Universal Shift Register

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Introduction

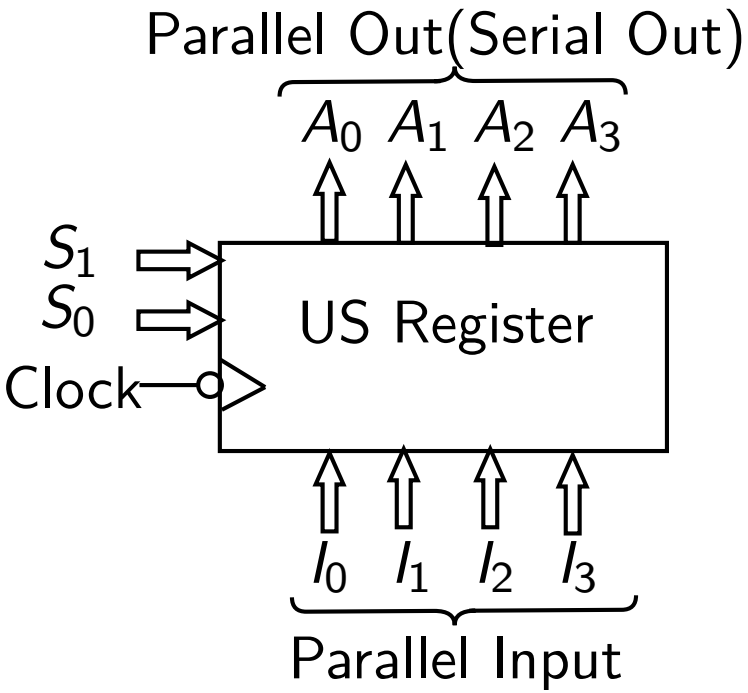
Universal Shift Register is a register which can capable to transfer data in both the shift-right and shift-left, along with the necessary input and output terminals for parallel transfer.

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

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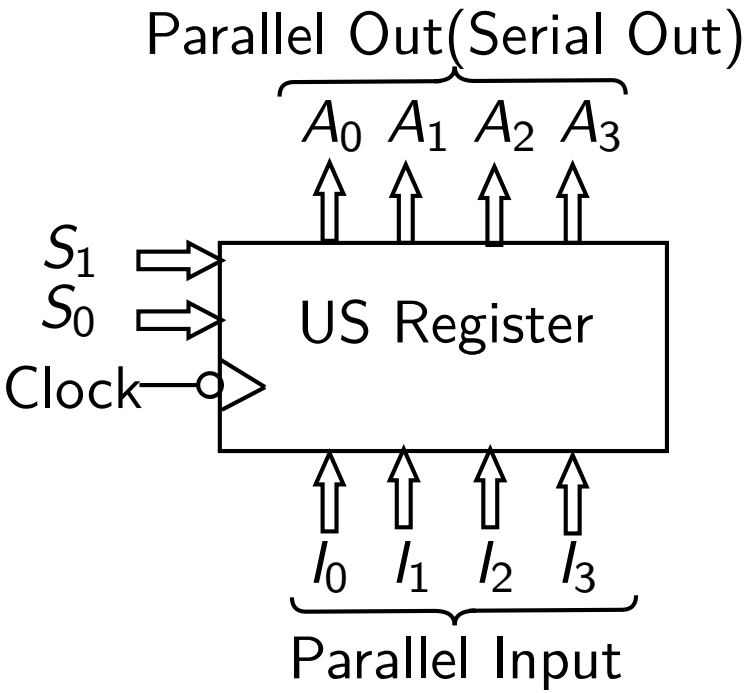

