CS220 Computer Architecture
Digital Logic Design
Practical 8

The TkGate Logic Simulator under Linux is used to implement these practicals. Boot Linux, log in and launch the TkGate application.

In this practical, you will design and implement a 3-bit left shift register as a synchronous sequential circuit. When the clock signal controlling the circuit is activated, each flip-flop passes its value to the flip-flop logically to its left, i.e. a higher bit position. The flip-flop representing the lowest bit position will have its output replaced with a value present on an input line X during the shift operation. The flip-flop representing the most significant bit position will have its contents discarded and replaced by the bit to its right.

Note you created a module for the J-K flip flop circuit in previous practicals and if it was operational, you should use instances of that module to build the circuit (AFTER YOU HAVE COMPLETED THE DESIGN).

1. Design the circuit on paper leading to a logic schematic. Your notes must show these workings and you must understand and be able to explain your own design.

2. Using the J-K flip-flop module implement the logic schematic on the TkGate simulator and verify its operation. The register should display the value of its contents on a decimal display.

3. Using phone/camera to reecord an 1 to 3 minutes video(720p or 1080p) to demonstrate your working circuit on the simulator and upload on Moodle. Note that shifting the register one position to the left is equivalent to multiplying its contents by 2.