





CST202

COMPUTER ORGANIZATION & ARCHITECTURE
PROCESSOR LOGIC DESIGN
DESIGN OF SHIFTER

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- The shift unit is attached to the ALU and it transfers the ALU result to output bus.
 - The basic shifter performs one of two main types of transformations on the data: right shift and left shift.
 - It can also pass the data as such without any shift.

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- Shifter can be a bidirectional shift register with parallel load.
 - A combinational shifter can also be constructed with multiplexers.

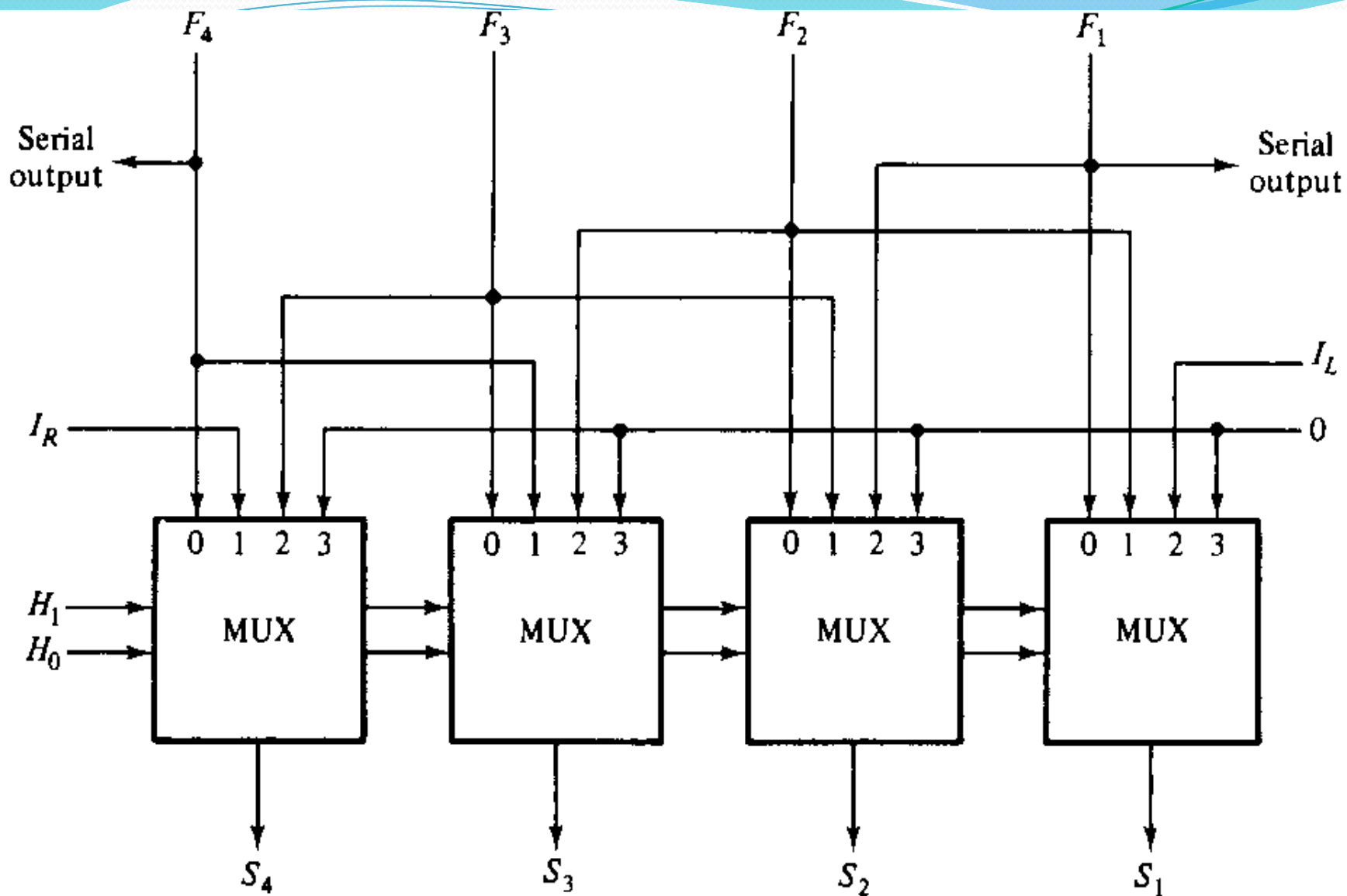



Figure 9-15 4-bit combinational-logic shifter

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- This is a 4 bit bi- directional shifter constructed using four 4:1 multiplexers.
 - The shift operation is controlled by two selection variables, H0 and H1.
 - Depending on the values of H0 and H1, the operation performed can be : no shift, right shift , left shift or outputting all zeros.

Shifter Functions

TABLE 9-7 Function table for shifter

H_1	H_0	Operation	Function
0	0	$S \leftarrow F$	Transfer F to S (no shift)
0	1	$S \leftarrow \text{shr } F$	Shift-right F into S
1	0	$S \leftarrow \text{shl } F$	Shift-left F into S
1	1	$S \leftarrow 0$	Transfer 0's into S

- The selection variable S is applied to all four multiplexers to select the type of operation within the shifter.
- $H1H0=00$ causes B to be passed through the shifter unchanged.
- $H1H0 = 01$ causes a right-shift operation
- $H1H0 = 10$ causes a left shift operation.
- $H1H0 = 11$ causes all 0's to given at output
- The right shift fills the position on the left with the value on serial input IR . The left shift fills the position on the right with the value on serial input IL .