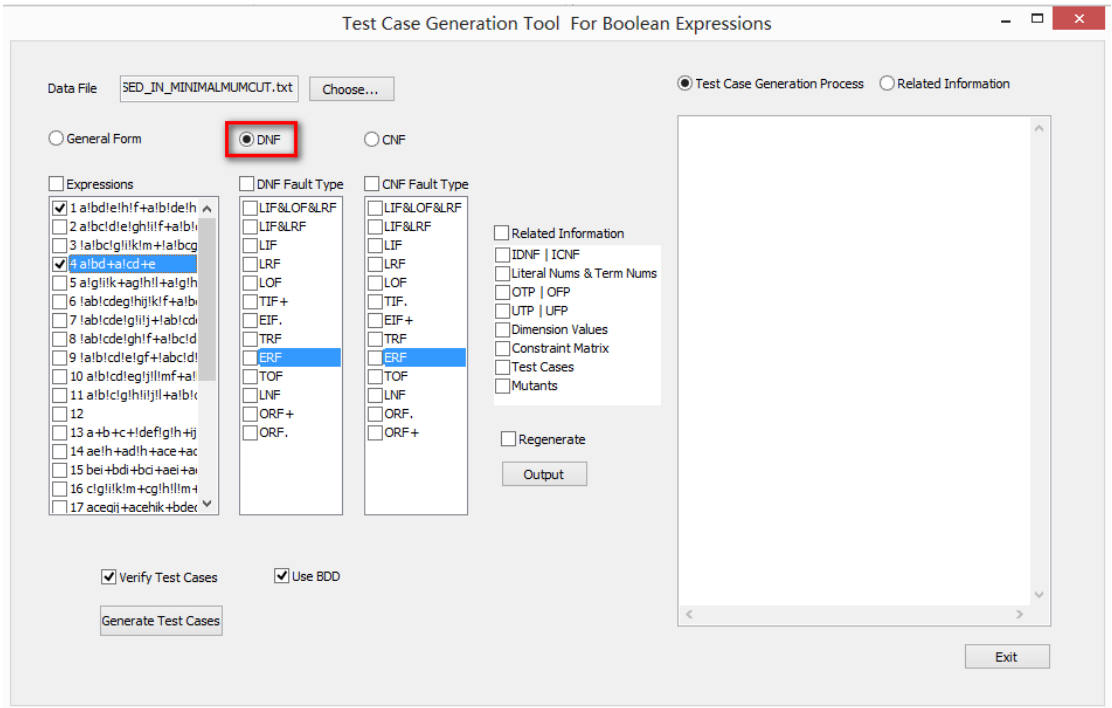
2. Check the expressions which need to be examined. Pay attention, you could just choose one expression or check a set of expressions. However, if you want to generate test cases for multiple expressions at one time, you should make sure that they are in the same normal form.



