

Universal Shift Register

Mohammed Latif Siddiq
Nadia Anjum

Bangladesh University of Engineering and Technology

August 3, 2018

Table of Contents

- 1 Introduction
- 2 Block Diagram
- 3 Basic Components
- 4 Circuit Diagram
- 5 Uses

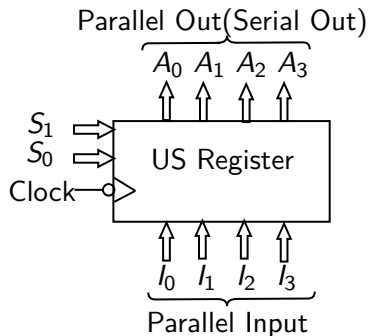
Universal Shift Register is a register which can capable to transfer data in both the shift-right and shift-left, along with the necessary input and output terminals for parallel transfer.

Universal Shift Register has two functions -

- Bidirectional Shifting
- Parallel Loading

Block Diagram

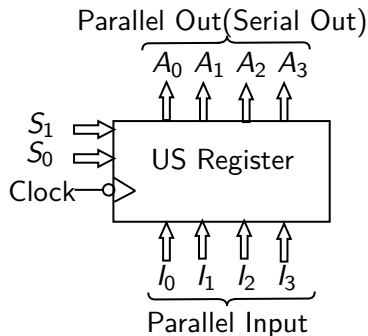
Block diagram and selection bits for 4 bit universal shift register :



| S_1 | S_0 | Register Operation |
|-------|-------|--------------------|
| 0 | 0 | No change |
| 0 | 1 | Shift Right |
| 1 | 0 | Shift Left |
| 1 | 1 | Parallel Load |

Block Diagram

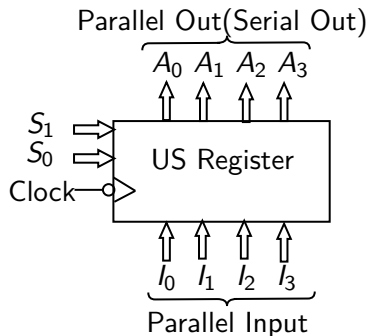
Block diagram and selection bits for 4 bit universal shift register :



| S_1 | S_0 | Register Operation |
|-------|-------|--------------------|
| 0 | 0 | No change |
| 0 | 1 | Shift Right |
| 1 | 0 | Shift Left |
| 1 | 1 | Parallel Load |

Block Diagram

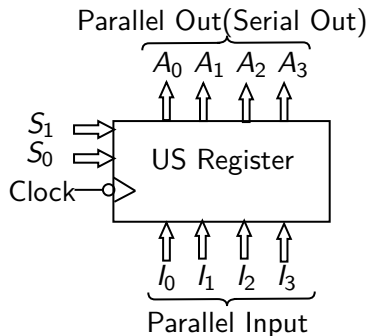
Block diagram and selection bits for 4 bit universal shift register :



| S_1 | S_0 | Register Operation |
|-------|-------|--------------------|
| 0 | 0 | No change |
| 0 | 1 | Shift Right |
| 1 | 0 | Shift Left |
| 1 | 1 | Parallel Load |

Block Diagram

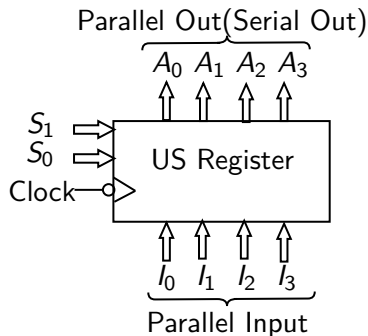
Block diagram and selection bits for 4 bit universal shift register :



| S_1 | S_0 | Register Operation |
|-------|-------|--------------------|
| 0 | 0 | No change |
| 0 | 1 | Shift Right |
| 1 | 0 | Shift Left |
| 1 | 1 | Parallel Load |

Block Diagram

Block diagram and selection bits for 4 bit universal shift register :



| S_1 | S_0 | Register Operation |
|-------|-------|--------------------|
| 0 | 0 | No change |
| 0 | 1 | Shift Right |
| 1 | 0 | Shift Left |
| 1 | 1 | Parallel Load |

Basic Components of Universal Shift Register

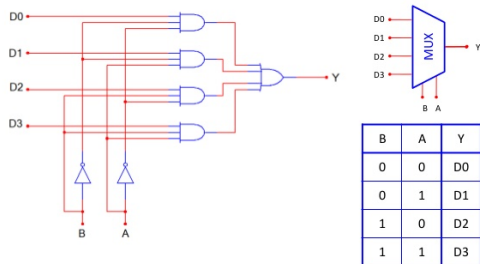
Universal Shift Register has two main components -

- 4 to 1 Multiplexer
- D Flip-Flop

Components of Universal Shift Register

- 4 to 1 Multiplexer

4-to-1 Multiplexer (MUX)



