

Polling Hardware Timers

LECTURE 7

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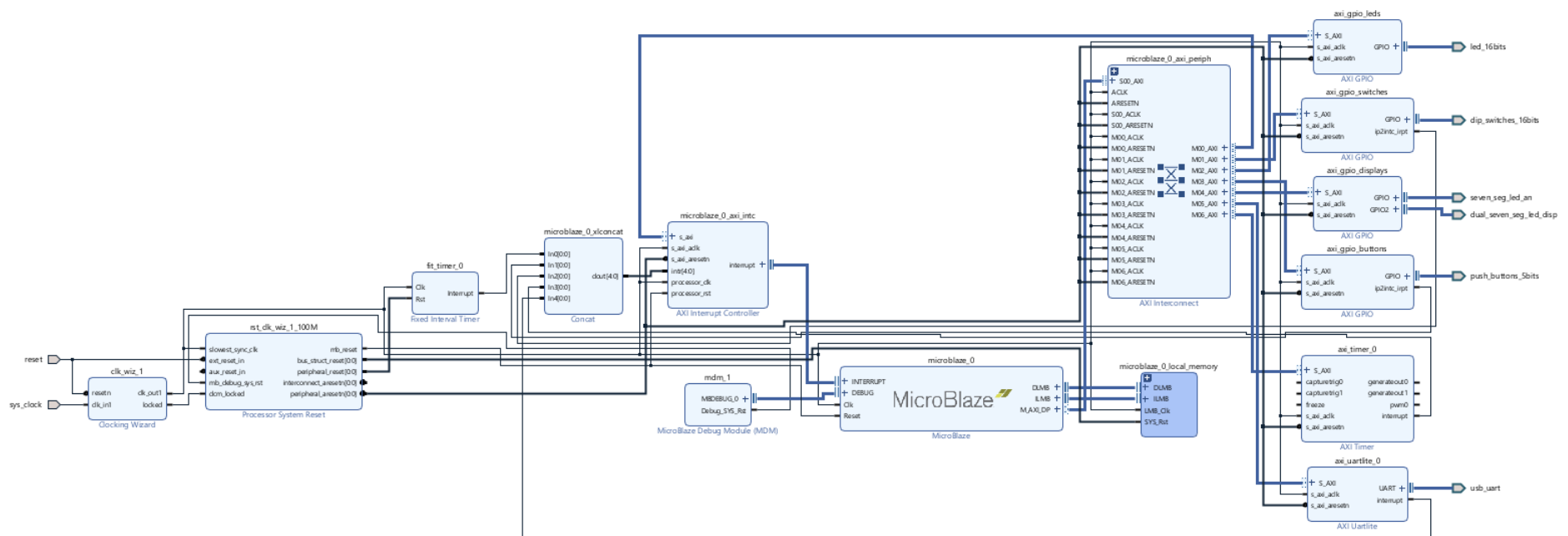
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Block Design (BD)



