**Forcing Inputs in ModelSim – The Slightly Easier Way**

Consider the following truth table:

| W | X | Y | Z(W,X,Y) |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 1 |
| 0 | 1 | 0 | 1 |
| 0 | 1 | 1 | 1 |
| 1 | 0 | 0 | 0 |
| 1 | 0 | 1 | 1 |
| 1 | 1 | 0 | 0 |
| 1 | 1 | 1 | 0 |

In order to simulate a circuit whose output is Z, we will have to force the inputs to match each of the table rows. This can be time consuming, tedious and may lead to errors when done by hand.

In ModelSim, you may force a variable input to take on certain values over a certain timescale. For example consider the command (entered into the ModelSim command console at the bottom of the application):

```
force W 0 100
```

This command forces the input W to be 0 at 100 nanoseconds. We may chain these forces together with a comma to get different behavior:

```
force W 0 0, 1 100
```

The above command will force W to be 0 at time 0, and then 1 at time 100ns. We may also specify a repeat flag and timescale for forces:

```
force W 0 0, 1 100 -repeat 200
```

This will force W to 0 at 0ns and 1 at 100ns. The cycle will restart every 200ns. In this way, we can make W alternate between 0 and 1 every 100ns.

You may want to use this in order to enumerate all behavior in the truth table. Say that Y alternates between 0 and 1 every 100ns. Looking at X, it alternates at half the rate of Y, and W alternates at half that rate – so X would alternate every 200ns, and W every 400ns. In order to enumerate the full truth table on the previous page, we need 4 commands:

force W 0 0, 1 400 -repeat 800

force X 0 0, 1 200 -repeat 400

force Y 0 0, 1 100 -repeat 200

run 800

This will enumerate each of the values in the previous truth table one time – you can imagine extending the truth table to include an additional bit, say V, to the left of W. In order to include V and enumerate all states, we would simply add

force V 0 0, 1 800 -repeat 1600

And then:

run 1600

In order to enumerate the new truth table.

Below is a screenshot of the simple circuit of the truth table on the previous page: