CLD Exercise 12: Sequencer State Machine

Objective

Develop a state machine to sequence steps based on data loaded from a file. Use the given application front panel (Figure 1) and controls provided.
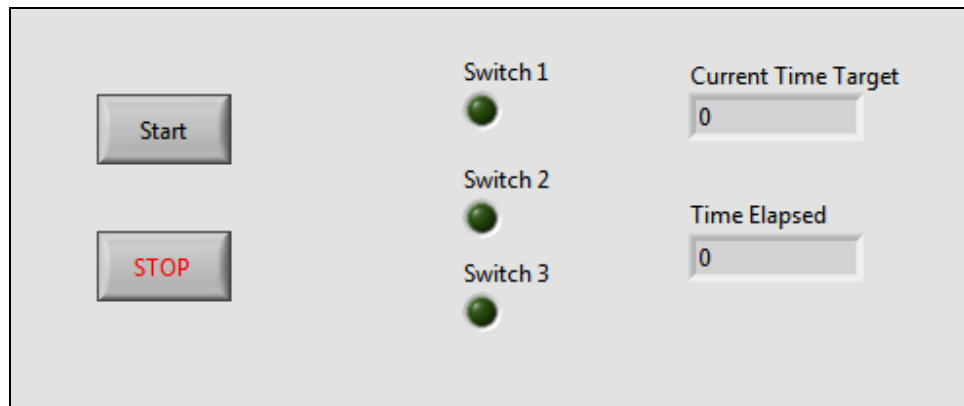

Figure 1. Application Front Panel

General Operation

The application runs steps based on the order listed in the file. The steps either set the time for the timer, or display the Boolean state data and elapsed time. The front panel displays the **Current Time Target**, the **Time Elapsed**, and the **Switch** ON/OFF states. When time has elapsed, the application runs the next step.

Application Terminology

Time Target

The time, in seconds, for the timer. This value can only be set during a SetTime step.

Elapsed Time

This indicator must continuously display the elapsed time in seconds.

Data file format

Each row contains five elements. The step command is the first element of each row. The data is the last four elements of each row.

The five element data format of each row is:
- Step Command, The step time, Switch 1, Switch 2, Switch 3.
- **For example:** SetTime, 5, TRUE, False, True

The first step must be a Set Time step. Otherwise the timer will default to a zero time target.
Note: The application must be case insensitive to the string data.

Step Commands

The commands are steps in the state machine. There are two types of commands.

- **SetTime:** This command sets the time *and* starts the timer. The SetTime step uses the step time data only.
- **RunState1 and RunState2:** There are two Run steps. Their function is to display their corresponding Boolean values in the **Switch** LEDs. These steps also display the elapsed time and current time target. The run states do not use the time target data.

Initialization

The application must initialize as shown in Figure 1, and the front panel controls and indicators must be in the following states.

- **Current Time Target:** Set to 0 seconds
- **Switch LEDs:** Set to OFF
- **Time Elapsed:** Set to zero

General Operation

VI Run

When the **Start** button is pressed the sequencer loads the file data and then starts running the steps. The first step must be a SetTime step, otherwise the timer defaults to zero seconds. The action taken for subsequent steps depends on the step command.

SetTime Command:

- Use the Step Time for the timer and restart the timer
- Move to the next step

RunState Command:

- Use the Boolean values to set the Switch LEDs to ON/OFF
- Continue running this step until the time elapsed
- When time elapses restart the timer and move to the next step

When all steps have been completed the application is idle. The indicators are set to zero or OFF.

Questions

For the sample solution: What are the complications for adding the **Stop** button to the event structure?