

Digital Electronics and Computer Organization

Digital Design

Lecture 28: Sequential Multiplier



Birla Institute of Technology & Science, Pilani
Hyderabad Campus

8/2020

Innovate

achieve

1

lead

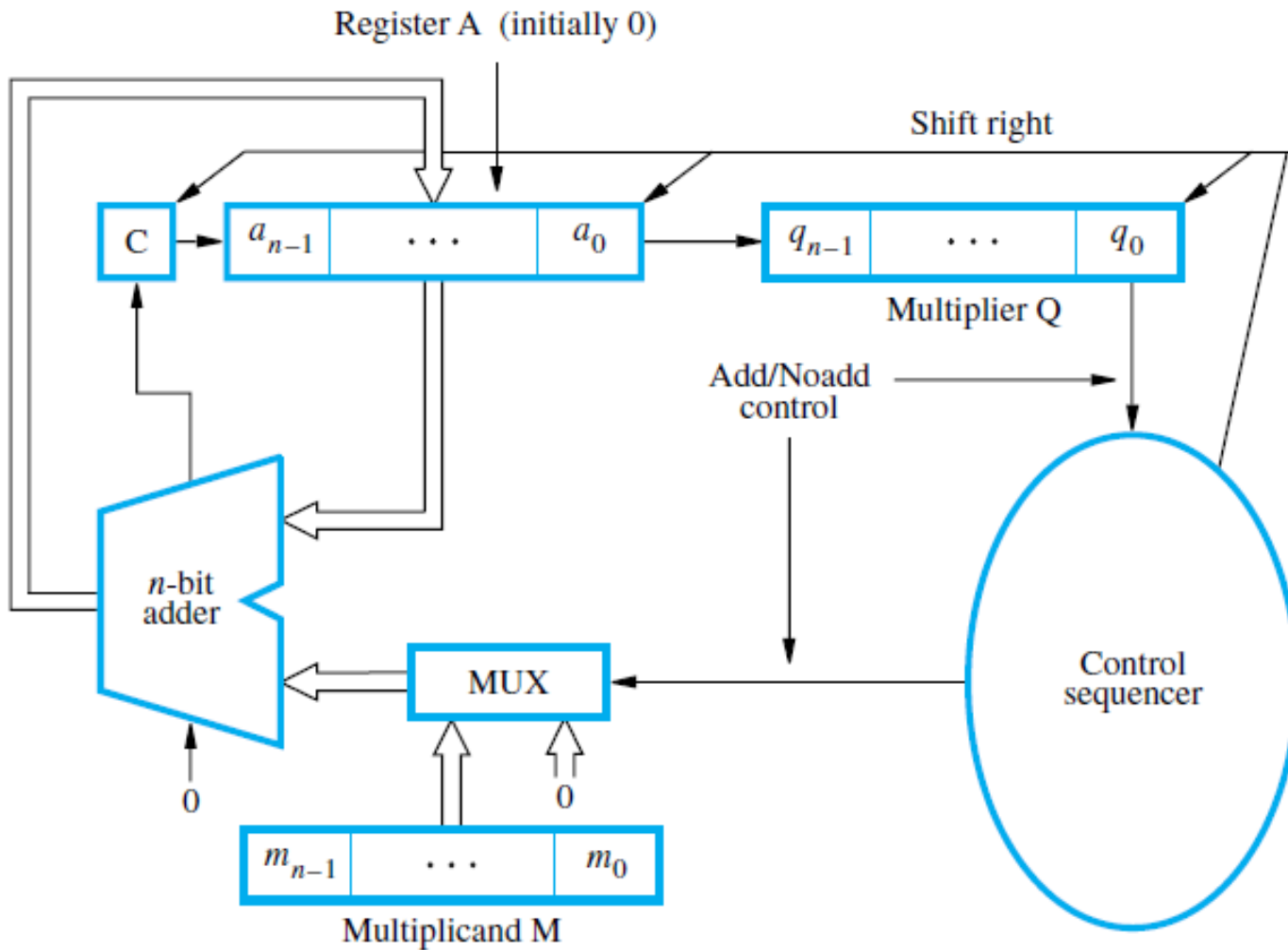


Sequential Multiplier

$$\begin{array}{rcccccc} & & & & 1 & 0 & 0 & 0 \\ & & & & x & 1 & 0 & 0 & 1 \\ \hline & & & & & 1 & 0 & 0 & 0 \\ & & & & & 0 & 0 & 0 & 0 \\ & & & & & 0 & 0 & 0 & 0 \\ & & 0 & 0 & 0 & 0 & & & \\ & 1 & 0 & 0 & 0 & & & & \\ \hline 1 & 0 & 0 & 1 & 0 & 0 & 0 & & \end{array}$$



