Welcome To My Presentation

My Presentation Topics is

Counter & Register

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What is Counter?

- A **Counter** is a device which stores (and sometimes displays) the number of times a particular event or process has occurred, often in relationship to a clock signal.
- Counters are used in digital electronics for counting purpose, they can count specific event happening in the circuit.

- For example,

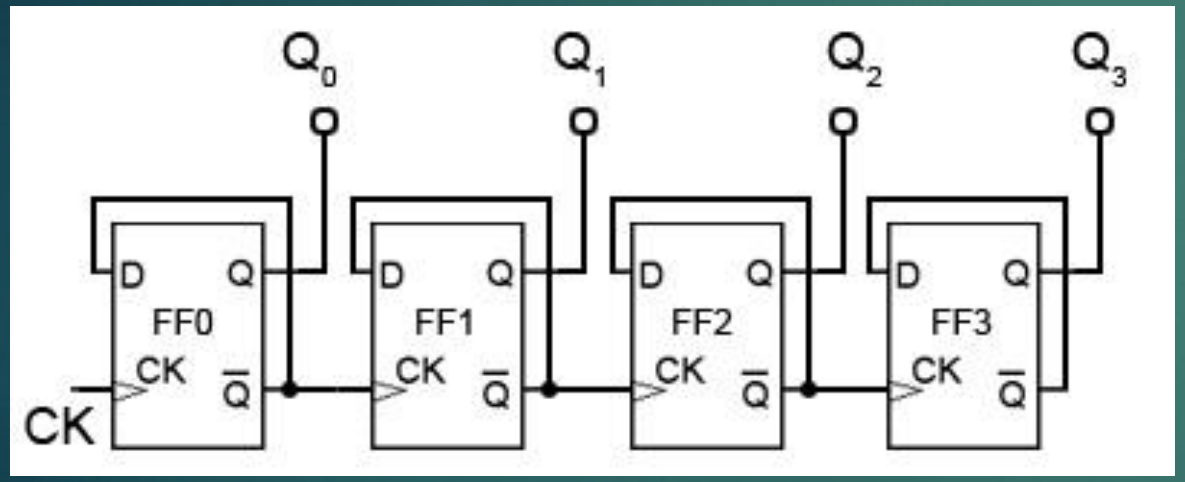
in UP counter a counter increases count for every rising edge of clock. Not only counting, a counter can follow the certain sequence based on our design like any random sequence 0,1,3,2… .

Counter Classification

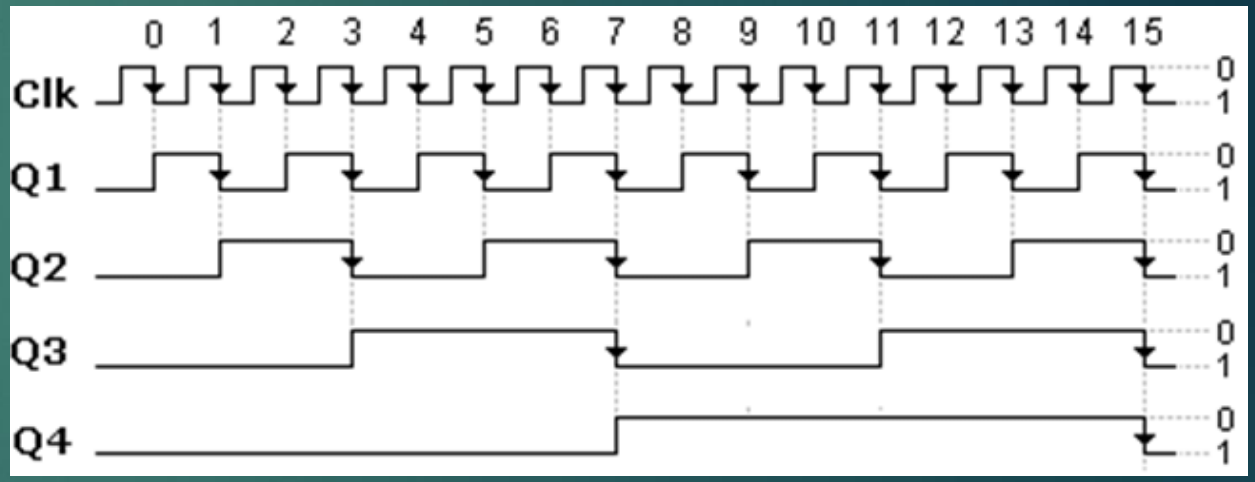
- Counters are broadly divided into two categories
  - Asynchronous counter
  - Synchronous counter

