**ModelSim Simulation: Buzzer & Mux4\_1**

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**Objective:**

The objective of this assignment is to create a Buzzer circuit simulation using Modelsim and subsequently create mux\_4\_1 circuit with.

# **Description of Specifications, and Functionality:**

The digital system I used in this assignment is ModelSimSetup-20.1.1. In the VHDL editor, I wrote my VHDL code to get the circuit output and then used Modelsim to simulate and run my circuit over time (ns unit).

1. **Buzzer Circuit**

In figure 1, I inserted my code from the page and then compiled ***buzzer.vhd*** successfully.

Graphical user interface, application

Description automatically generated

Figure 1:Buzzer vhdl file

In figure 2, I created the waveform for the ***buzzer.vhd*** and we can see the output.

Graphical user interface

Description automatically generated

Figure 2: Waveform Output

In figure 3, I did the AND2 component and it compiled succesfuly.

Graphical user interface, text, application

Description automatically generated

Figure 3: AND2 component

In figure 4, I did the OR2 component and it compiled succesfuly.

Graphical user interface, application

Description automatically generated

Figure 4: OR2 component

In figure 5, I did the NOT1 component and it compiled succesfuly.

Graphical user interface, application

Description automatically generated

Figure 5: NOT 1 component

1. **4:1 mux 1-bit**

In figure 6, I added the existed the file in the new project and then compiled it. As we can, the VHDL compiled successfully.

Graphical user interface, text, application

Description automatically generated

Figure 6: Mux\_4\_1

In figure 7, we can see the final output of all the waveforms.

Graphical user interface, application

Description automatically generated

Figure 7: MUX\_4\_1 simulation waveform

**Explanation:**

For part A, I used the page code and then compiled them. For the mux\_4\_1, I did the same thing. I used the boolean expression to check my work. I set the wave and clock pattern and attributes in that way. Then I ran the simulation to see if my output wave matched with the truth table and it did. Hence, the waveforms are right.

**Conclusion:**

This assignment was helpful to learn modelism and simualtion in Modelism software. It was a thorough and brief practice to learn the software. The operations and condition logics were helpful to learn easily. The truth table helped me to get the circuit waveform quicker. I relearned and reviewed the concept again and which will help me in the course further.