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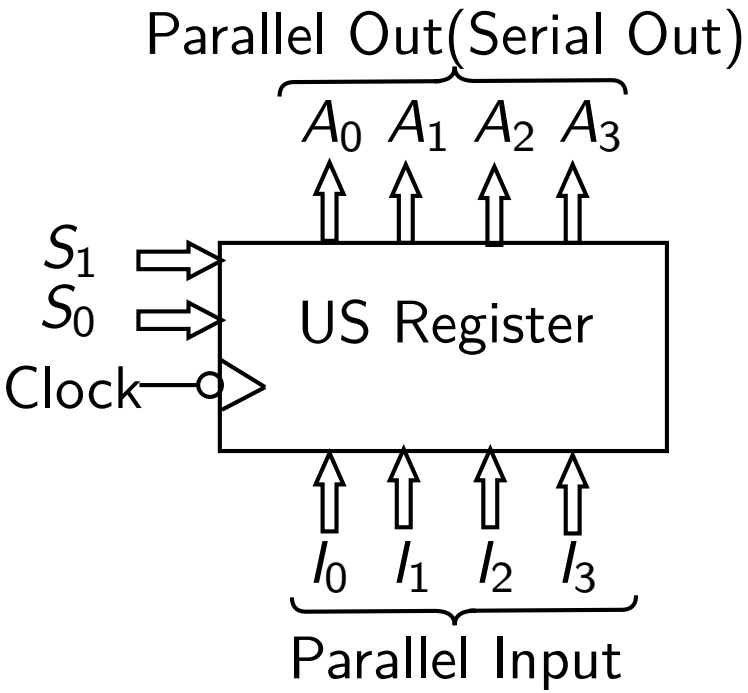

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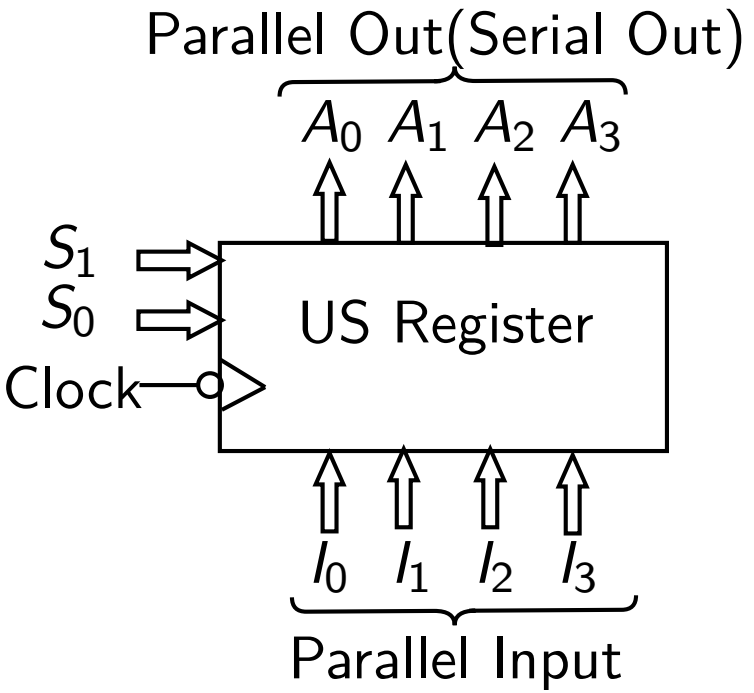

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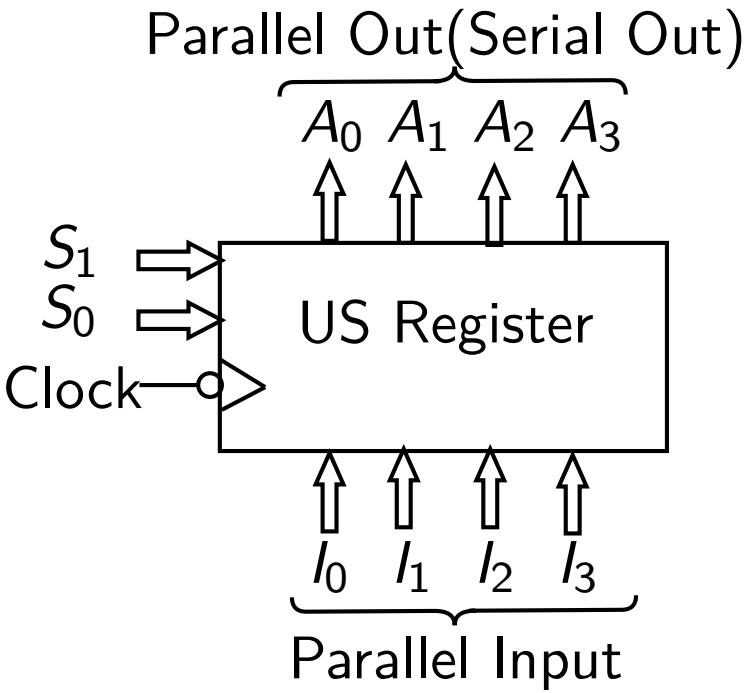