Asynchronous Counter

- In asynchronous counter we don’t use universal clock, only first flip flop is driven by main clock and the clock input of rest of the following flip flop is driven by output of previous flip flops. We can understand it by following diagram-



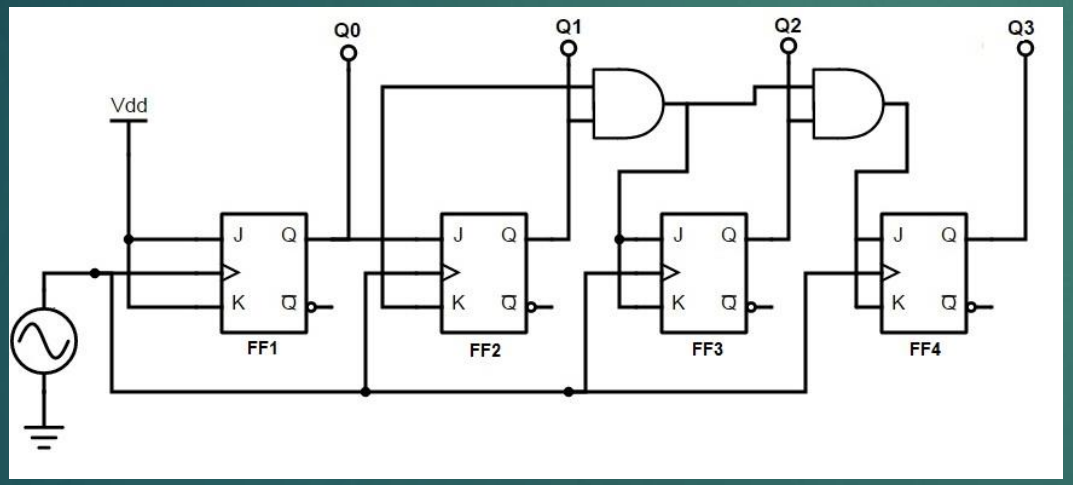
Asynchronous Counter



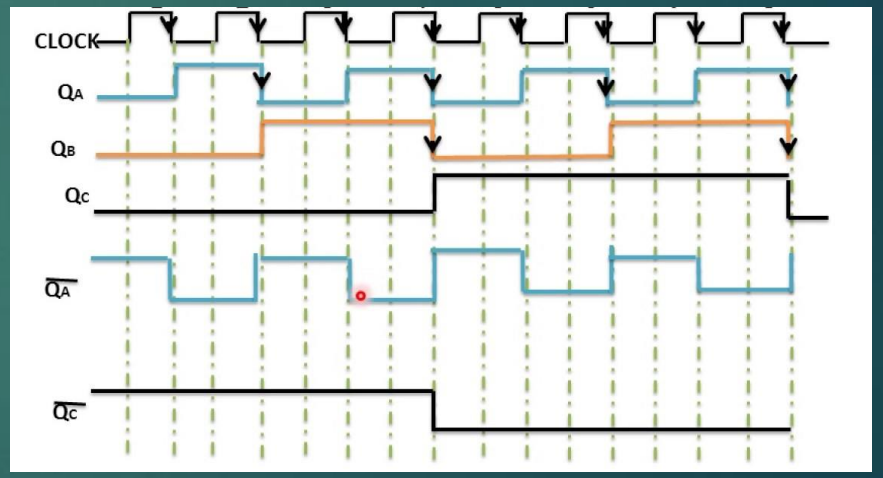
Asynchronous Counter Diagram

Synchronous Counter

- Unlike the asynchronous counter, synchronous counter has one global clock which drives each flip flop so output changes in parallel.
- The one advantage of synchronous counter over asynchronous counter is, it can operate on higher frequency than asynchronous counter as it does not have cumulative delay because of same clock is given to each flip flop.



