Using Timer/Counter (ATmega16)

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Timer ⇔ Counter

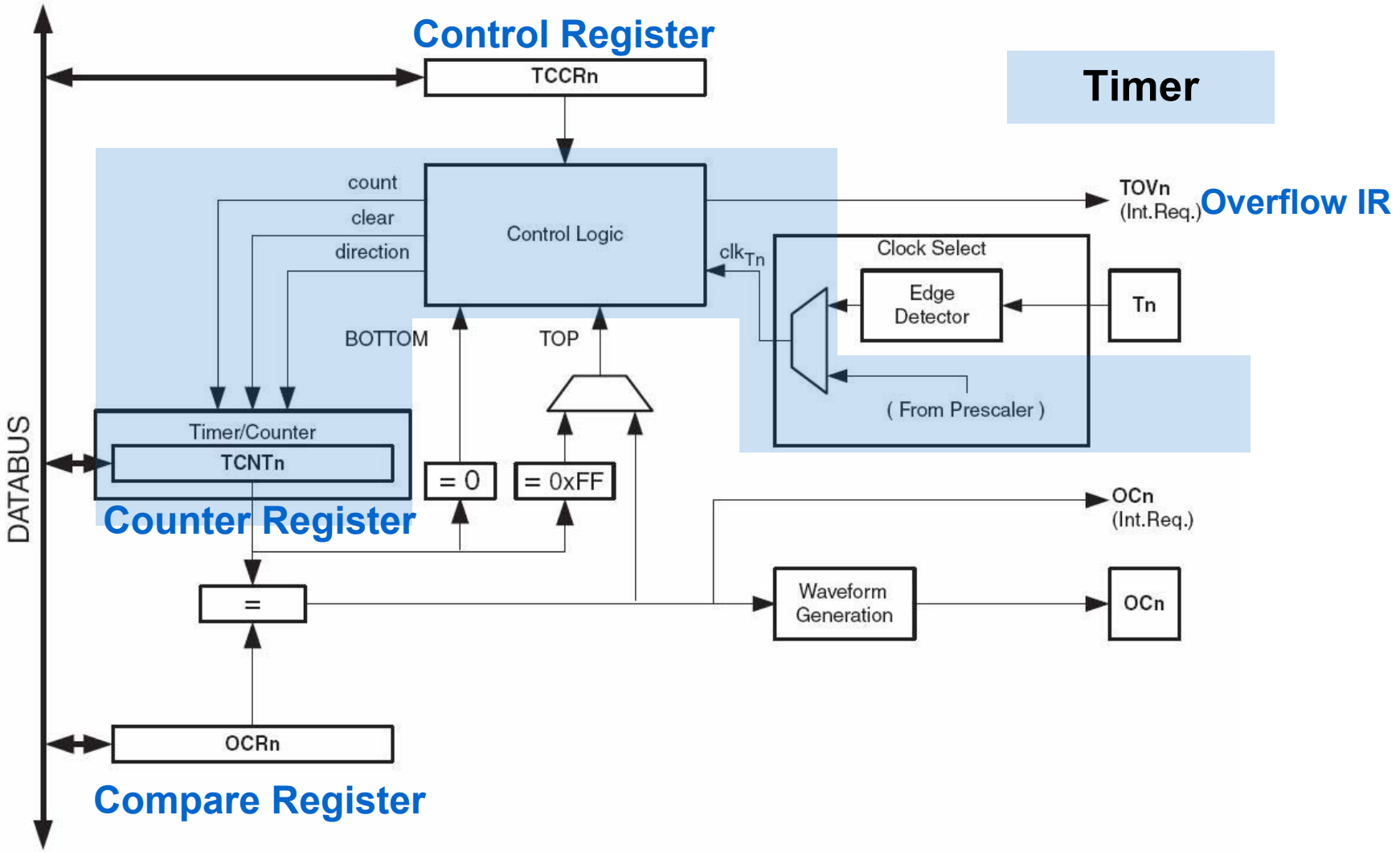
- Timer
  - Counts clock signal (measures time)
  - Clock divider can be used (for longer time intervals)
  - Example: switch an LED every second
- Counter
  - Counts external events
  - Example: switch an LED after 20 external events
- Usually every Timer can also be used as Counter and vice versa

