

## SoC Lab Lab3 – Fir Implementation

### 1. AP Signals generation and control:

#### (1) ap\_done

```
always @(posedge axis_clk, negedge axis_rst_n) begin
    if(!axis_rst_n) begin
        ap_done_reg <= 0;
    end else if(ss_tlast) begin
        ap_done_reg <= 1;
    end else begin
        ap_done_reg <= ap_done_reg;
    end
end
```

#### (2) ap\_start

```
always @(posedge axis_clk, negedge axis_rst_n) begin
    if(!axis_rst_n) begin
        ap_start_reg <= 0;
    end else if(ss_state_ps > SS_IDLE) begin//RESET after data start to process
        ap_start_reg <= 0;
    end else if(ap_start_r) begin
        ap_start_reg <= ~ap_start_reg;
    end else
        ap_start_reg <= ap_start_reg;
end
```

#### (3) ap\_idle

pseudo code:

```
always @(*) begin
    case(ss_state_ps)
        SS_IDLE:
        SS_LAST:
            ap_idle_reg = 1
    endcase
end
```

### 2. Xin and Yout:

step1: initialize data memory with zeros

step2: read 1 Xin into data memory, and set ss\_read1x\_r = 1

step3: start to compute 1 Yout, and after finishing computation, set sm\_finish\_cal1y\_r = 1

Note:

(1). The computation for Yout is done by the module named fir\_mac\_op

(2). The whole code uses only 1 multiplication and one addition

(1). Setting

## Timer Settings

Settings		Multi-Corner Configuration		
Enable Multi Corner Analysis:	Yes			
Enable Pessimism Removal:	Yes			
Pessimism Removal Resolution:	Nearest Common Node			
Enable Input Delay Default Clock:	No	Corner Name	Analyze Max Paths	Analyze Min Paths
Enable Preset / Clear Arcs:	No			
Disable Flight Delays:	No	Slow	Yes	Yes
Ignore I/O Paths:	No	Fast	Yes	Yes
Timing Early Launch at Borrowing Latches:	No			
Borrow Time for Max Delay Exceptions:	Yes			
Merge Timing Exceptions:	Yes			

## (2). Summary

## Design Timing Summary

Setup	Hold	Pulse Width
Worst Negative Slack (WNS): 3.826 ns	Worst Hold Slack (WHS): 0.137 ns	Worst Pulse Width Slack (WPWS): 4.500 ns
Total Negative Slack (TNS): 0.000 ns	Total Hold Slack (THS): 0.000 ns	Total Pulse Width Negative Slack (TPWS): 0.000 ns
Number of Failing Endpoints: 0	Number of Failing Endpoints: 0	Number of Failing Endpoints: 0
Total Number of endpoints: 228	Total Number of Endpoints: 228	Total Number of Endpoints: 131
All user specified timing constraints are met.		

#### 4. Utilization report

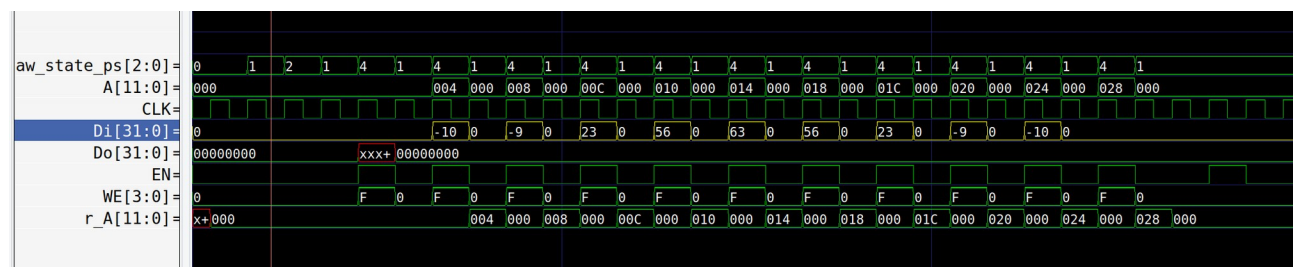
LUT: 360(0.68%)

FF: 142(0.13%)

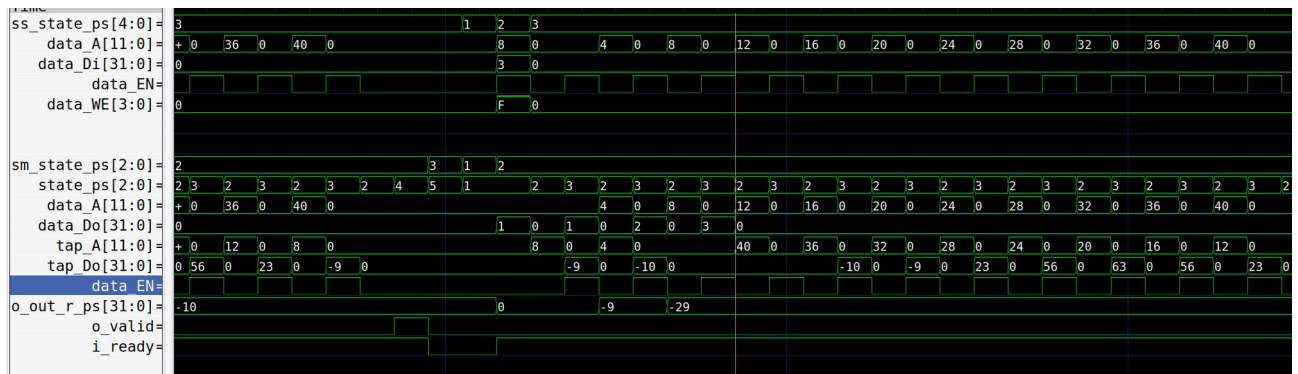
DSP: 3 (1.36%)

### 5. Waveform:

(1). Coefficient write & RAM control:



## (2). Xin(AXI Stream slave), Yout(AXI Stream master)



## (3). ap\_start:

