EEIE30069: VLSI Testing

Assignment #3 (Due: Oct. 14, 2024 23:59:99)

Last update: Sep. 27, 2024

Reading:

- Source code provided in assignment #0.
- Please put all results into a report and try to discuss them.
- Please compress the folder containing all the source code and the short report into a file named by `ASS3_<your-student-ID>` and upload it to new E3
- The report should include
  - The algorithm or idea of your code
  - Several case results
  - Discuss your results
  - How to compile your code
  - Other information (optional)

Homework Description:

1. (150 pts) (Parallel pattern logic simulator)
   a. (20 pts) Please pack different number of patterns (1, 4, 8, 16) into a simulation run. Compare CPU times and memory usage on different circuits.
   b. (30 pts) Please calculate the average number of gate evaluations for different number of packed patterns. We can collect the number of gate evaluations of each pattern and then average the number of all patterns. DOES this number has correlation with the CPU times? What is the percentage of average gate evaluations over the total number of gates?
   c. (100 pts) Please write a compiled code simulator based on a fixed number (16) of parallel patterns. You can implement the "simulator" as a method of `CIRCUIT` class. In the method, you will output gate evaluation code in a levelized way (like ParallelLogicSim() in psim.cc), but all gates will be scheduled. Save the output code in a .c or .cc file and compile it as a program. Please compare the CPU time and memory usage with corresponding event-driven simulators.
   When comparing CPU times, please do not perform any IO functions (e.g. cout), which dramatically slows down the program.
      - The parallel logic simulation result by your simulator about c7552 circuit should be named **c7552.out**. The PI & PO sequence must follow the sequence in podem (PIlist & POlist).
   In this assignment, TA will only use combinational circuits to evaluate your program.

Grading:

- **Correctness 90%**
- **Report 10%**

Attention:

1. A new option "-simulator" you should create is as follows :

>   **./atpg -simulator [output_name] -input [input_pattern_file] [circuit_name]**

  Input:

```
./atpg -simulator c17.cc -input c17.input c17.bench
```

  Example files:

  - c17.cc
  - c17.input
  - c17.out

2. Memory usage examples:
   I. In command line:

> **/usr/bin/time -f "Average memory usage: %K \nMaximum memory usage: %M\n" ./atpg c17.bench**

   II. In main.cc, add:

> **#include <sys/types.h>**
> **#include <unistd.h>**
> **int pid=(int) getpid();**
> **char buf[1024];**
> **sprintf(buf, "cat /proc/%d/statm",pid);**
> **system(buf);**

   III. In main.cc, add:

> **system("ps aux|grep atpg");**