Polling

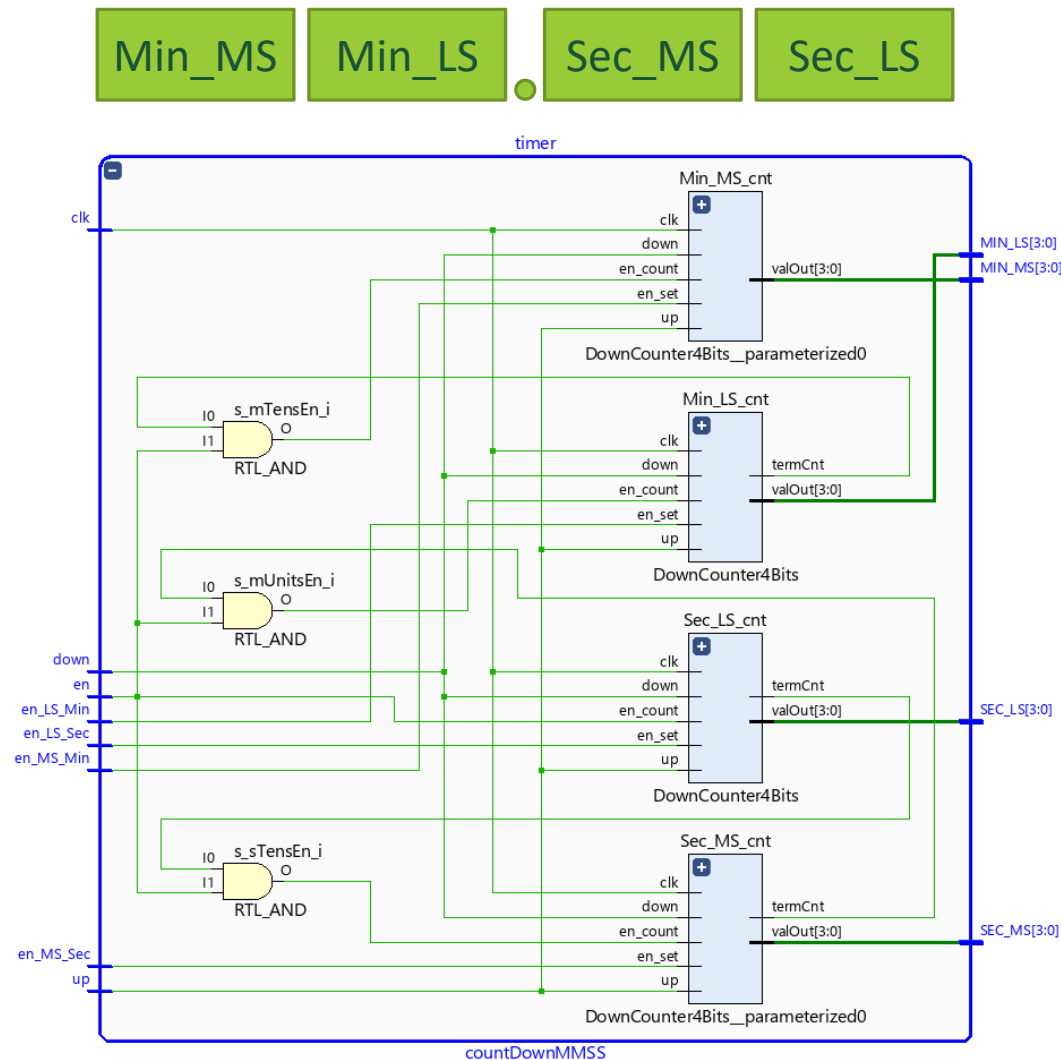
Polling means repeatedly reading a timer register and testing the input data value.

- simple to code
- not very efficient because the polling happens even if the timer reading has not achieved the required value

Low-level driver functions (or macros) that can be used to access the timer:

