A State Machine Linear Sequencer

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Introduction

This application note demonstrates how to implement a Linear Sequencer using the Asynchronous State Machine in the SLG46531 GreenPAK IC. The sequencer can control up to 7 lines with a constant delay of switching.

Structure of a State Machine

Figure 1 shows the ASM editor window. The initial state is State0. The value of outputs in each state are shown in the RAM window. When transitioning from state to state (like S0>S1>S2>S3>S4>S5>S6>S7), every incrementing state output switches HIGH. Conversely, when decrementing through the states they switch to LOW (like S7>S6>S5>S4>S3>S2>S1>S0).

Incrementing from S0 to S7 occurs when the input ENABLE signal goes HIGH, and decrements when it goes LOW.

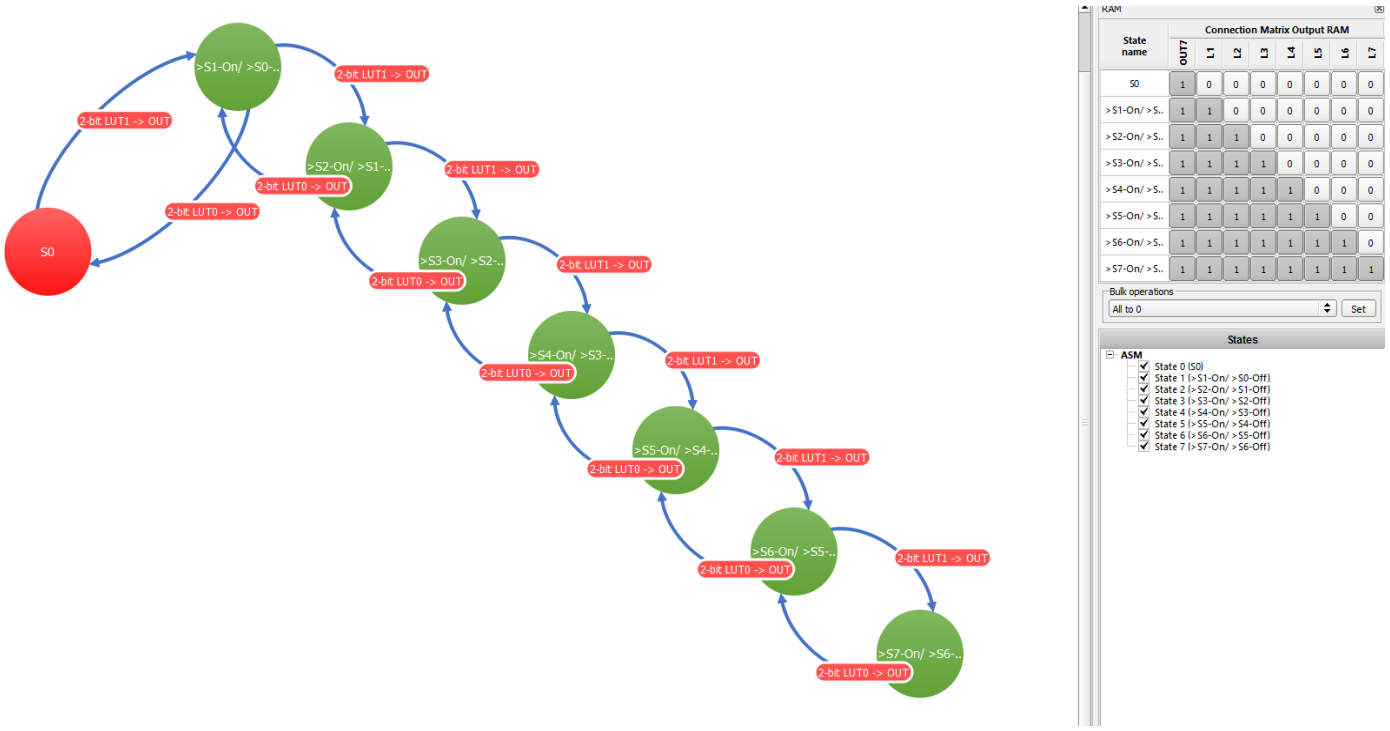

Figure 1. ASM Editor Window

Lines Sequencer Control

Control of switch direction between states is done by 2-bit LUT1 and 2-bit LUT0. They pass the pulses of CLK GENERATOR, as shown in Figure 2. Each subsequent clock pulse makes the transition from one state to another with a delay of 100ms. ENABLE signal input level sets the direction of the Sequencer.

To turn the generator ON and OFF 3-bit LUT1 is used. This reduces current consumption. ENABLE, Line1 and Line2 signals are fed into IN2, IN1 and IN0 3-bit LUT1 inputs respectively. When all inputs are High or Low, then the output is LOW and the generator turned OFF. In all other cases it is turned ON.

Also for the correct operation of CLK GENERATOR, 3-bit LUT0 is used. When the rising or the falling are edge signal ENABLE, then the PDLY logic cells output will be High. This pulse will reset the generator, and that provides the proper delay.