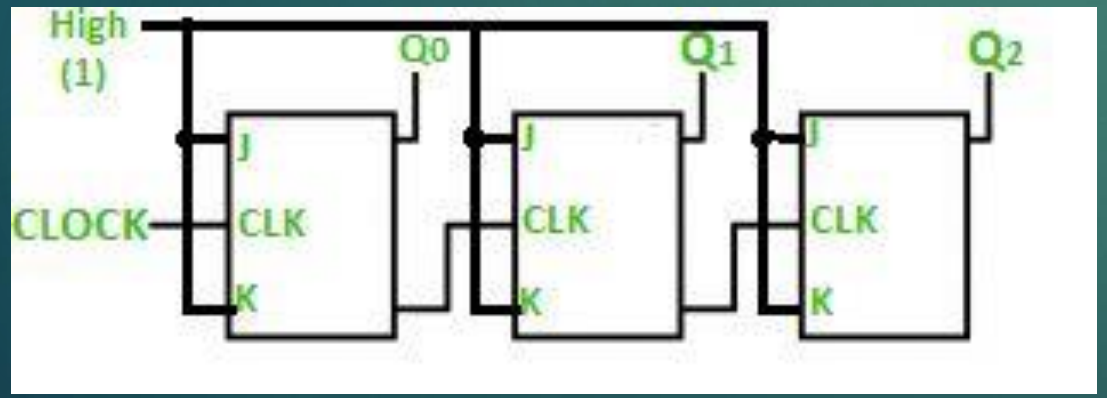
Synchronous Counter



Synchronous Counter Diagram

Ripple Counter

- It is an asynchronous counter.
- Different flip-flops are used with a different clock pulse.
- All the flip-flops are used in toggle mode.
- Only one flip-flop is applied with an external clock pulse and another flip-flop clock is obtained from the output of the previous flip-flop.
- The flip-flop applied with external clock pulse act as LSB (Least Significant Bit) in the counting sequence.

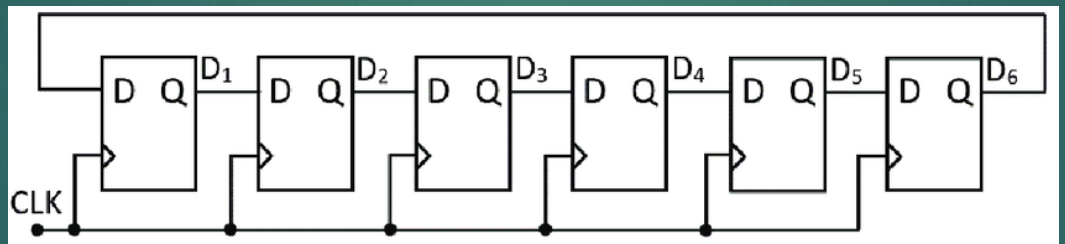


Counter State	Q_2	Q_1	Q_0
0	0	0	0
1	0	0	1
2	0	1	0
3	0	1	1
4	1	0	0
5	1	0	1
6	1	1	0
7	1	1	1

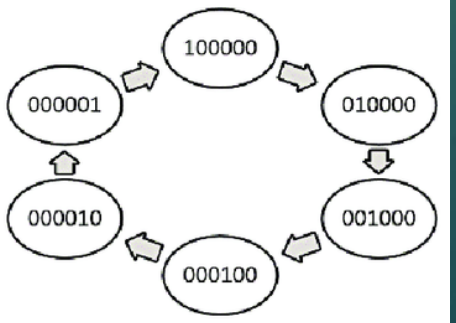
Ring Counter

- Ring counter is a typical application of Shift resister. Ring counter is almost same as the shift counter.
- The only change is that the output of the last flip-flop is connected to the input of the first flip-flop in case of ring counter but in case of shift resister it is taken as output.
- Except this all the other things are same.