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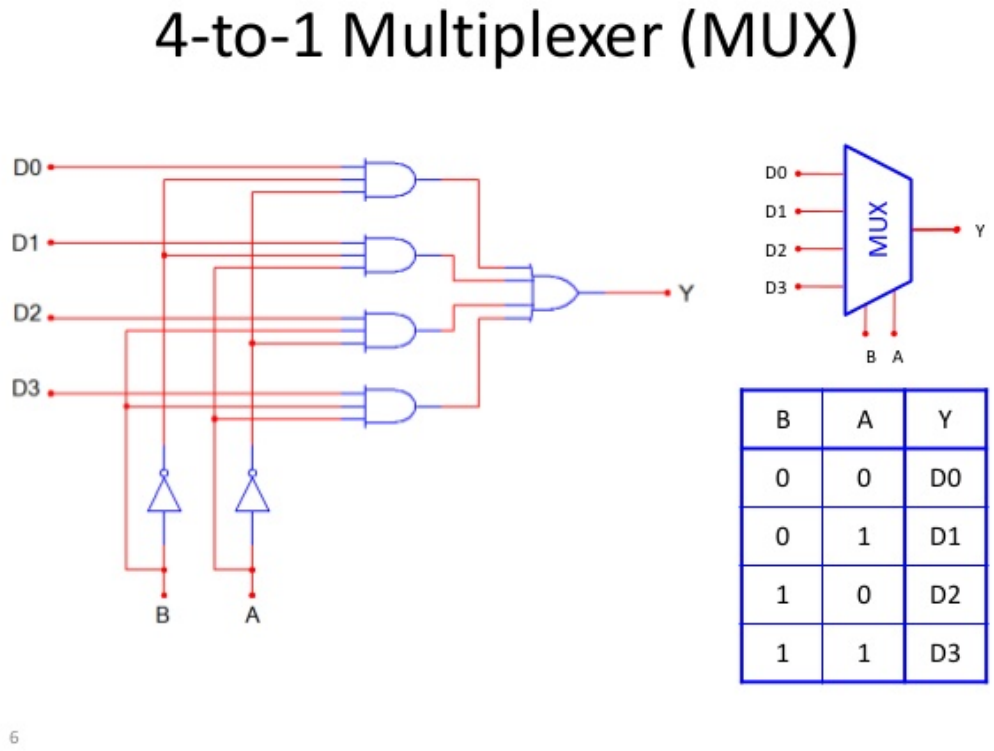
Components of Universal Shift Register