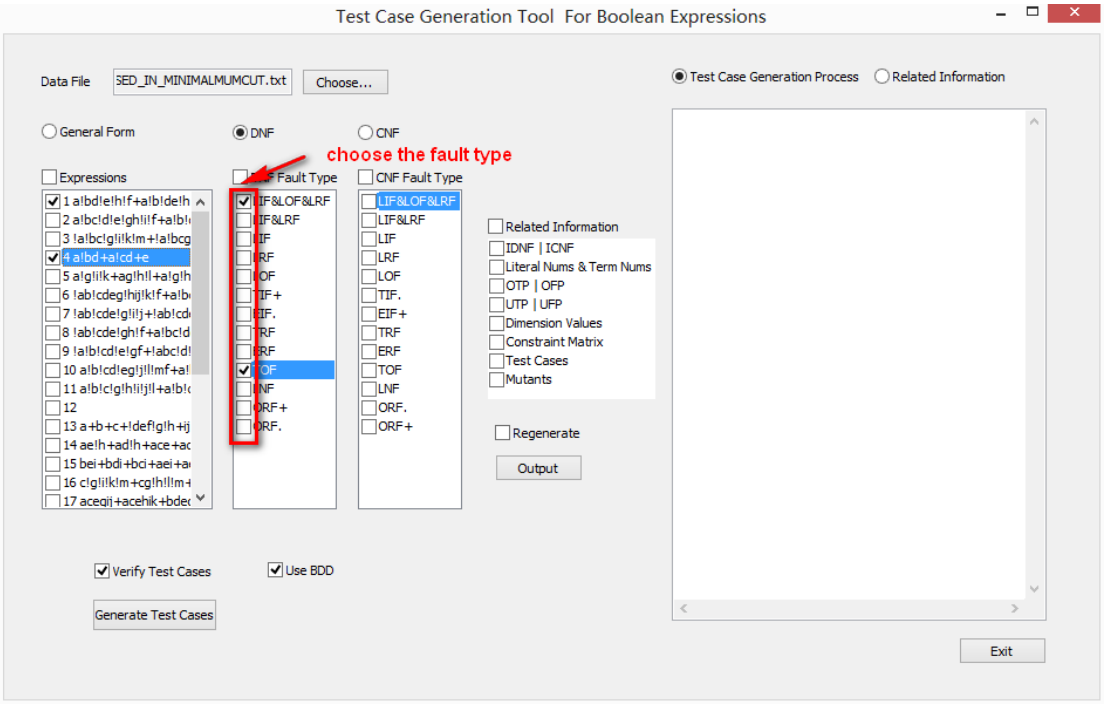
If you want to check all the expressions, here is a simple way. Just check the checkbox highlighted in the following picture.



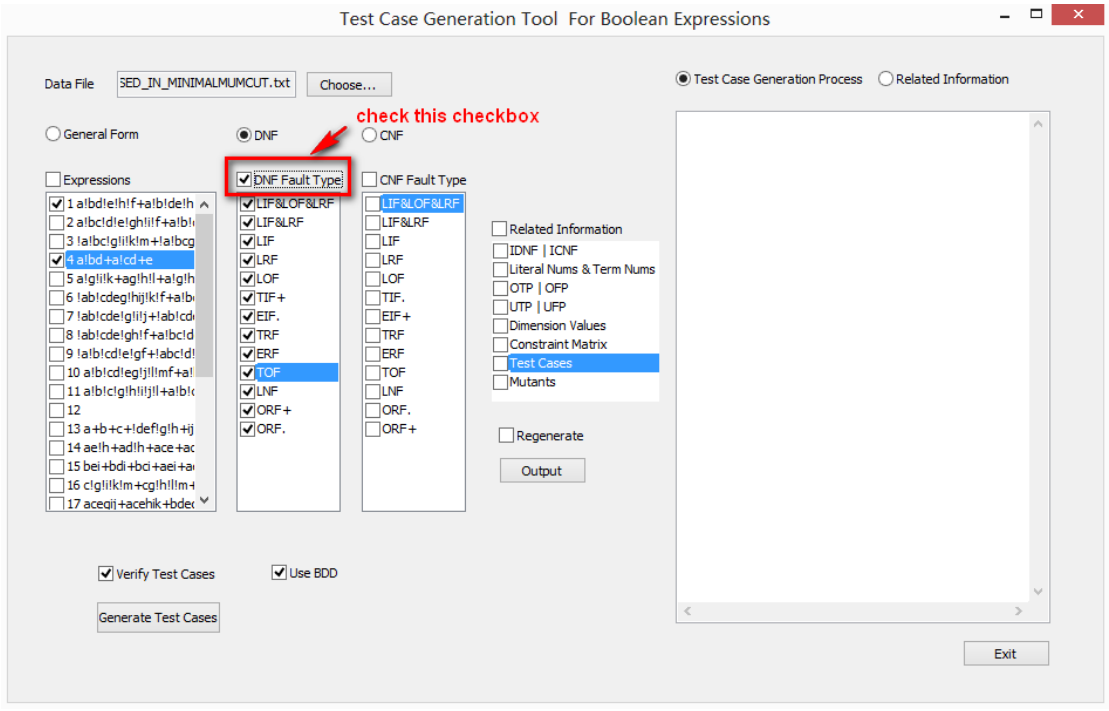
3. Choose the normal form type which the expression(s) you have checked should be in. Here you have three options, General Form, DNF and CNF. You should check the corresponding normal form correctly. Otherwise, may cause the software to crash.