Johnson Counter



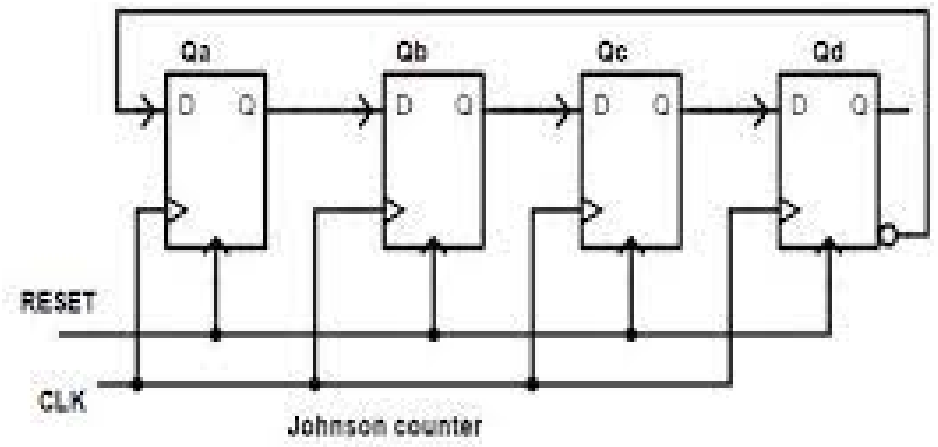
CLK	D_1	D_2	D_3	D_4	D_5	D_6
1	1	0	0	0	0	0
2	0	1	0	0	0	0
3	0	0	1	0	0	0
4	0	0	0	1	0	0
5	0	0	0	0	1	0
6	0	0	0	0	0	1



Johnson Counter

- The **Johnson counter** is similar to the **Ring counter**.
- The only difference between the **Johnson counter** and the **ring counter** is that the outcome of the last flip flop is passed to the first flip flop as an input.
- But in **Johnson counter**, the inverted outcome Q' of the last flip flop is passed as an input.
- The remaining work of the **Johnson counter** is the same as a **ring counter**. The **Johnson counter** is also referred to as the **Creeping counter**.

Q_A	Q_B	Q_C	Q_D
0	0	0	0
1	0	0	0
1	1	0	0
1	1	1	0
1	1	1	1
0	1	1	1
0	0	1	1
0	0	0	1
repeat			