Universal Shift Register has two main components -

- 4 to 1 Multiplexer
- D Flip-Flop

Components of Universal Shift Register

- 4 to 1 Multiplexer



B	A	Y
0	0	D0
0	1	D1
1	0	D2
1	1	D3

Components of Universal Shift Register

- D Flip-Flop

D Flip-flop

Symbol

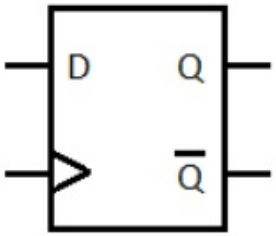
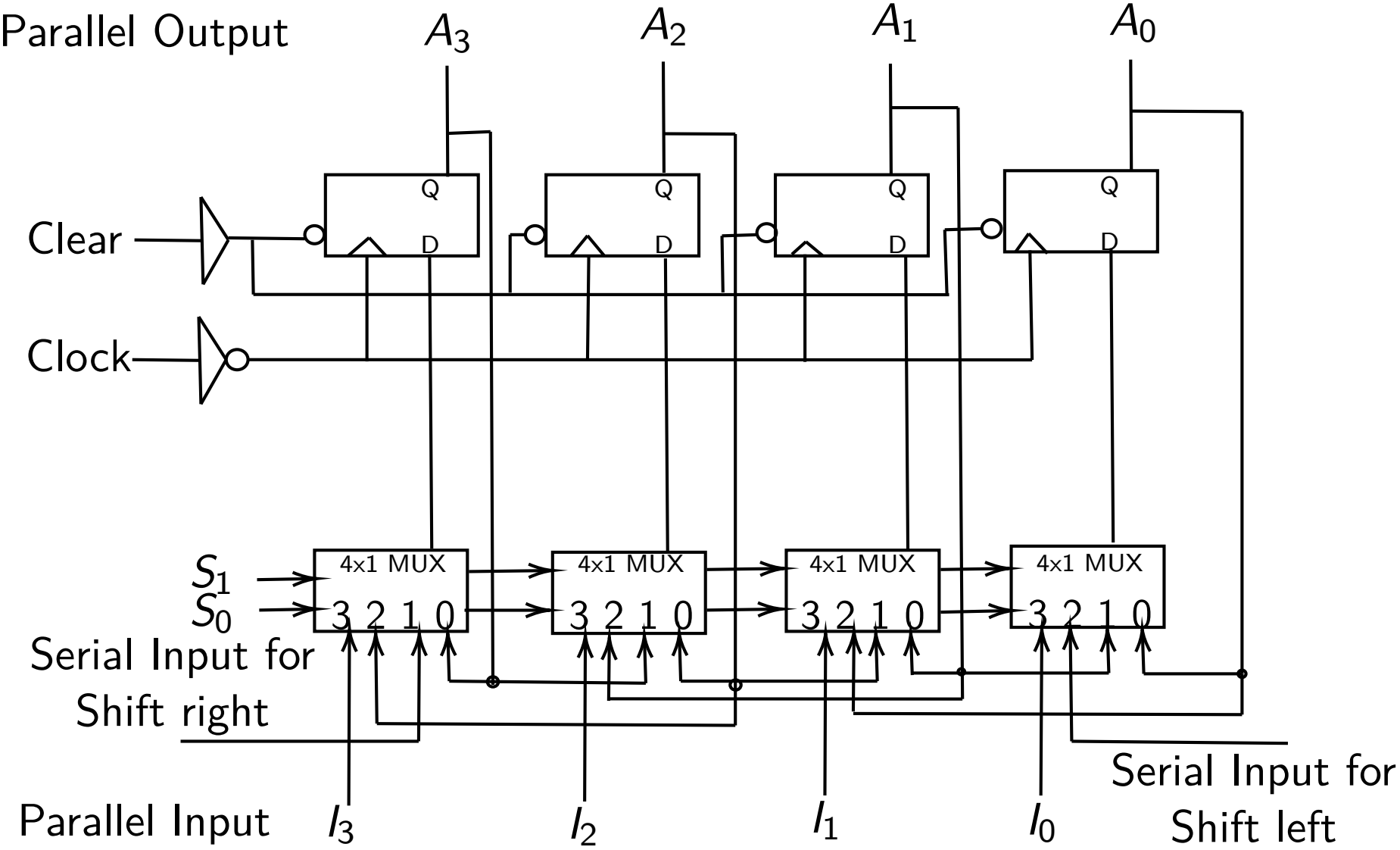


