1 Simulator Design Overview

Figure 1 shows the overall class structure of the simulator design. Class *LG i.e.* Logic Gate is the abstract class for implementation of the all other basic gates. Instance of class *LG* cannot be created. class *GATE1* and *GATE2* are derived from class *LG*. Class *GATE1* stands for the one input one output gates and class *GATE2* stands for two input and two out gates. Class *Connector* is used for connecting different basic components to create combinational and sequential circuits. Details of all classes are described in further sections.

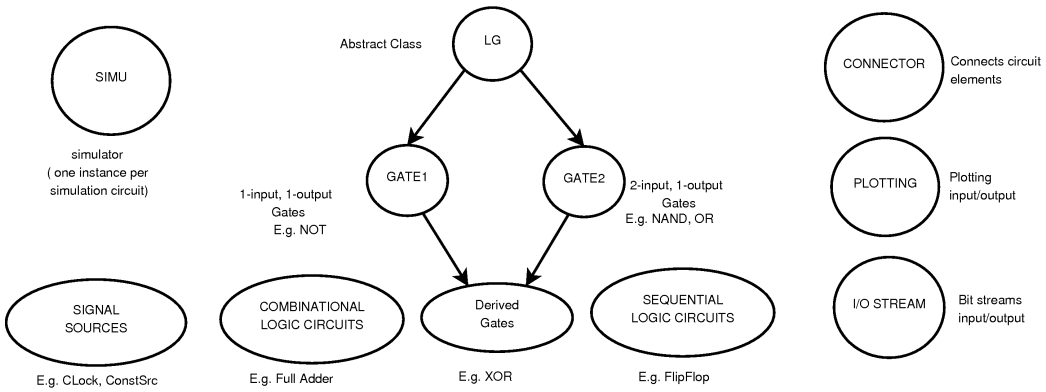

Figure 1: Class Structure

Class *SIMU* is the central class of the *pydlcs* simulator. It monitors the whole circuit operations and provides clock to different elements of the circuit. Its main functions are,

- Provide system clock to circuit elements
- Plotting input and output graphs
- Save the results and plots
- Monitor and control i/o streams
- Circuit debug option

Figure 2 shows the *SIMU* class details. We are going to describe the usage of this class's object in upcoming sections.

Figure 3 shows the system model of the *pydlcs* simulator. Simulator takes the bit-streams as an input form files specified. *Istream* is the class

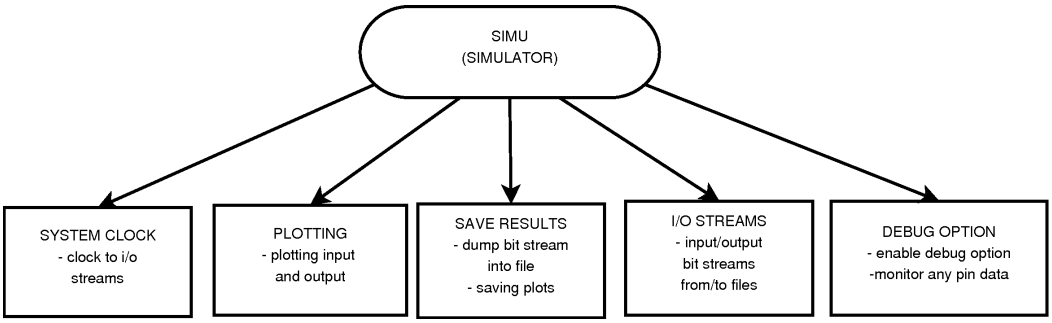

Figure 2: Simulator Class Details

defined for the providing the input facility from files. Each *Istream* object is connected to one file on one side and can supply bit-stream to any number of gates of the circuit on other side. *Ostream* is class defined for providing facility of writing result of simulation into the file specified. *Ostream* class object is connected to circuit pin from one side and pins data is logged into the file specified on other side. Both classes, *Istream* and *Ostream*, need to provide system clock for their operation. Figure 4 shows the *i/ostream* operational model. Their are different flags in *SIMU* class that we need to set for enabling different options *e.g.* for enabling annotation of plots we need to set flag *pannotate* in *SIMU* object. Flags details are as bellow,

- *plots* - Enable plots
- *pannotate* - Enable plot annotation
- *pclk* - Enable plotting system clock
- *start* - Start the simulation flag
- *stop* - Stop simulation flag
- *debug* - Enable debugging
- *step* - Enable step execution

There should be only one instance of *SIMU* class per circuit description file. Introduction to writing circuit description file is given in upcoming sections.

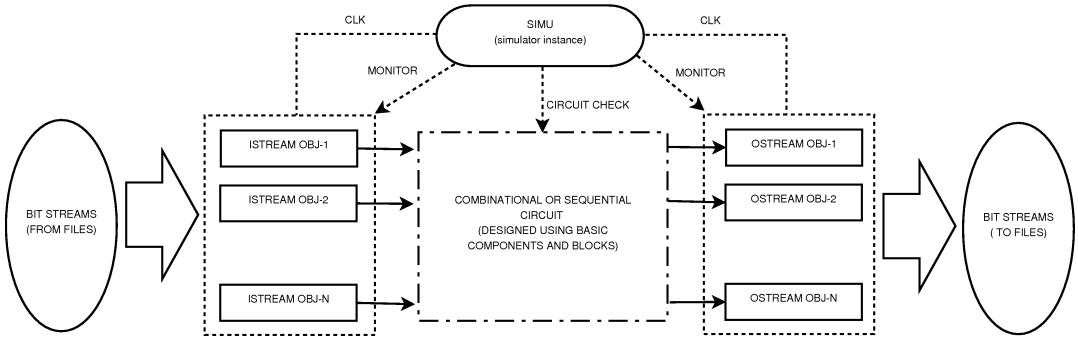

Figure 3: Simulator System Model

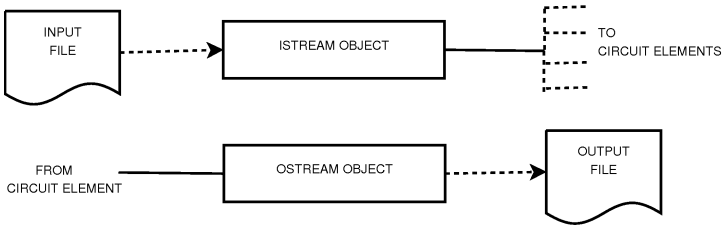

Figure 4: I/O Stream Model