4. Choose the fault types you want the automatically generated test cases to cover.

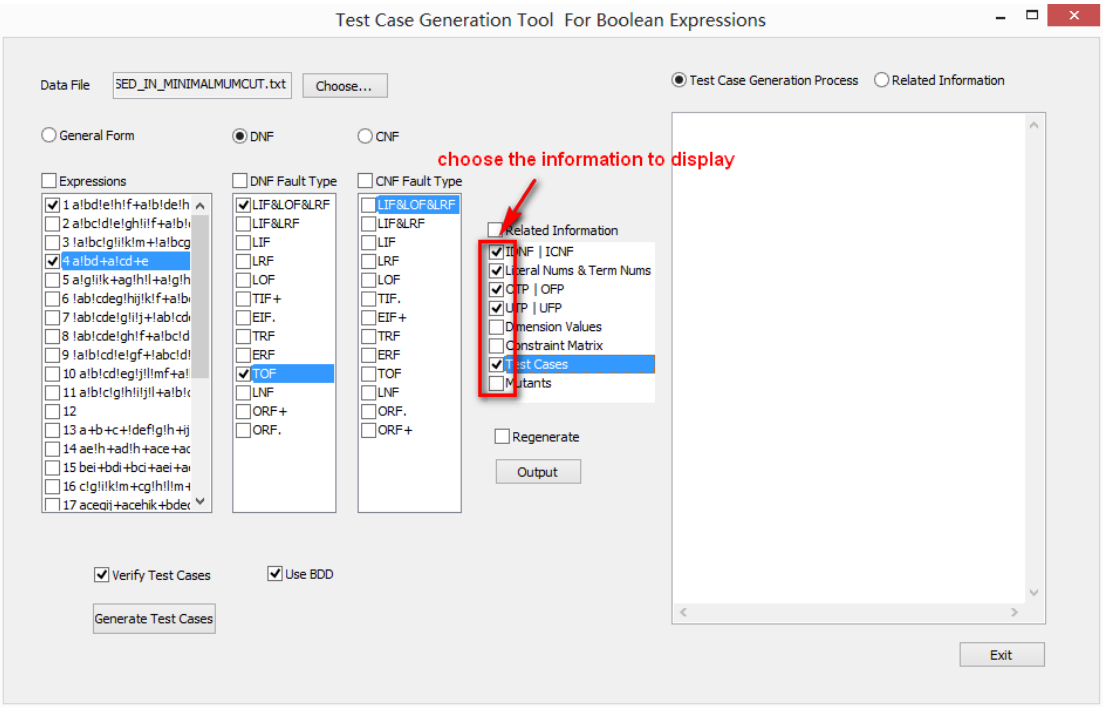


If you want to check all the Fault types, here is a simple way. Just check the checkbox highlighted in the following picture.