Table of truth:

clk	D	Q	$\overline{Q}$
0	0	Q	$\overline{Q}$
0	1	Q	$\overline{Q}$
1	0	0	1
1	1	1	0

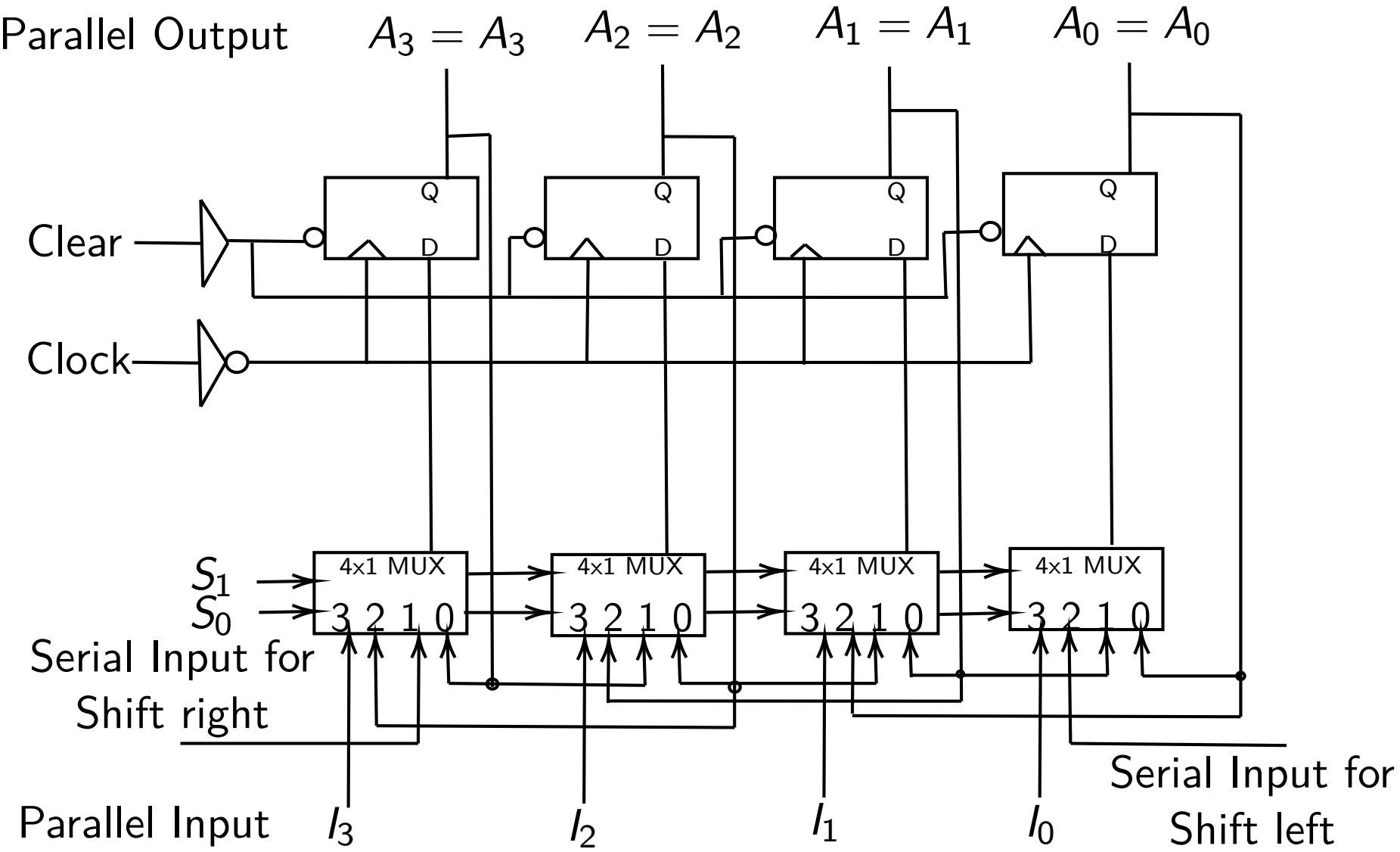
Circuit Diagram

