COL215 LAB Assignment 9 : FIFO Buffer

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1 Aim

Learn how to create a FIFO buffer by first instantiating a memory component

2 Design

Input is taken from 2 push buttons : left(push), right(pop) and 8 switches.

Initially the display shows nothing and the fifo buffer is empty.

We press the left push button to store whatever is the current number represented by the switches configuration.

All these values are stored in the BRAM upto a depth of 16.

Once full, the BRAM accepts no new values and if tried to push something then display is disabled in case it is on already.

The elements can be popped on press of right push button whenever BRAM has a non empty elements in it.

When all elements are popped and displayed on the screen, any more attempt to pop will disable display until more elements are pushed in and popped.
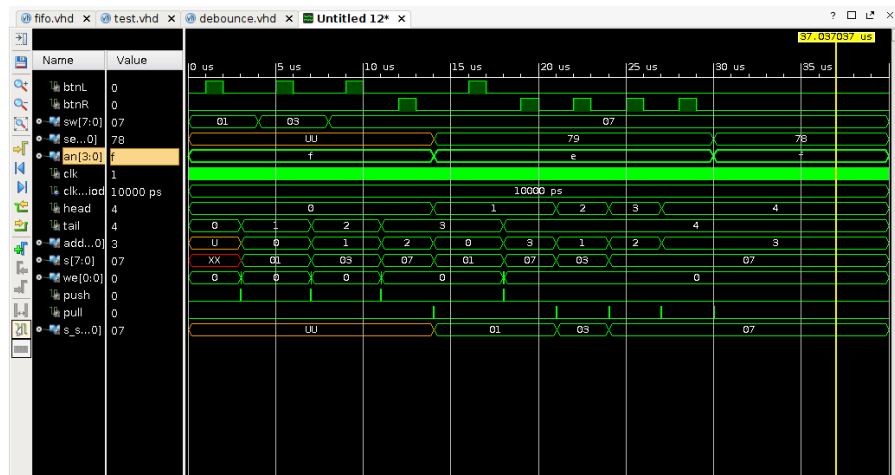
3 Simulation

The code is simulated on test-bench created by the name test.vhd.

The below simulation show simple push and pop of data through fifo buffer.
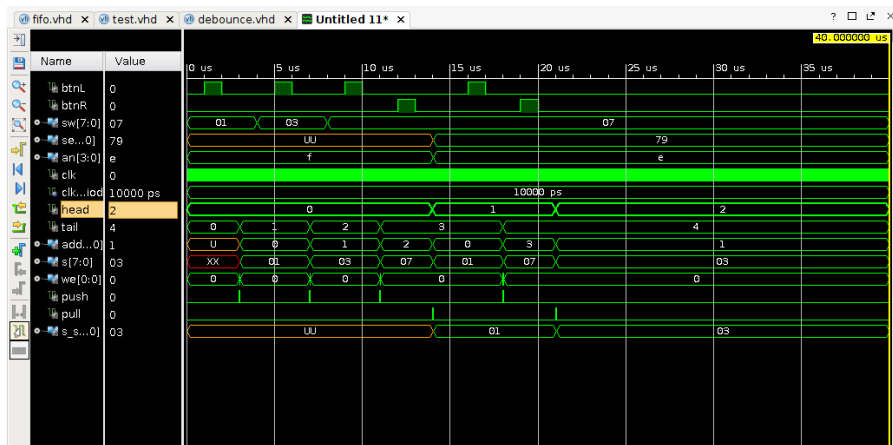
The below image shows the case when all elements are popped and buffer is empty still someone presses the right push button to pop further more data -¿ in this case display is disabled.

The below image shows the case when buffer is full still someone presses left push button to push more data -¿ the display is disabled in this case also.
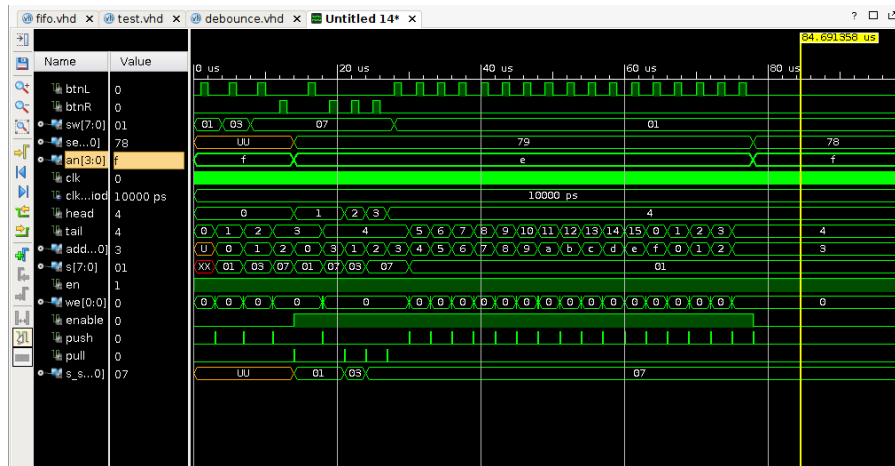
4   Utilisation Report

102 LUT's are used (as logic)
81 registers are used as flip-flops.
22 Input Output Blocks are used (1 clock input(clk) and 7 segment outputs(seg) and 4 display outputs(an) and 2 buttons(btnL,btnR), 8 switches(sw))
1 BUFGCTRL is used (to enable clock)

1 bram blk mem gen 0 0 is used as block memory for storage of file content.
The bram itself takes 0.5 Block RAM Tile and 1 RAMB18E1 primitive.

```
+----------+------+--------------------+
| Ref Name | Used | Functional Category |
+----------+------+--------------------+
| FDRE     |   81 |      Flop & Latch |
| LUT1     |   52 |               LUT |
| LUT4     |   21 |               LUT |
| LUT6     |   14 |               LUT |
| CARRY4   |   14 |        CarryLogic |
| OBUF     |   11 |                IO |
| LUT5     |   11 |               LUT |
| IBUF     |   11 |                IO |
| LUT3     |   10 |               LUT |
| LUT2     |    6 |               LUT |
| BUFG     |    1 |             Clock |
+----------+------+--------------------+
```

(Utilisation report is also given in the submission.)