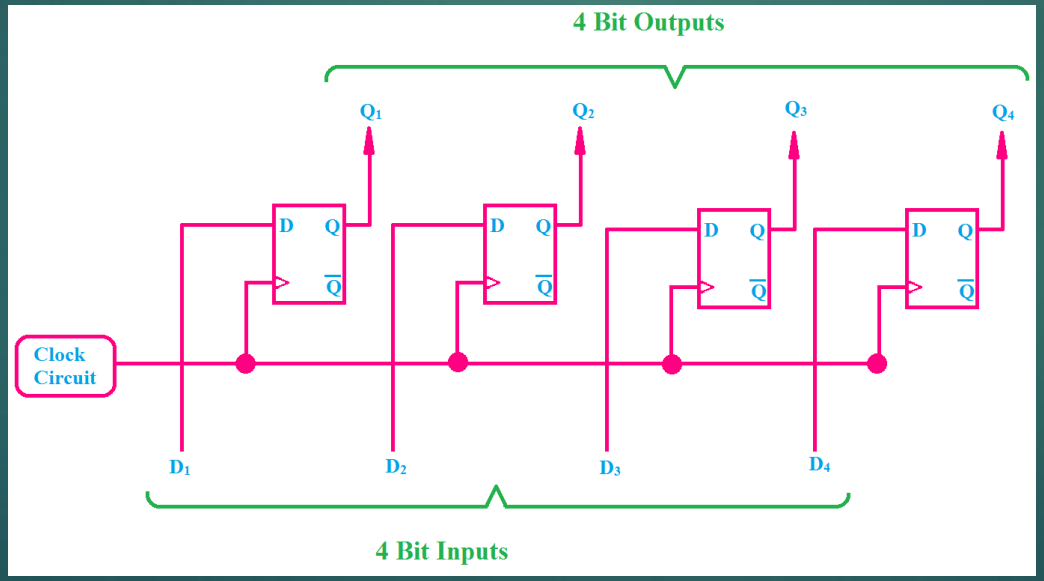


The Uses of Counter

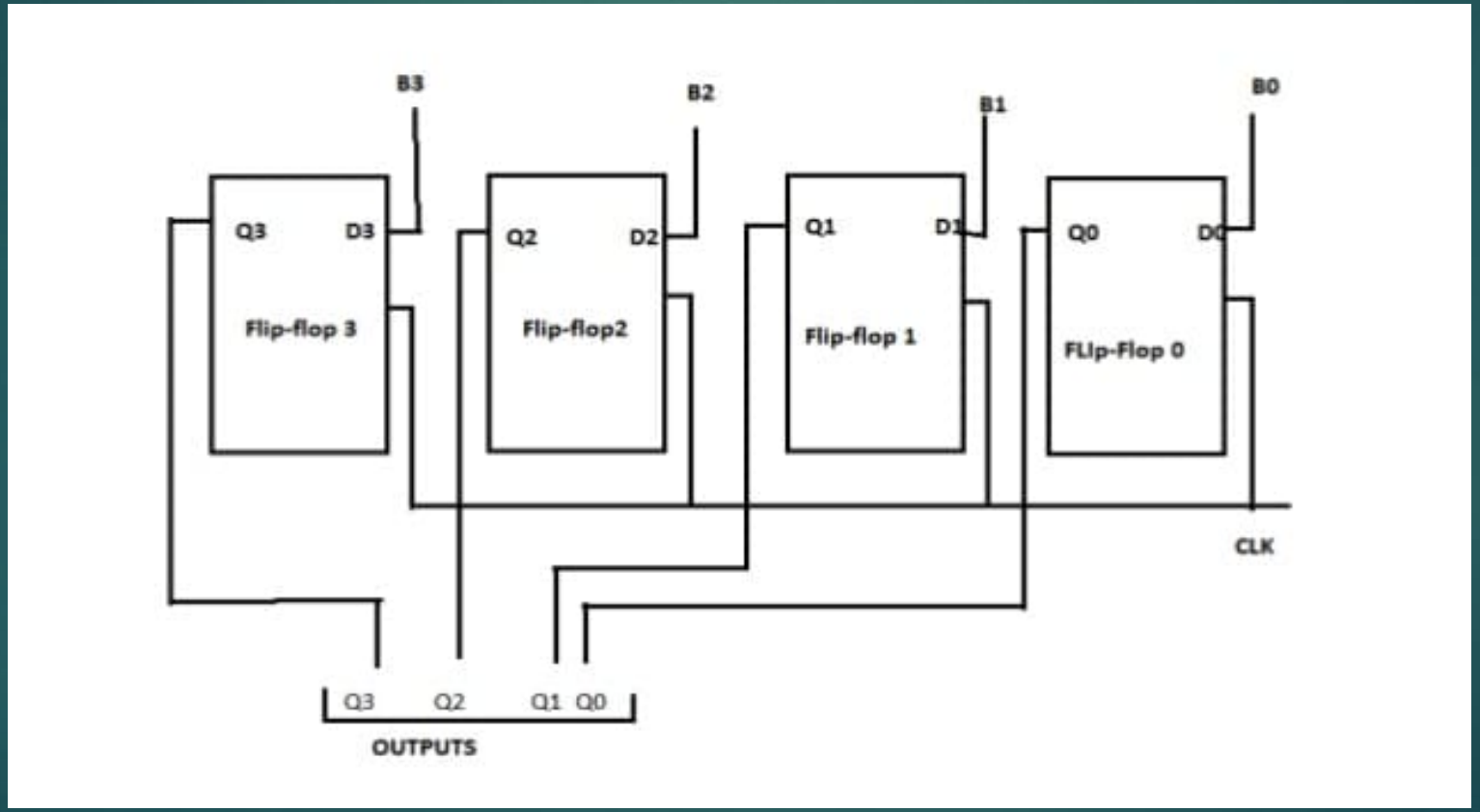
- In the conversions from Analog to Digital, these counters are used.
- In the applications of Timers for example Washings machines where we set the time. These counters are used.
- With the help of these counters, a ‘Digital Triangular Wave Generator’ can be designed.
- In the application of ‘Digital Clock’ counters are used.
- A practical example of these devices is seen in malls, stadiums, or auditoriums. In the above situations to keep the data on the number of persons. This can be made possible or it will become simple because of these counters.

What is Register?