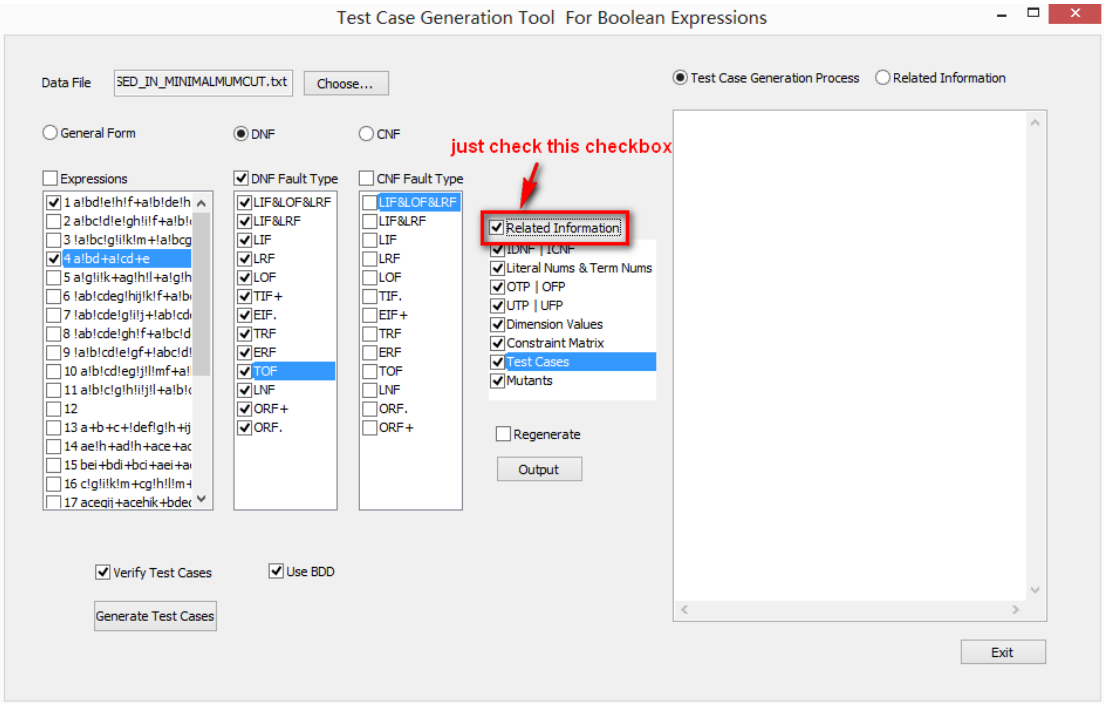


(the 4th step can also be applied to CNF fault types)

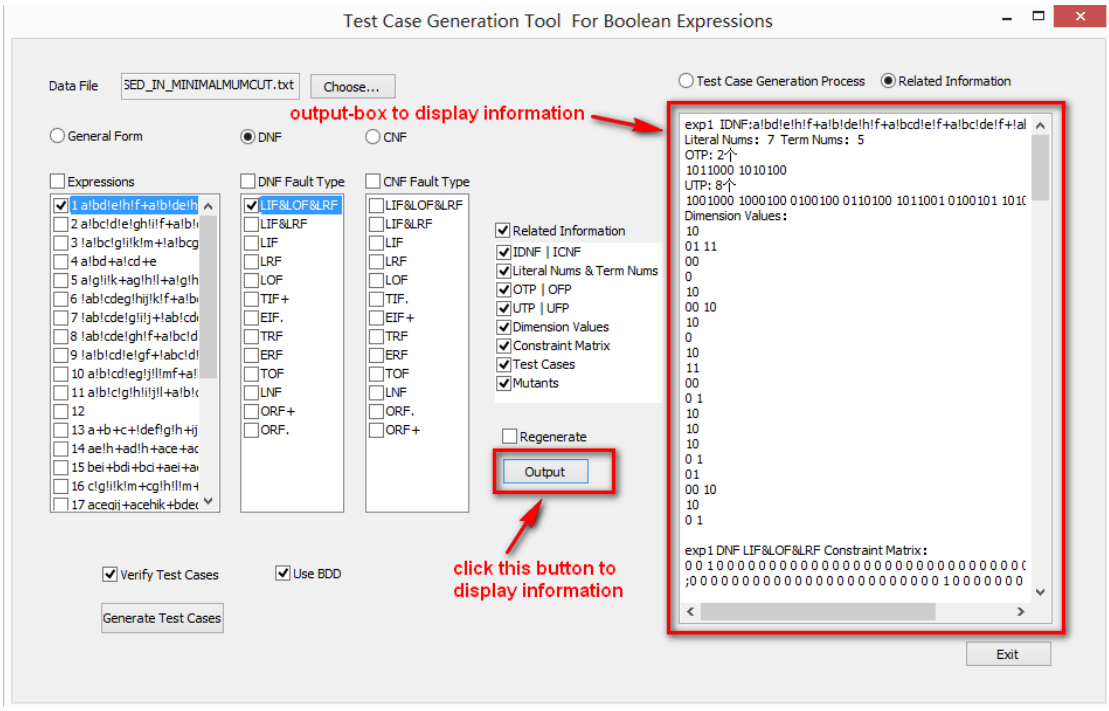
5. You can displayed the related information in the output-box to the right. As to the information types to display, you can decide by checking the corresponding checkbox shown as follows.



