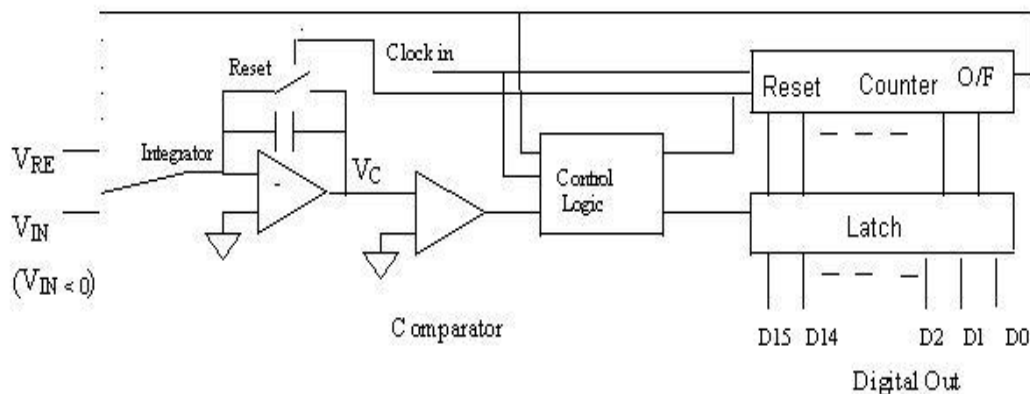


## ELEG-458: Analog VLSI, ADC Project.

In this project, you are going to design a high accuracy dual-slope analog-digital converter (ADC) with 16 bit output. The block diagram of the ADC circuit architecture is shown in Figure 1. The 16-bit analog-to-digital converter (ADC) consists of both analog and digital parts. The analog part includes an integrator and a comparator. The digital part includes a counter, a latch, a switch, and a control circuit. The converter works with analog voltage input and can complete the following functions: switching properly between input voltage and reference voltage, resetting the whole circuit after a conversion, and outputting latched values after the conversion.

- 1). Briefly explain the working principle of the dual-slope ADC.
- 2). Implement the ADC with Mentor Graphics Schematics.
- 3). Implement the layout of the ADC with Mentor Graphics IC Station.
- 4). Extract the netlist, and perform Accusim simulation on the circuit to demonstrate the correct function of the ADC circuit. Please clearly show the input/output waveforms, and the waveforms for some important signals. Please explain the waveforms to prove the correctness of the ADC function. (Note: After extracting the netlist, you may also use PSPICE for the simulation. Please use the PICE model parameters we emailed you before for the simulation.)
- 5). Based on the simulation results, estimate the maximum delay and the maximum allowed working frequency of your ADC circuit.



**Fig. 1 Block Diagram of 16-bit dual-slope ADC**