Circuit diagram for 4 bit universal shift register



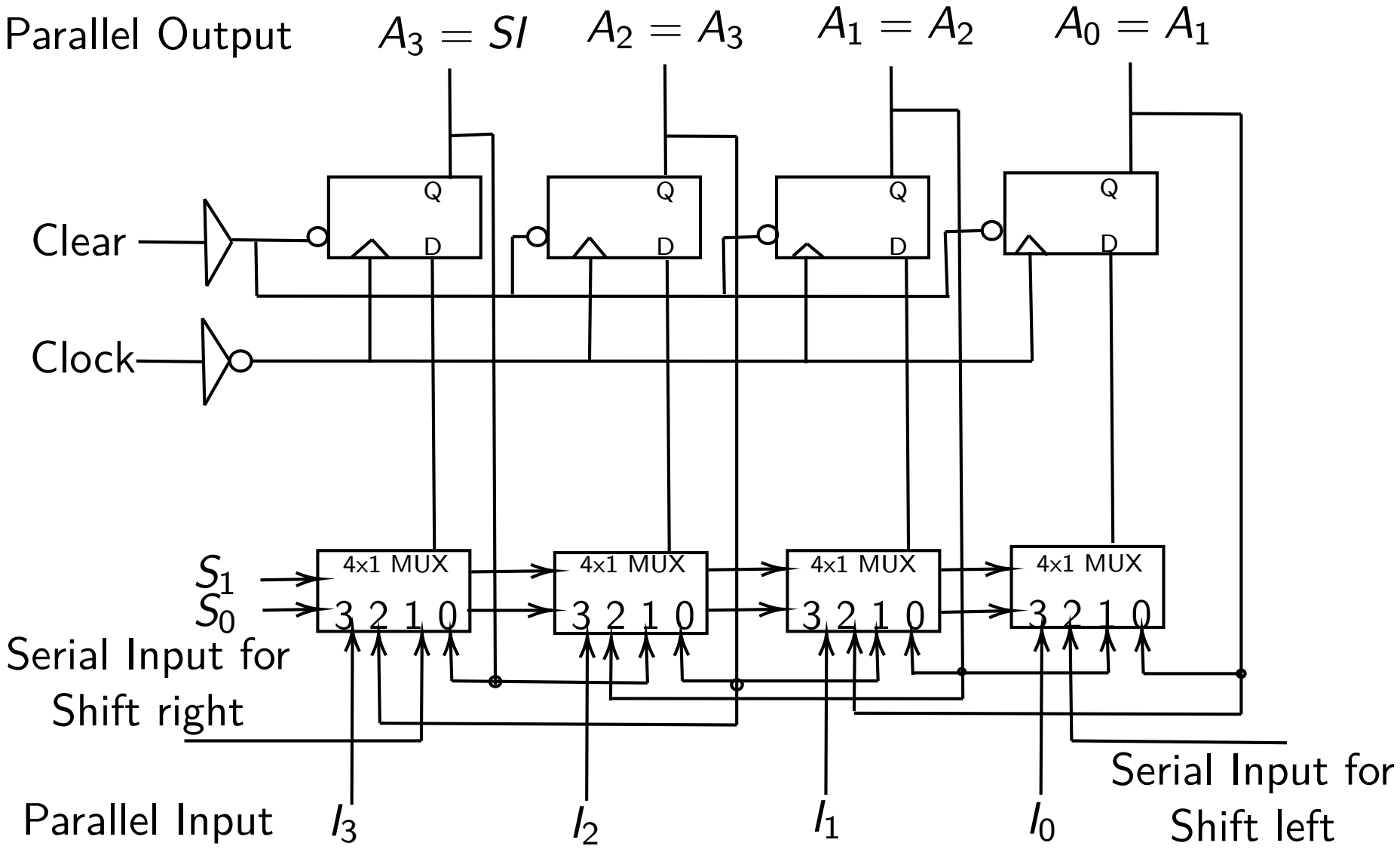
Unchanged of Output in Universal Shift Register

