

COS10004: Computer Systems

Assignment 1 – Music Player

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Circuit Description:

Overall, we can see that the ON/OFF button is connected with all the LED lights in the circuit, also the HEX Digit Display, which will all goes off if the circuit is in the OFF state but will still save the last processes.

Part 1a, 1b:

There are two buttons, PLAY and PAUSE that defines the PLAY/PAUSED state of the music player, depends on which button is being pressed. To make the circuit has the state like the requirements, which is pressing 2 PAUSE buttons then it becomes PLAY state, I utilize the Toggle State of the J-K Flip Flop for this music player state.

Part 2:

- The Volume ++ and Volume -- buttons are created to adjust the volume of the music player. The part to increase the volume includes the AND, OR gates with the D Flip-Flops, while the decreasing-volume part includes the NOT, AND and also NAND gate.
- There are 8 different D Flip Flops connected with 8 LED lights (8 volume levels)
- In the increasing-volume part, the first Flip-flop's output is connected to the AND gate of second volume level, and the second Flip-flop's output is connected to the AND gate of third volume level and so on. Therefore, the volume can be increased continuously.

Whereas the part that includes NOT and NAND gate at the middle of the circuit is connected to the input of one Flip-flop's input, which is to adjust the output the LED lights, to decrease the volume gradually from 8 to 0.

Part 3:

These Next and Previous buttons are used for choosing tracks in detail based on the hex digit display.

- The AND4 gate adds 0001 to the track number. The AND “NEXT” gate makes sure that when Next >> button is clicked and the track number is 09, the adder's output is 0A. The output of NEXT gate then will be 1, thereby resetting some D-flip-flops, as well as 0001 to the other flip-flop, results as 10.
- When adder 1 hits F, the lower adder decreases by 1111. This part also includes two four-bit adders. When NEXT >> button is clicked, one input to each adder will be similar to each HEX display, and other input to the adder will be 0001 when PREVIOUS << button is clicked and 1111 when next track is clicked.

Part 4:

ON (PLAYED state), ON (PAUSED state) and OFF state are already displayed at the first part.

Part 5:

Throughout the part 2, the two volume buttons are connected to an OR gate, which has the output connected to an AND gate with the ON/OFF button of the music player. This AND gate goes along with a Buffer, will acts as a clock for the Flip-Flops. As a result, if the music player is at OFF state, the Flip-flops will remain their state, which explains why the music player full settings can be stored.

Circuit Screenshots:







