TINYC Programming

1 Today's goal

- Lean TINYC programming.
- Develop a stop watch program using TINYC and implement it in the FPGA Board.

2 Today's contents

Step 1 *Check 1* Implement the 4-digit decimal counter (i.e. Homework 2) in the FPGA and see if it works correctly.

Step 2 Modify the UCF for tinycpu such that clk is connected to CLK50MHZ. After that, implement the 4-digit decimal counter in the FPGA and see if it works correctly.

Step 3 Modify the 4-digit decimal counter such that the counter is incremented in every 10ms. For this purpose, we will use the dummy loop below to wait for approximately 10ms.

```
i=x;
while(i){
  --i;
}
int i,x=10000;
```

Compile this dummy loop and trace the resulting assembly language program. After that, evaluate the number of clock cycles to exacute a loop. Based on the evaluation, determine an appropriate initial value x to complete this loop in approximately 10ms.

Step 4 *Check 2* Modify the 4-digit decimal counter such that the counter is incremented in every 10ms using the dummy loop in Step 3. Note that the error must be less than 5%, that is, the counter must be between 0950 to 1050 in 10 seconds.

Step 5 *Check 3* Assign function "start/stop" to BTN_WEST and function "reset" to BTN_EST as follows. When the program starts, the counter is not working. If "start/stop" is pushed while the counter stops, then the counter starts or restarts. if "start/stop" is pushed while the counter is incrementing, then the counter stops. If "reset" is pushed, then the value of counter become 0. (Note that "reset" differs from input port reset of tinycpu. That is, "reset" is counter reset, and reset is system reset.)

Step 6 *Check 4* Assign function "lap" to BTN_NORTH. If "lap" is pushed while the counter is working, then the counter increment continues but the display of the counter value stops. If "lap" is pushed while the counter display stops, then the displayed value is updated by the current counter value, and the counter display continue to stop. If "start/stop" is pushed while the counter display stops, then the display starts to show the current value of the counter.