6

Components of Universal Shift Register

- D Flip-Flop

D Flip-flop

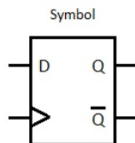
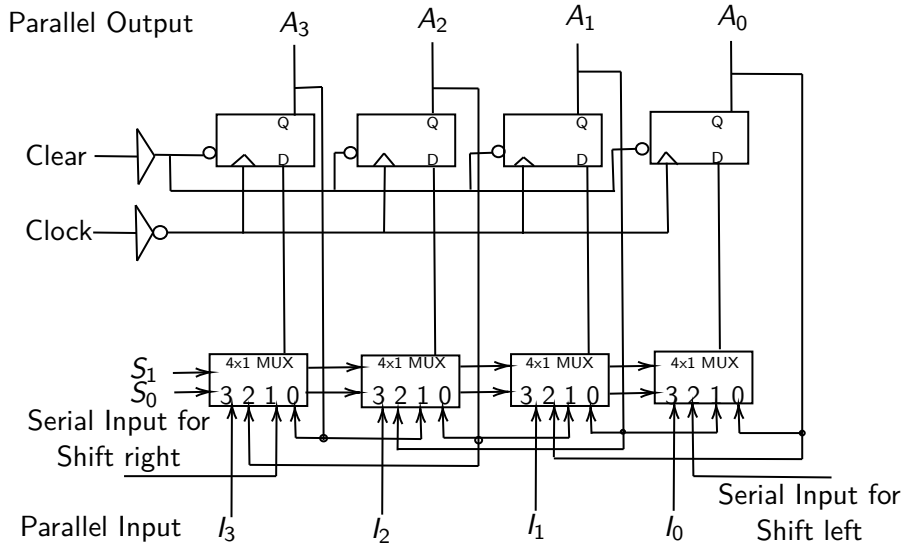


Table of truth:

| clk | D | Q | \bar{Q} |
|-----|---|---|-----------|
| 0 | 0 | Q | \bar{Q} |
| 0 | 1 | Q | \bar{Q} |
| 1 | 0 | 0 | 1 |
| 1 | 1 | 1 | 0 |

Circuit Diagram

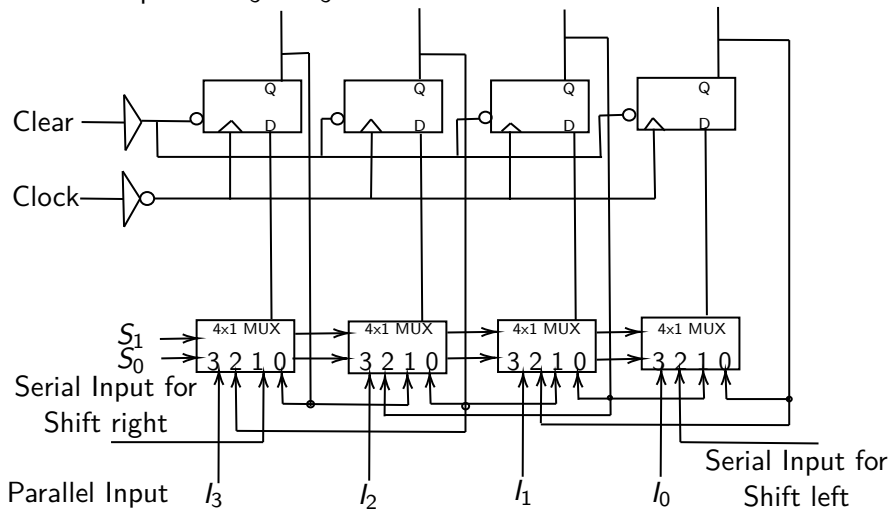
Circuit diagram for 4 bit universal shift register



Unchanged of Output in Universal Shift Register

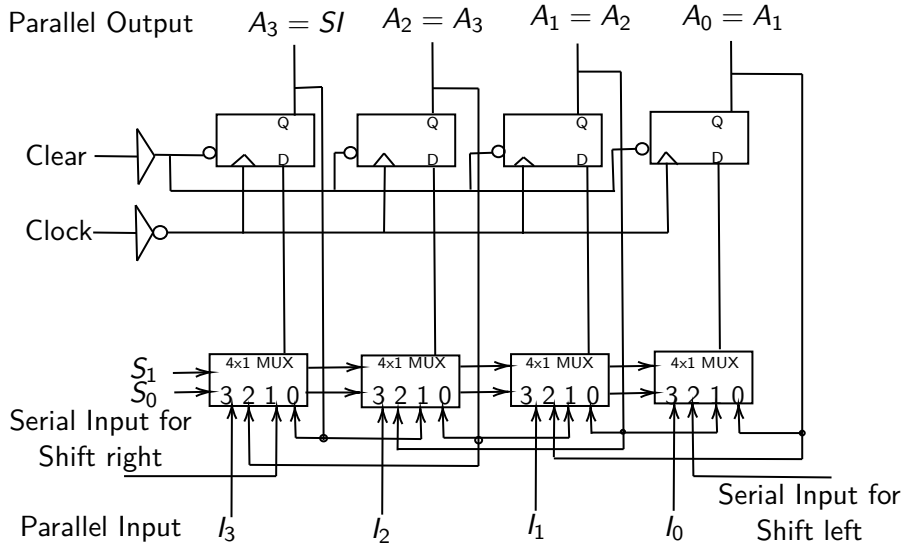
When $S_0 = 0$ and $S_1 = 0$, output will changed.

