Table of Contents

Question 1

To export test vectors, the following command was used in cmd, in the path of the folder containing the tool Atalanta(C:\...\Lab 1 - Atalanta & Hope\Atalanta): ***atalanta -l c880o_atpg.log -D 5 c880o.bench*** . With the -l option we define the file in which the logs of the execution of the command will be recorded. The file contains the test vectors exported and the execution information printed in cmd. With the -D 5 option, the tool outputs 5 test vectors for each fault, while at the same time the undefined inputs remain as they are.

The execution results are shown in folder "**1**" and are the files ***c880o.test*** and ***c880o_atpg.log*** .

To find the response of the circuit for each fault in each of the 5 cases the following command was used in cmd, in the path of the folder containing the tool Hope(C:\...\Lab 1 - Atalanta & Hope\ Hope): ***hope -t .. \Atalanta\c880o.test -N -F c880o. F -l c880o_sim.log c880o.bench*** . With the -t option we define the file that contains the test vectors for which we want to simulate faults. The file we select is the one that the Atalanta tool produced previously. With the -l option we define the file in which the logs of the execution of the command will be recorded. With the -F option, the tool records in a file the correct as well as the incorrect responses for all faults. According to the *Hope_Manual,* the -F command does not use fault dropping, i.e. if a fault is detected with a test vector then it is not dropped from the fault list. However, this does not seem to be the case and that is why the -N option is used.

Thus, we can see the response of the circuit for each of the 5 cases, for the fault for which each one was produced. Indicatively, for the first fault (796gat->812gat /1), the responses for each of the 5 test vectors (from the .F file) are:

1. xxxx01xxxx1xxxxxxxxxxx1xx1
2. xxxx01xxxx1x00xxxxxxxx1xx1
3. xxxx01xxxx1xxxxxxxxxxx1xx1
4. xxxx01111x1000xxxxxxxx1xx1
5. xxxx01111x10x0xxxxxxxx1xx1

The execution results are shown in folder "**1**" and are the files ***c880o.F*** and ***c880o_sim.log*** .

The commands for the export of test vectors and for the simulation are located in the folder "**1**" and in the file ***commands.txt***.

Question 2

To export test vectors, the following command was used in cmd, in the path of the folder containing the Atalanta tool(C:\...\Lab 1 - Atalanta & Hope\Atalanta): ***atalanta -l s9234_atpg.log -r 48 s9234.bench*** . The -l option is described in the previous question. With option -r 48, the tool uses Random Pattern Testing (RPT) before deterministic export of test vectors, which stops if 48 consecutive packets of 32 random vectors do not detect a new fault.

The results of the run are shown in folder "**2**" and are the files ***s9234.test*** and ***s9234_atpg.log*** .

The command to export the test vectors is located in the folder "**2**" and in the file ***commands.txt***.

Question 3

To export test vectors, the following command was used in cmd, in the path of the folder containing the Atalanta tool(C:\...\Lab 1 - Atalanta & Hope\Atalanta): ***atalanta -l s9234_atpg.log -u -b 4 -D 2 s9234.bench***. The -D and -l options are described in previous questions. With -b 4, we limit the number of maximum backtracks for the FAN algorithm to 4. With the -u option, the tool returns to a file named circuit_name.ufaults, the list of undetected or discarded faults.

- The test vectors exported are 11632.
- The faults returned to the list in the output file are 68.
- The redundant faults found by the program are 392.

The execution results are shown in folder ''**3**'' and are the files ***s9234.test***, ***s9234_atpg.log*** and ***s9234.ufaults*** .

The command to export the test vectors is located in the folder "**3**" and in the file ***commands.txt***.

Question 4

Using the file format for the fault lists shown in the Atalanta_manual, i.e. gate_A->Gate_B /0-1 and gate_A /0-1 we have:

a. sw3->gt1 /1
b. gt2->sb2 /0
c. f8 /1
d. gh6->gt1 /0

The description gate_A->Gate_B /0-1 means that the output of the gate_A leads to the input of the Gate_B and on this connection there is the Stuck-at/0-1 fault. The description gate_A /0-1 means that the gate_A output has the Stuck-at/0-1 fault.

