Universal Shift Register

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Abstract—**This paper presents the design of a Universal Shift Register. Universal A register that can store the data and /shifts the data towards the right and left along with the parallel load capability is known as a universal shift register. It can be used to perform input/output operations in both serial and parallel modes.**

Keywords—**Universal Shift Register**

I.DESCRIPTION

If a register can shift data in either right or left, then it is called Unidirectional Shift Register. If a register can shift data in both directions, then it is called Bidirectional Shift Register. Along with bidirectional shifting if we have parallel loading it is called Universal Shift Register. Here the following operations can be performed:

- Serial IN Serial OUT
- Serial IN Parallel OUT
- Parallel IN Serial OUT
- Parallel IN Parallel OUT

Universal Shift Register has a wide range of applications. Some of them include:

- Used in micro-controllers for I/O expansion
- Used in parallel data transfer.
- Used as a memory element in digital electronics like computers.
- Used in time delay applications
- Used as frequency counters, binary counters, and Digital clocks
- Used in data manipulation applications.

To perform operation on 4-bit binary number, we need four 4:1 mux and four D flipflops. The modes of operations based on select lines are listed in the table below.

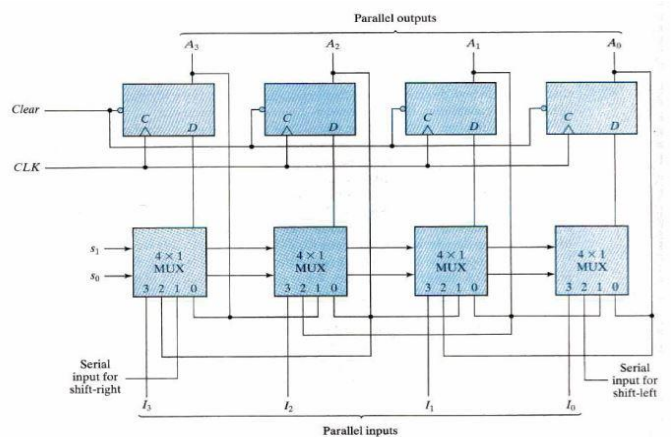| S0	S1	Mode of Operation
0	0	Locked state (No change)
0	1	Shift-Left
1	0	Shift-Right
1	1	Parallel Loading

II.CIRCUIT DIAGRAM

Fig. 1. Universal Shift Register Circuit Diagram

III.WAVEFORM

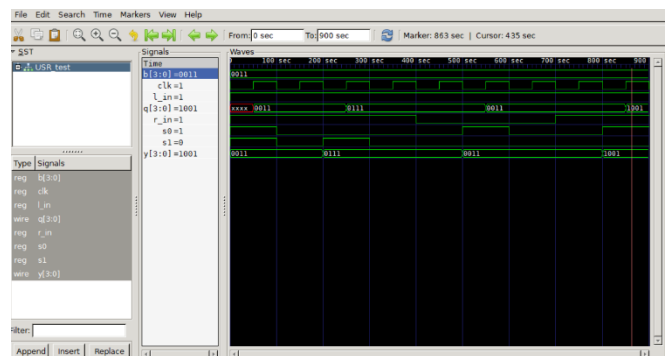The figure 2 shows the sample functioning of the design described in figure 1.

Fig. 2. Universal Shift Register in action

REFERENCES

[1] Universal Shift Register Digital Logic, https://cutt.ly/AZnChtf