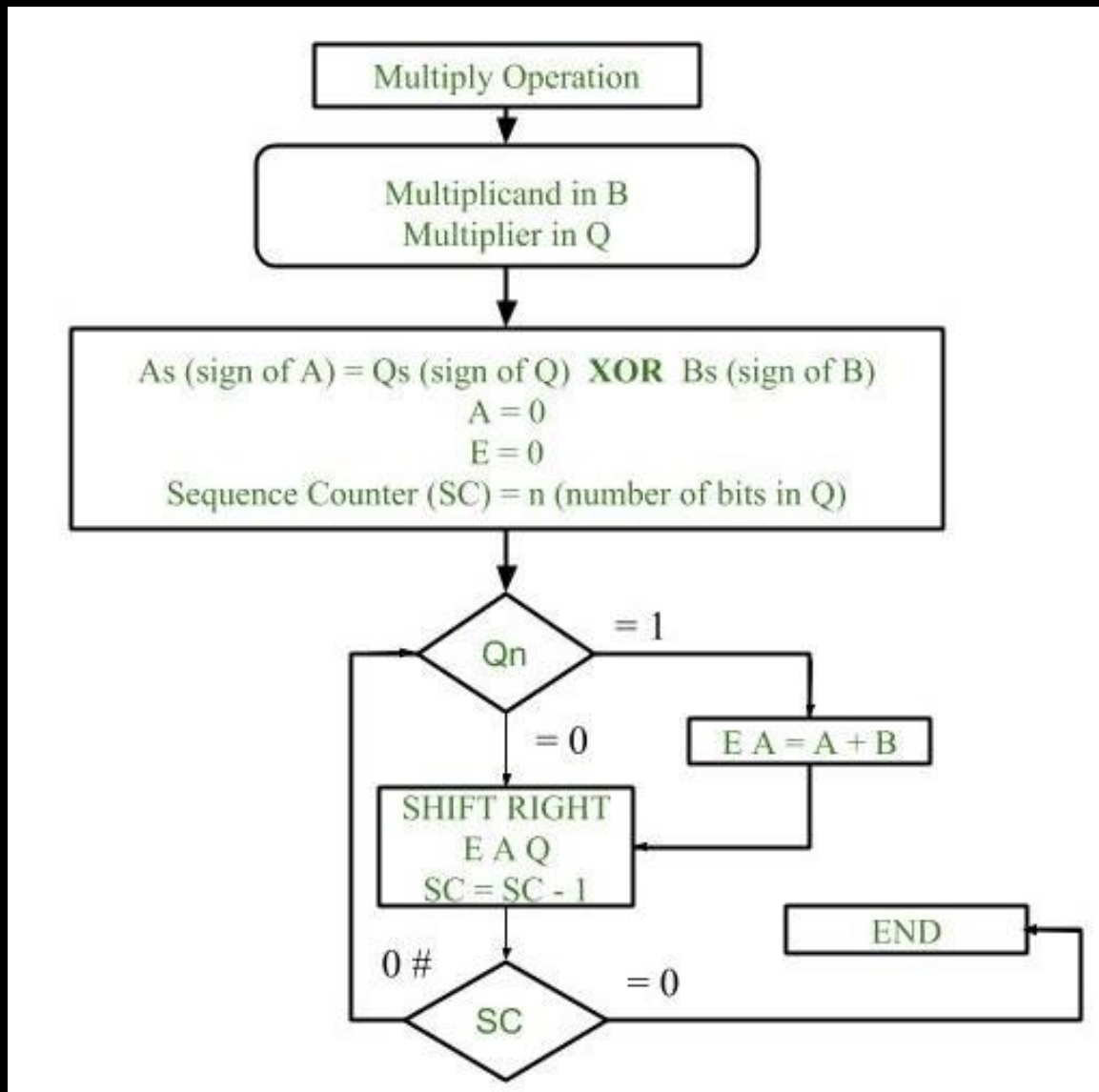
Sequential Multiplier



(a) Register configuration



Sequential Multiplier





Sequential Multiplier

Example:

| 3x5 | | | | |
|---------------------|------|-------|--------------|---|
| | M | A | Q | |
| Initial Condition | 0011 | 00000 | 010 1 | |
| Clk ↑ (Load) | 0011 | 00011 | 0101 | 1 |
| Clk ↓ (Shift Right) | 0011 | 00001 | 101 0 | |
| Clk ↑ (Load) | 0011 | 00001 | 101 0 | 2 |
| Clk ↓ (Shift Right) | 0011 | 00000 | 110 1 | |
| Clk ↑ (Load) | 0011 | 00011 | 110 1 | 3 |
| Clk ↓ (Shift Right) | 0011 | 00001 | 111 0 | |
| Clk ↑ (Load) | 0011 | 00001 | 111 0 | 4 |
| Clk ↓ (Shift Right) | 0011 | 00000 | 1111 | |



Sequential Multiplier

Example:

| 5x6 | | | | |
|---------------------|------|-------|------|---|
| | M | A | Q | |
| Initial Condition | 0101 | 00000 | 0110 | |
| Clk ↑ (Load) | 0101 | 00000 | 0110 | 1 |
| Clk ↓ (Shift Right) | 0101 | 00000 | 0011 | |
| Clk ↑ (Load) | 0101 | 00101 | 0011 | 2 |
| Clk ↓ (Shift Right) | 0101 | 00010 | 1001 | |
| Clk ↑ (Load) | 0101 | 00111 | 1001 | 3 |
| Clk ↓ (Shift Right) | 0101 | 00011 | 1100 | |
| Clk ↑ (Load) | 0101 | 00011 | 1100 | 4 |
| Clk ↓ (Shift Right) | 0101 | 00001 | 1110 | |



Thank You