The fault list can be found in folder "**4**" and in the file ***faults.txt***.

Question 5

To emulate the circuit, the following command was used in cmd, in the path of the folder containing the tool Hope(C:\...\Lab 1 - Atalanta & Hope\ Hope): ***hope -l c1355o_sim.log -D c1355o.bench*** . The -l option is described in the previous question. With the -D option, the tool returns to an output file (the one defined by the -l option), the list of faults detected by each test vector. For the simulation the tool used 224 random test vectors.

We observe that while the first vectors detect many faults, the latter detect much fewer and in fact quite a few do not detect any faults. This is not because the last test vectors do not have debugging ability, but because the tool follows the fault dropping technique. According to this technique, faults detected during the simulation process are dropped from the fault list so that they do not need to be checked again. This is because the goal is to cover the faults, that is, once we have found a vector that detects a fault, then that fault has been covered by our test set and we don't have to try to detect it in any other way. Thus, the last vectors detect faults from a much smaller list of faults than the original one, with the result that some do not detect any.

The results of the execution can be seen in folder "**5**" and in the file ***c1355o_sim.log***.

The command for the simulation can be found in folder "**5**" and in the file ***commands.txt***.

Question 6

To simulate the circuit, the following command was used in cmd, in the path of the folder containing the tool Hope(C:\...\Lab 1 - Atalanta & Hope\ Hope): ***hope -l c1355o_sim.log -N -D c1355o.bench*** . The -D and -l options are described in previous questions. With the -N option, the tool does not apply the fault dropping technique during simulation, that is, all test vectors examine all faults in the original fault list. Since the list of faults does not shrink as we test new test vectors, we expect them to detect a sufficient number of faults regardless of the order in which they were applied.

The results of the simulation confirm our predictions, since all test vectors detect several faults, regardless of the order in which they are applied.

The results of the execution can be seen in folder "**6**" and in the file ***c1355o_sim.log***.

The command for the simulation can be found in folder "**6**" and in the file ***commands.txt***.

Question 7

The description of the circuit can be found in folder "**7**" and in the file ***mycirc.bench***. The description is:

```
# mycirc
INPUT(A)
INPUT(B)
INPUT(C)
INPUT(D)
INPUT(E)
OUTPUT(F)
g1 = AND(A, B)
g2 = AND(C, D)
g3 = OR(g1, g2)
F = AND(g3, E)
```

To export test vectors, the following command was used in cmd, in the path of the folder containing the Atalanta tool(C:\...\Lab 1 - Atalanta & Hope\Atalanta): ***atalanta -l mycirc_atpg.log mycirc.bench*** . The -l option is described in the previous question. The rest of the options, since they have not been defined, are the defaults.

The test vectors produced by the tool are 5, after compression of the test set has been applied. Atalanta compresses test patterns using 2 methods: reverse order compaction and shuffling compaction. With the first method, the test patterns are applied in the opposite order and the fault simulation is run. With the second method, the vectors are randomly shuffled and fault simulation is done. During fault simulation, any vectors that do not detect a new fault are discarded.

The results of the run are shown in folder "**7**" and are the files ***mycirc.test*** and ***mycirc_atpg.log*** .

To find the response of the circuit for each case, the following command was used in cmd, in the path of the folder containing the tool Hope(C:\...\Lab 1 - Atalanta & Hope\ Hope): ***hope -t .. \Atalanta\mycirc.test***

-N -F mycirc. F -l mycirc_sim.log mycirc.bench. The -t, -N, -F, and -l options are described in previous questions.

The results of the execution can be seen in folder "**7**" and are the files ***mycirc.F*** and ***mycirc_sim.log*** .

The commands for the export of test vectors and for the simulation can be found in folder "**7**" and in the file ***commands.txt***.