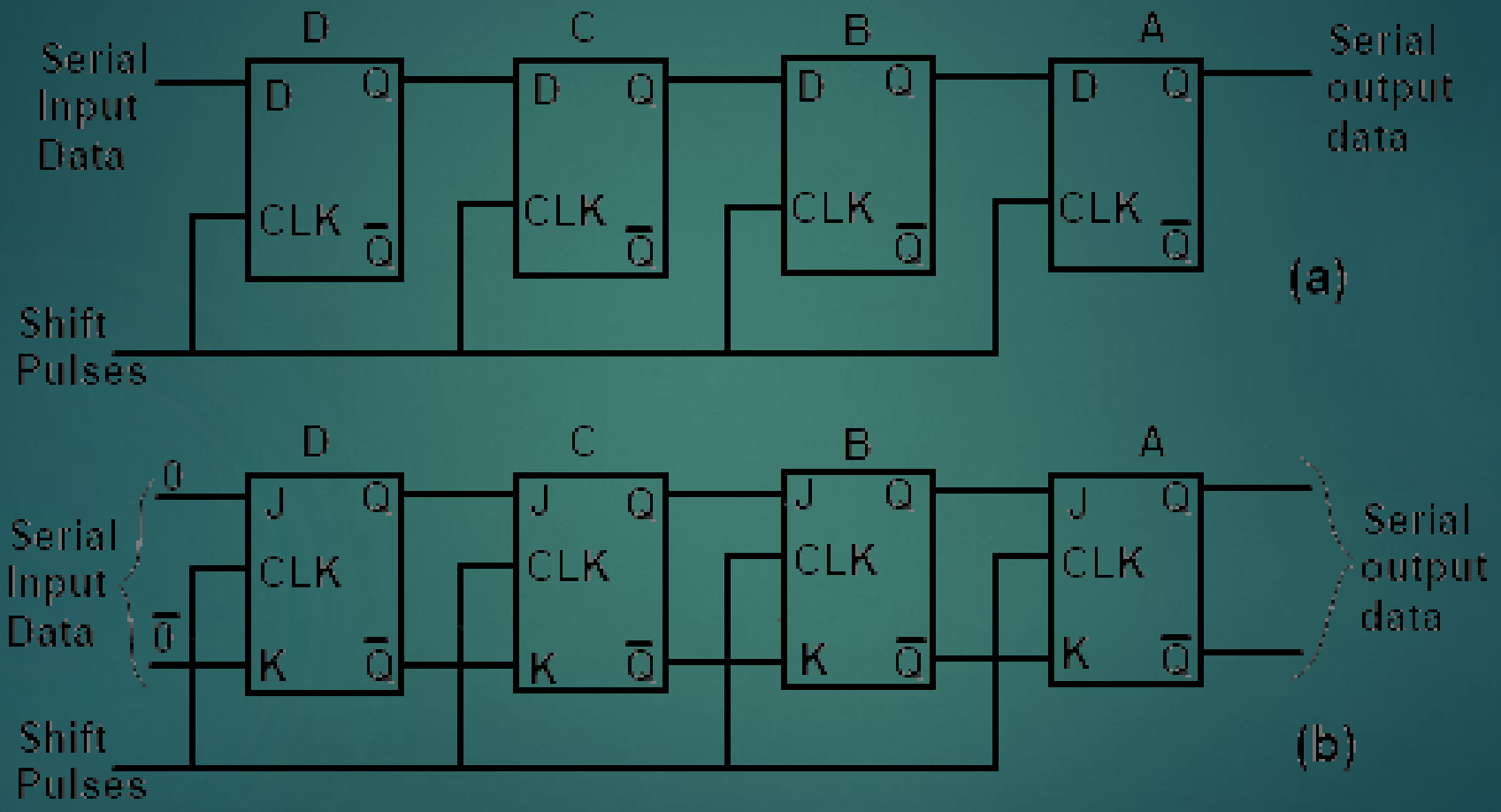
- The main application of register is **storing data in digital form**. They also can hold data and address. The registers are also used to make digital memory chips like ROM Chips, Flash Memory etc. Cache memory in CPU is also made by registers.