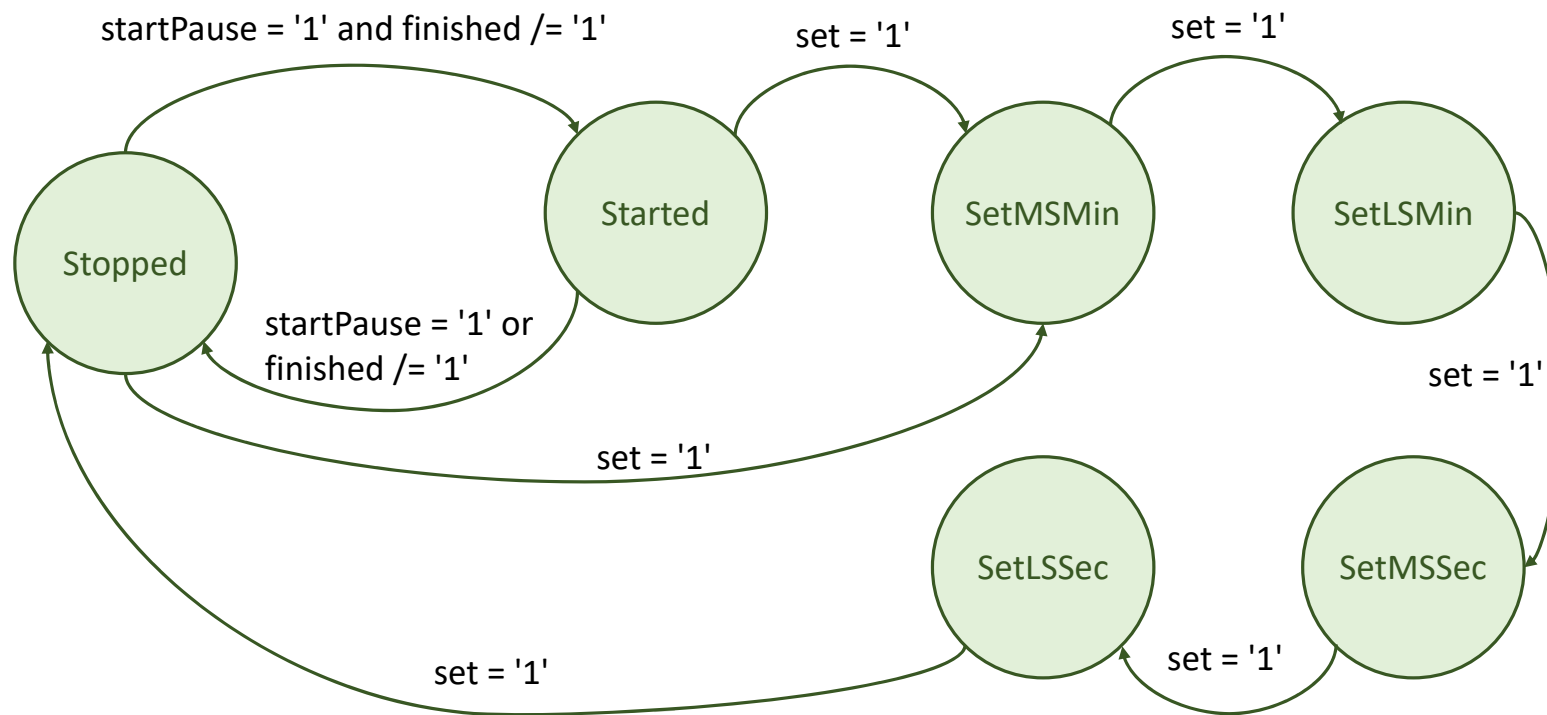
- XTmrCtr_SetControlStatusReg
- XTmrCtr_GetControlStatusReg
- XTmrCtr_SetLoadReg
- XTmrCtr_GetTimerCounterReg

Countdown Timer Datapath



Countdown Timer Controlpath

set = btnR
startPause = btnC



Countdown Timer in Software

What periodic operations have to be executed and at what frequencies?

1 Hz

- to decrement the countdown timer

800 Hz

- to refresh the 7-segment displays

2 Hz

- to set the time
- to blink the point separating minutes and seconds (with 1Hz frequency)

4 Hz

- to make the digit being set to blink (with 2Hz frequency)

8 Hz

- to read the buttons status

C Code for the Countdown Timer

```
// State machine data type
typedef enum {Stopped, Started, SetLSec, SetMSSec, SetLSMin, SetMSMin} TFSMState;

// Buttons GPIO masks
#define BUTTON_UP_MASK      0x01
#define BUTTON_DOWN_MASK   0x04
#define BUTTON_RIGHT_MASK   0x08
#define BUTTON_CENTER_MASK  0x10

// Data structure to store buttons status
typedef struct SButtonStatus
{
    bool upPressed;
    bool downPressed;
    bool setPressed;
    bool startPressed;

    bool setPrevious;
    bool startPrevious;
} TButtonStatus;

// Data structure to store countdown timer value
typedef struct STimerValue
{
    unsigned int minMSValue;
    unsigned int minLSValue;
    unsigned int secMSValue;
    unsigned int secLSValue;
} TTimerValue;
```



Test 1

Structure

- True/False questions – no penalty for wrong answers
- Multiple-choice questions – 33% discount for wrong answers; no discount for not answering
- Cloze questions (complete a given code, calculate some values) – no penalty

Organization

- Online (during the T class on May 6)
- Connection to zoom
- 1h
- Use of calculators is allowed
- Prepare a pen and paper
- No consultation is allowed

Material

- Everything considered in theoretical classes 1-7 (< April 30)
- However, there will be no questions about software development

Final Remarks

At the end of this lecture you should be able to:

- write C programs that poll a hardware timer

To do:

- Test the considered application in Vitis