Blocks configuration is presented in Figure 3.

Lines Sequencer functionality signals is shown in Figure 4.

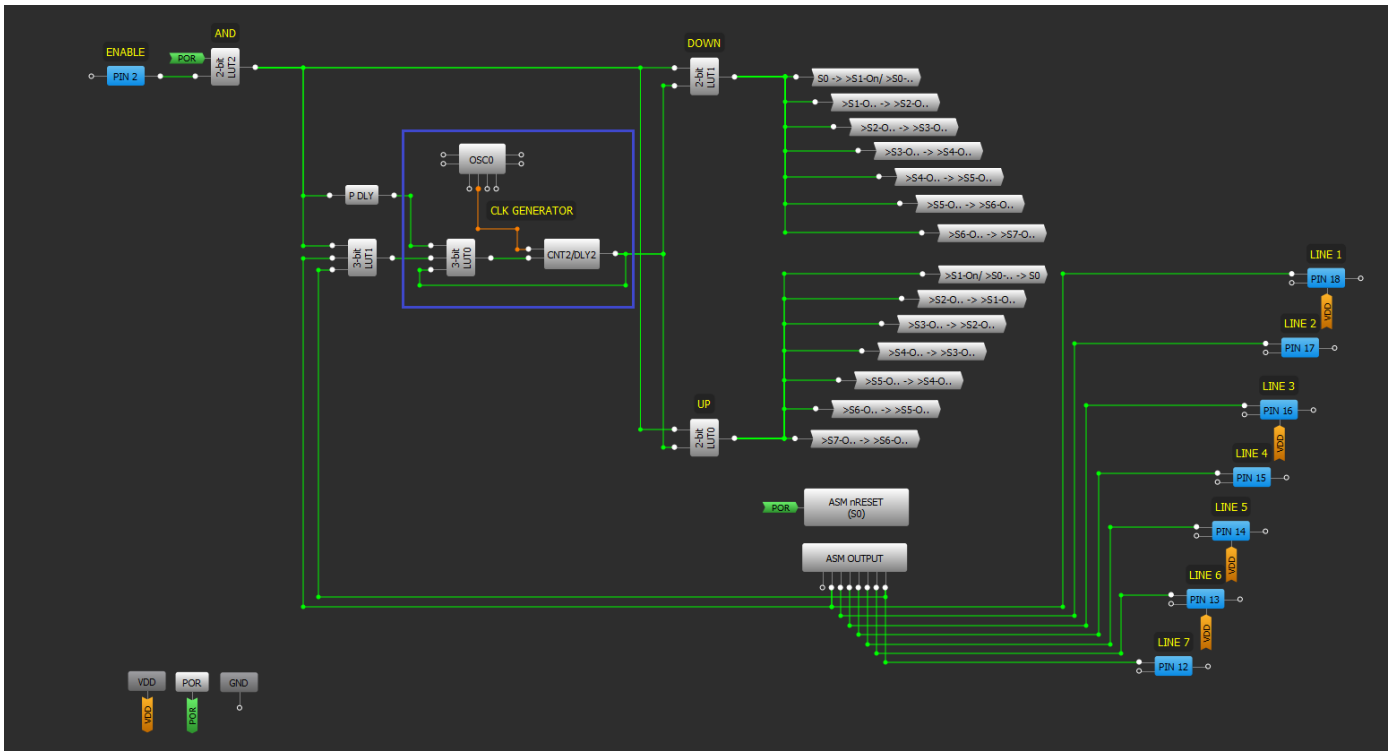

Figure 2. Linear Sequencer Schematic

Figure 3. Blocks Configurations

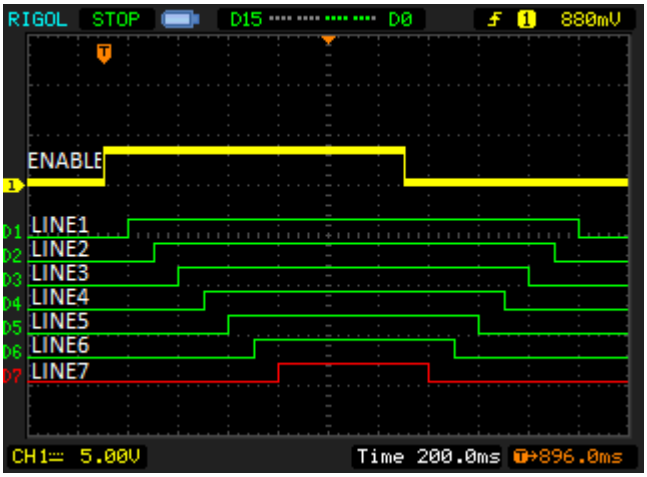

Figure 4. Linear Sequencer Functionality Waveform

Conclusion

Using the Asynchronous State Machine in the SLG46531 GreenPAK IC, we can make a 7-Line Sequencer. It was shown that using the ASM simplifies the design task nicely.

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