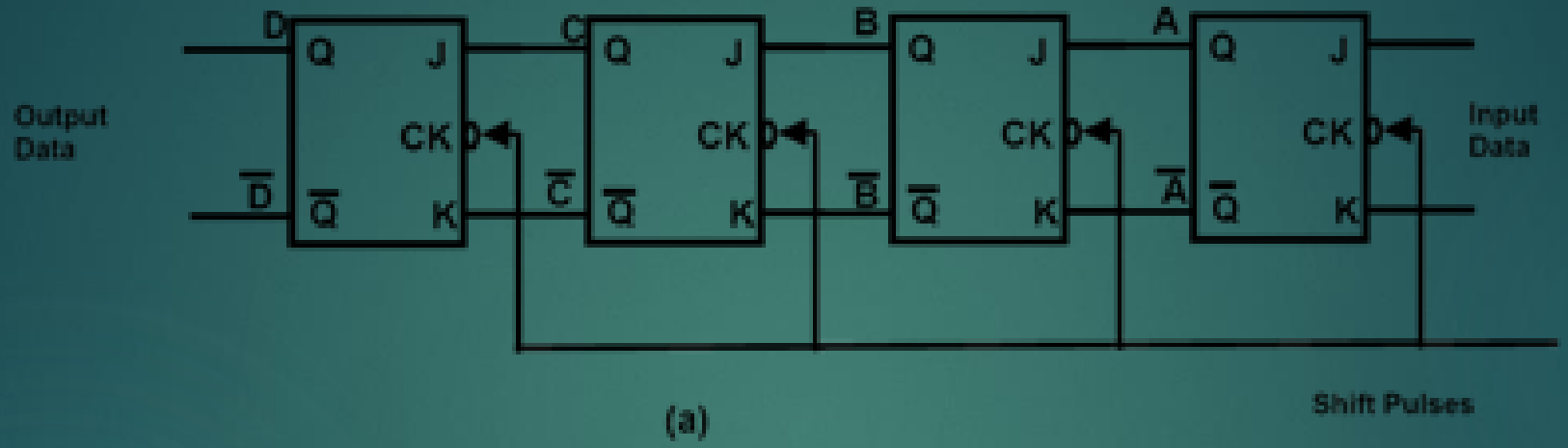
Parallel Load Register



Shift Right Register



Shift Left Register



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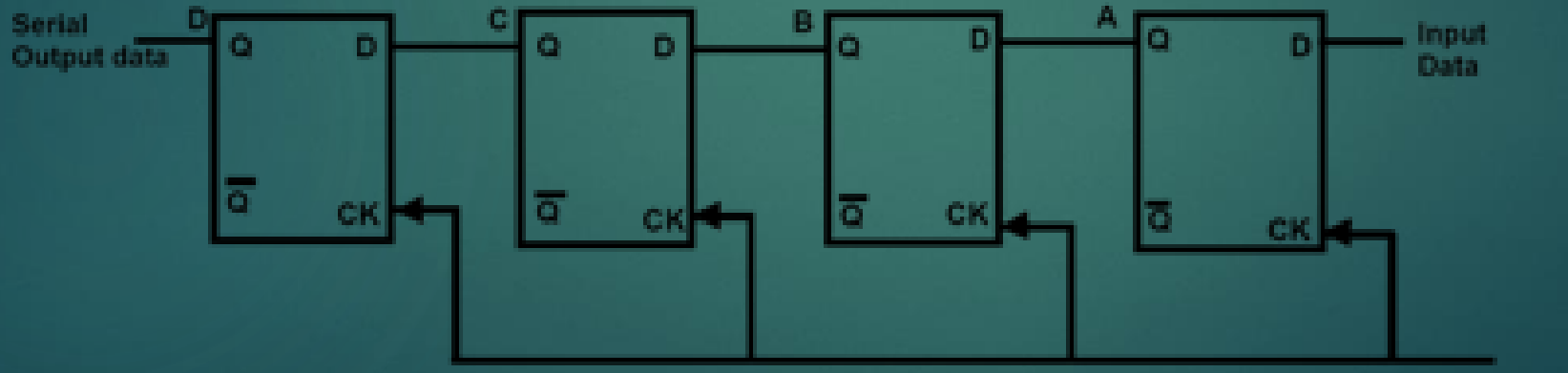

(b)

The Uses of Register

- The main application of register is **storing data in digital form**.
- They also can hold data and address.
- The registers are also used to make digital memory chips like ROM Chips, Flash Memory etc.
- Cache memory in CPU is also made by registers.

Thank You