Parallel Output $A_3 = A_3$ $A_2 = A_2$ $A_1 = A_1$ $A_0 = A_0$



Right Shift in Universal Shift Register

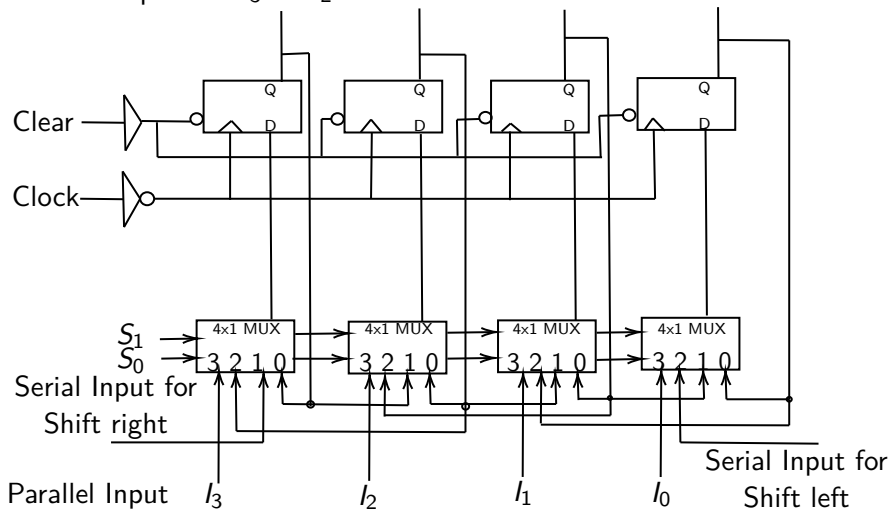
When $S_0 = 1$ and $S_1 = 0$, data will be shifted right.



Left Shift in Universal Shift Register

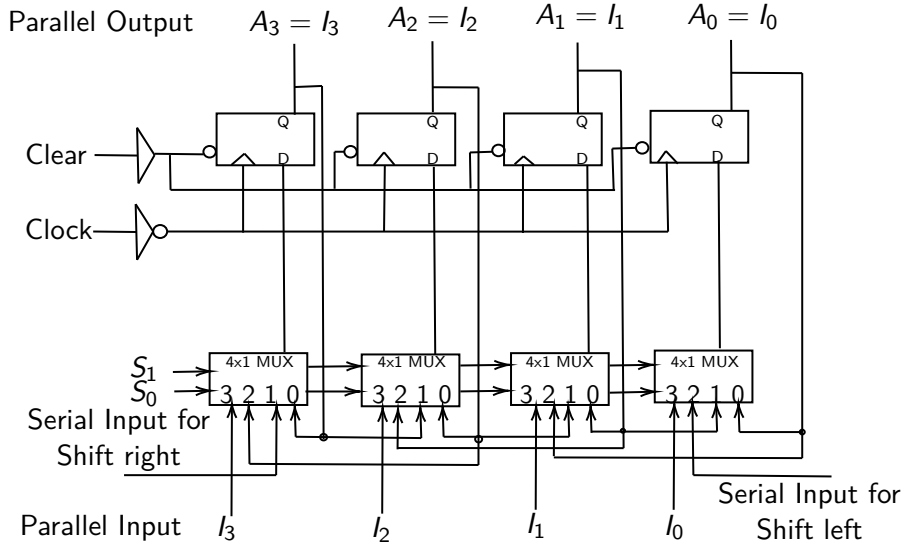
When $S_0 = 0$ and $S_1 = 1$, data will be shifted left.

Parallel Output $A_3 = A_2$ $A_2 = A_1$ $A_1 = A_0$ $A_0 = SI$



Parallel Load in Universal Shift Register

When $S_0 = 1$ and $S_1 = 1$, data will be loaded from parallel input.



Purposes of Universal Shift Register

We can use **Universal Shift Register** in different purposes :

- Temporary data storage
- Data transfer
- Data manipulation
- As counters.

Uses of Universal Shift Register

In practical scenario , **Universal Shift Register** is used for

- Serial communication of micro controller unit
- Multiplying binary numbers
- Storing ALU's operands, intermediate results and final results

For performing **Universal Shift Register** operations,different ICs are used.

Example : IC 74194 (4 bit) and 74198 (8 bit)



Figure: IC 74194



Figure: IC 74198



Thank You!
Any Questions?