Atmega16´s Timer/Counter

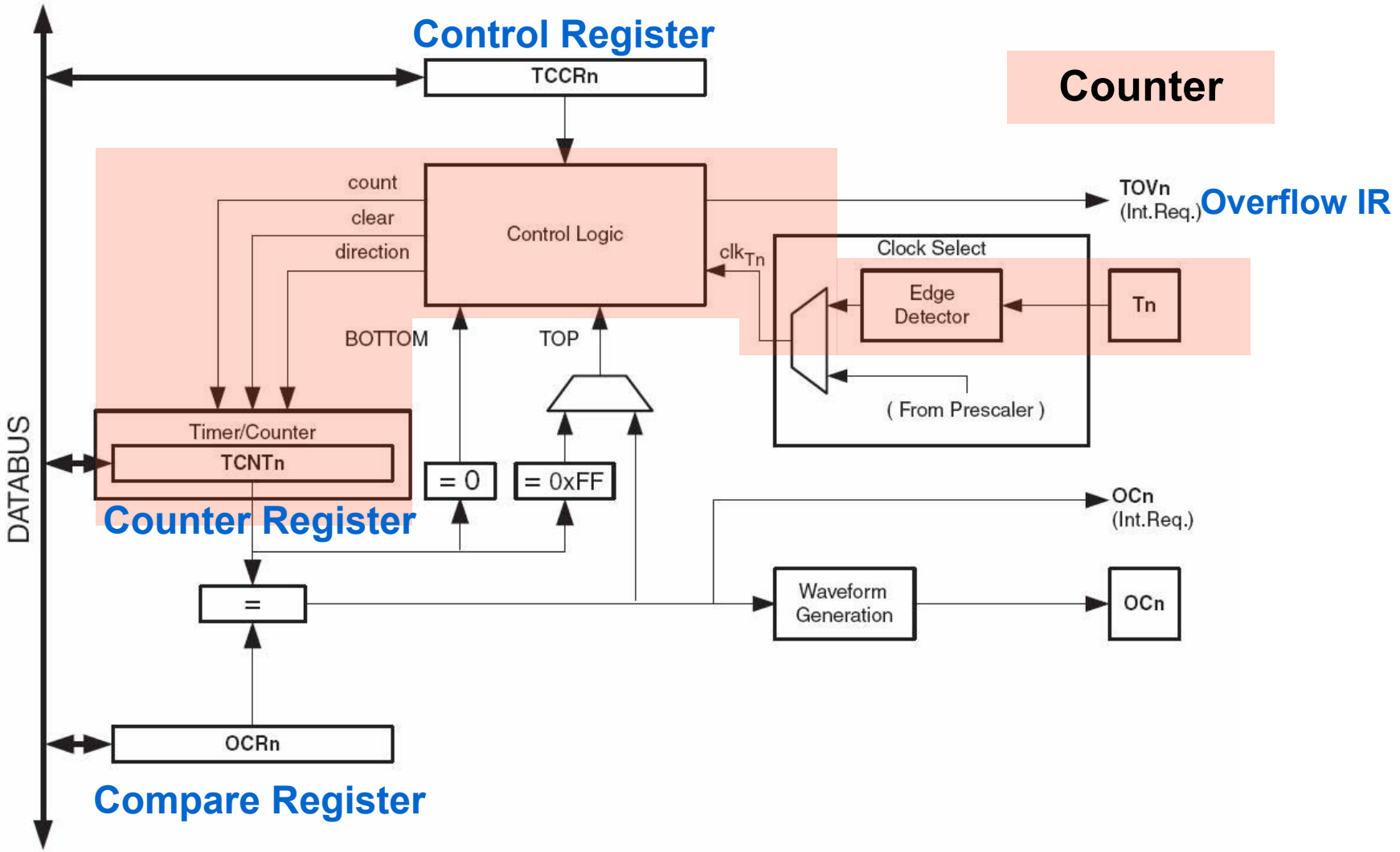
- Timer/Counter0:
  - 8bit
- Timer/Counter1:
  - 16bit
- Timer/Counter2:
  - 8bit

- All three units can
  - use prescaler (up to 1024)
  - create PWM signals
  - create interrupts (overflow, compare event)

ATmega16 – Timer/Counter0



ATmega16 – Timer/Counter0



Timer/Counter

- The according registers can be accessed like I/O ports
- More information about the function in the following example and in the ATmega16data sheet
- Timer/Counter can also generate Interrupts. Find more in the slides Using Interrupts.

Example Timer0

```
//blinks LEDs at PORTA with 22,888Hz (6MHz system clock)

#include <avr/io.h>

int main (void)
{
outp(0xFF,DDRA);      //PORTA is output
outp(0x00,TCNT0);     //Counter Register = 0
outp(0x05,TCCR0);     //start Timer0 with prescaler = 1024
                      //counter is running from now on until it is stopped
                      //counter restarts with 0x00 after 0xFF has been reached
while(1)
{
      if(TCNT0 < 100)                 //read and compare Counter Register
      {
      PORTA = 0xFF;                   //LEDs PORTA off
      }
      else
      {
      PORTA = 0x00;                   //LEDs PORTA on
      }
}
}
```