If you want to check all the related information, here is a simple way. Just check the checkbox highlighted in the following picture.

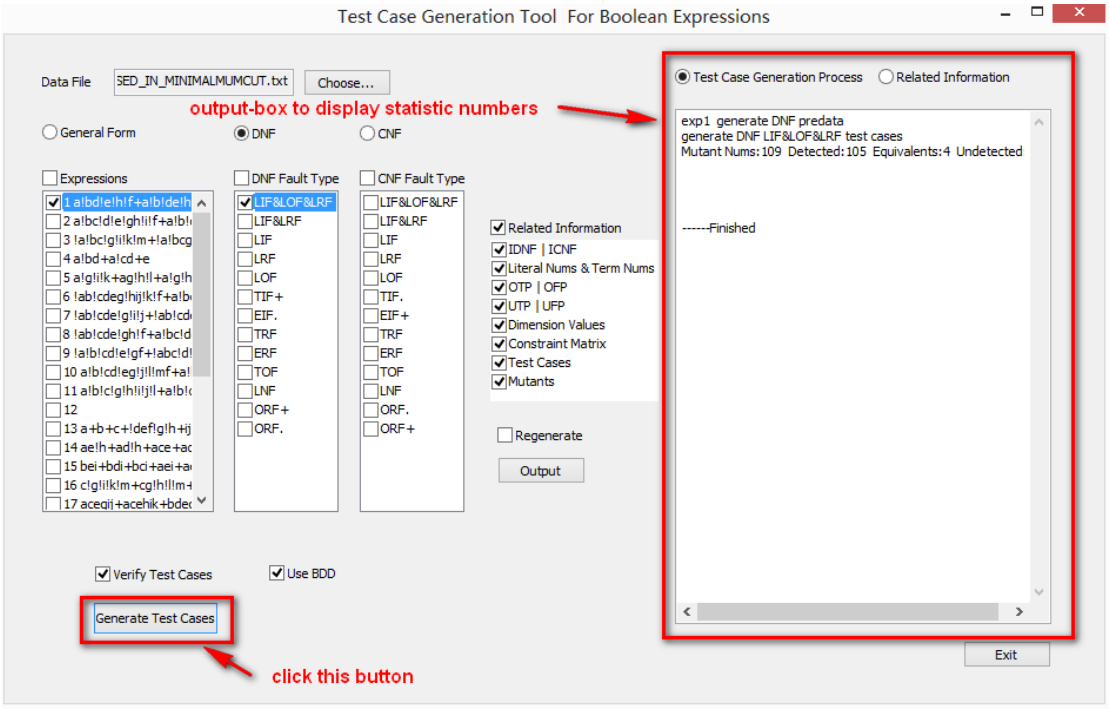


6. Click the Output button, you can see the information displayed in the output-box to the right.



7. If you want to check the effectiveness of the automatically generated test cases, you can just click the Generate Test Cases button after the first four steps. In the output-box to the right, the statistic numbers to measure the effectiveness including the total mutant numbers, detected mutant numbers and undetected mutant numbers can be displayed.

   Pay attention, in order to obtain the statistic numbers, Verify Test Cases checkbox must be checked. In order to accelerate the verification process, you should also check Use BDD checkbox. These two checkboxes are checked by defaut.



8. After using this application, just click the Exit button to exit.