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



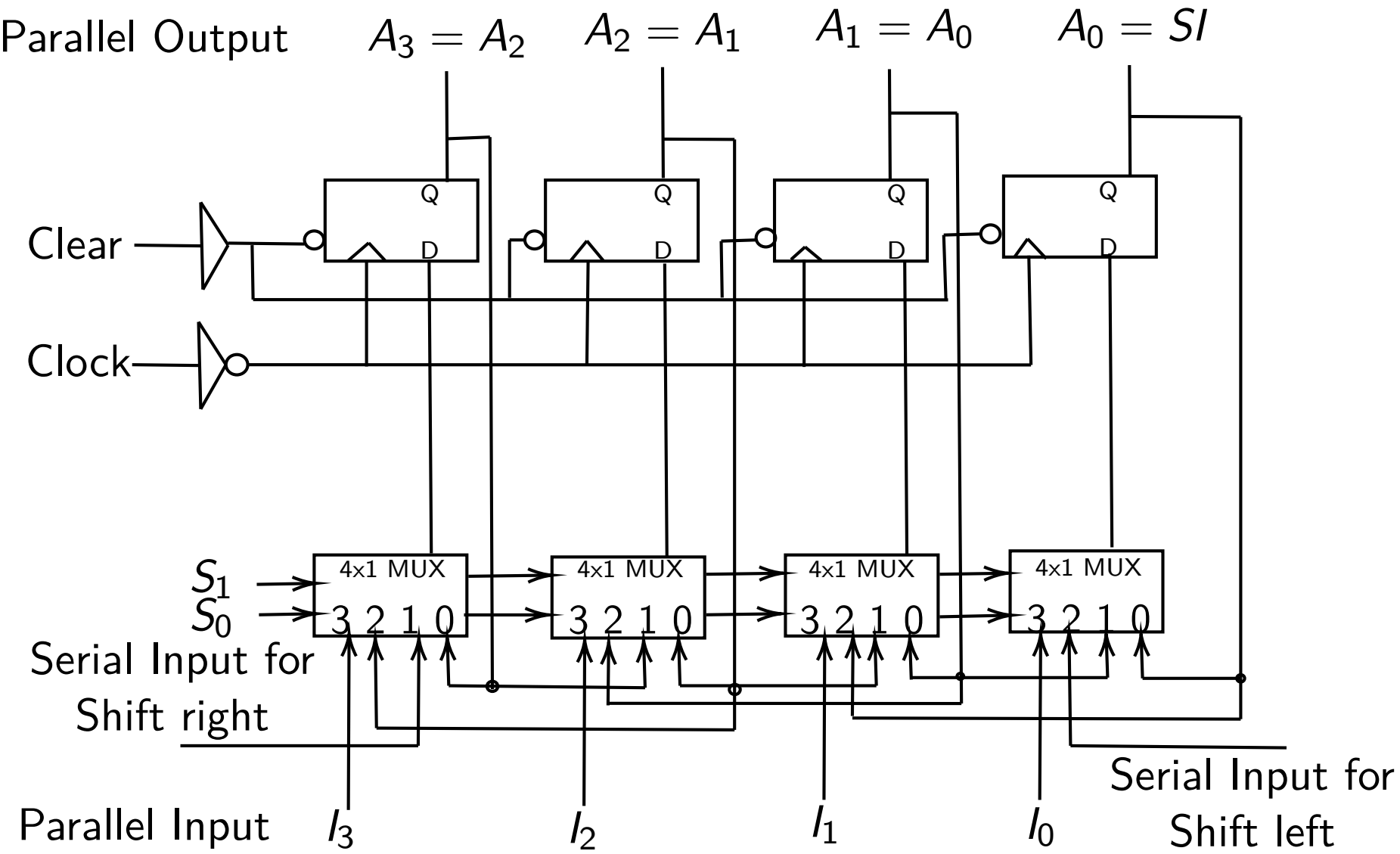
Right Shift Universal Shift Register

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



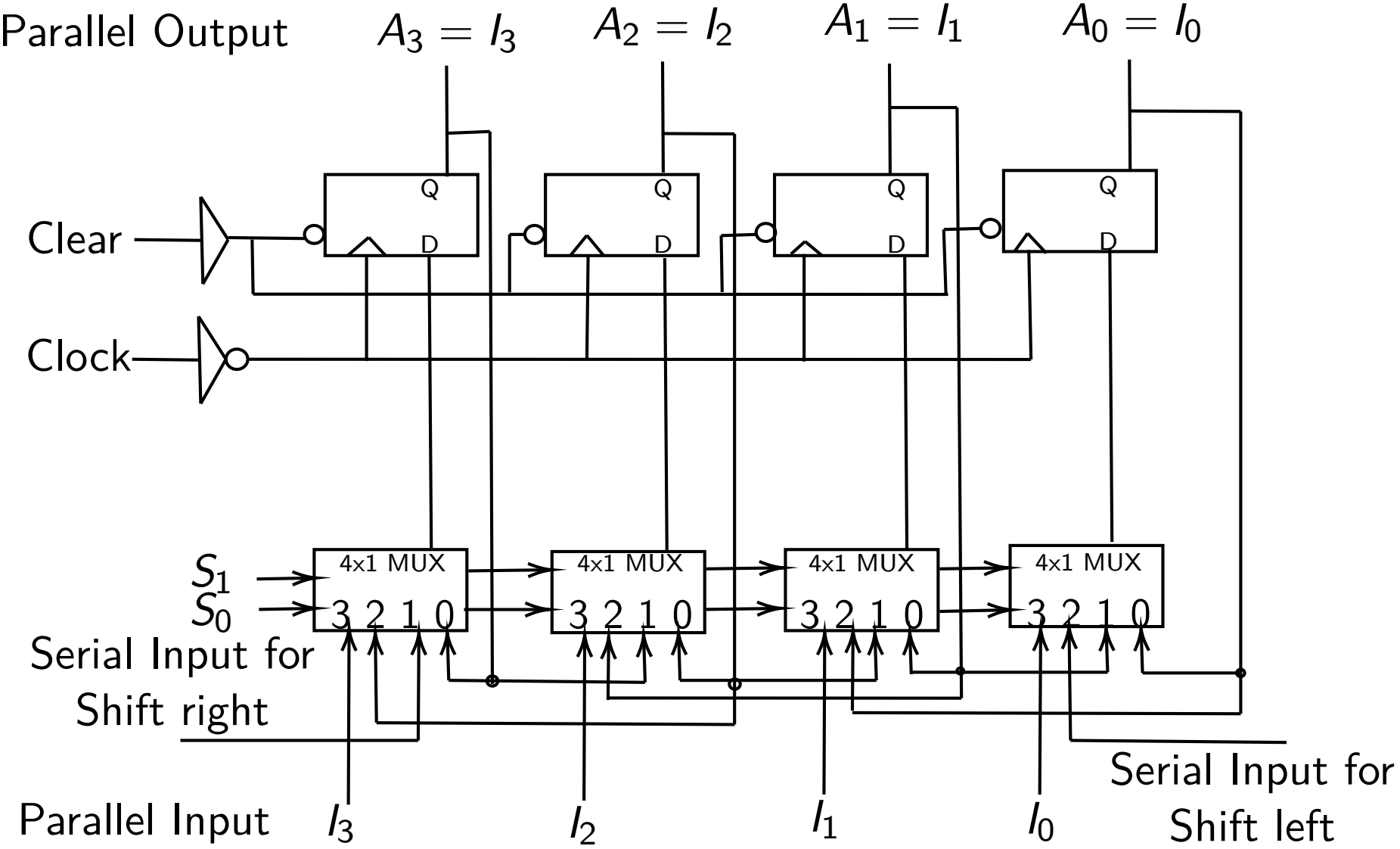
Left Shift in Universal Shift Register

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



Parallel 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)

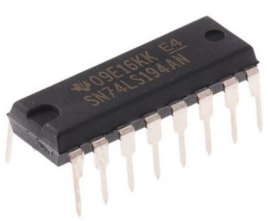


Figure: IC 74194

Figure: IC 74198

Thank you!
Any Questions?