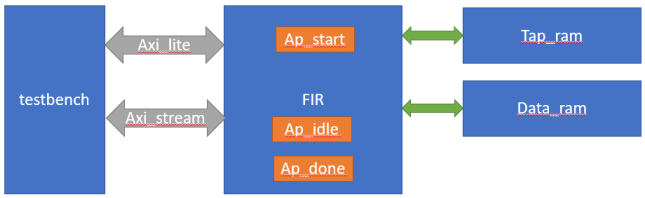
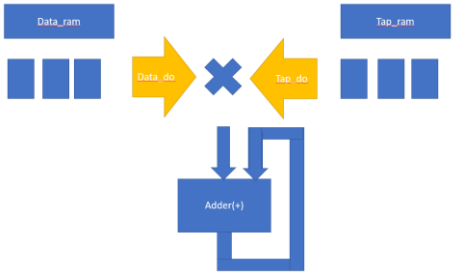
Block diagram:

-control path



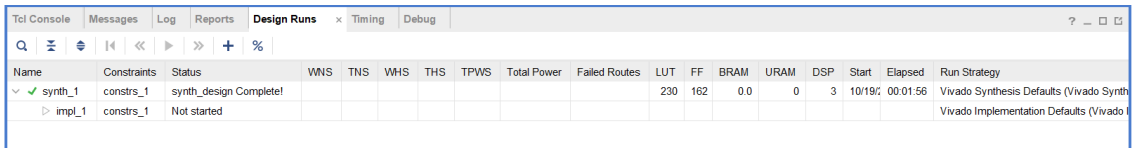
-data path



Operator:

一開始，testbench 用 axilite write 寫 tap data 進來 fir，然後我用了一些 register 把 addr 跟 data 都接起來後，寫進 tap bram，之後 tap bram 被 testbench 用 axilite read 把剛剛寫進來的資料都讀回去，做完以上動作後，testbench 用 axilite 寫 ap_start 為 1，然後我跟 testbench 之間透過 axistream 的方式開始寫值進 data bram，然後我每寫一個值進來，就會用十個 cycle 做 fir 的計算，計算方式如上圖 data path 的 block diagram，每次同時從 data bram 跟 tap bram 各讀一筆資料做成法計算後累加，十個 cycle 算完後資料就會用 axistream 的方法丟回 testbench，接著再吃下一個 data 進 bram，再做十個 cycle 的運算。值得注意的是，我每次寫 data 進 bram 的位置都會比前一次加一，然後依次往回數十個數字就是這次 data bram 依次拿來做計算的值。

Resource usage:

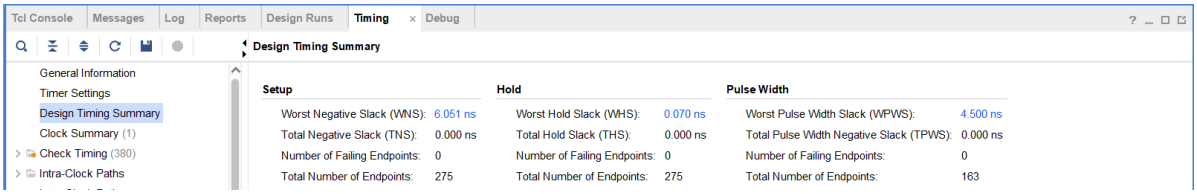


Tcl Console | Messages | Log | Reports | Design Runs | Timing | Debug

Name	Constraints	Status	WNS	TNS	WHS	THS	TPWS	Total Power	Failed Routes	LUT	FF	BRAM	URAM	DSP	Start	Elapsed	Run Strategy
synth_1	constrs_1	synth_design Complete!								230	162	0.0	0	3	10/19/2	00:01:56	Vivado Synthesis Defaults (Vivado Synth
impl_1	constrs_1	Not started															Vivado Implementation Defaults (Vivado I

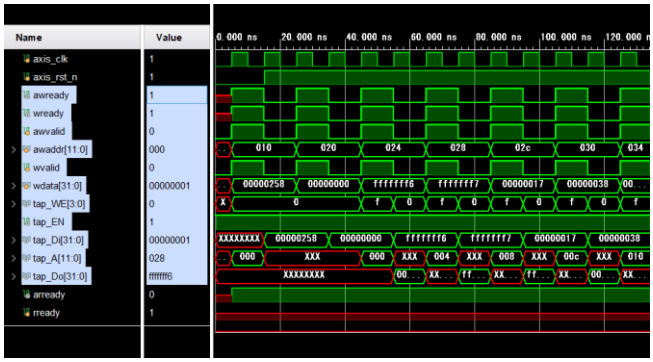
Timing report:

Period: 10ns

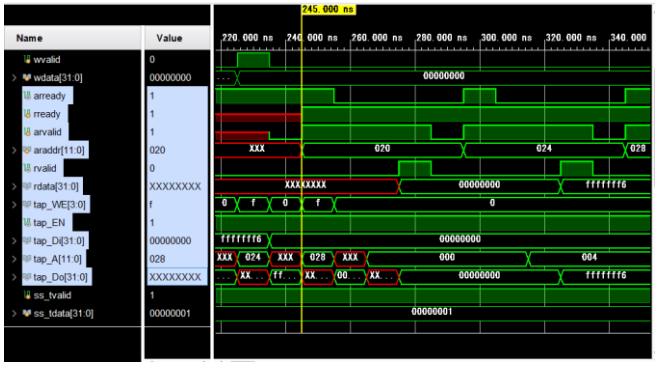


Waveform

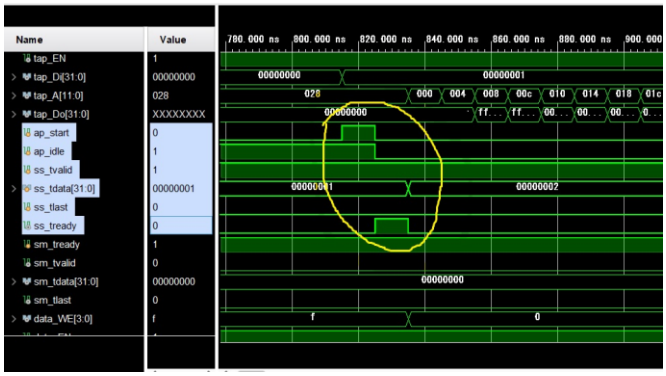
Axilite write



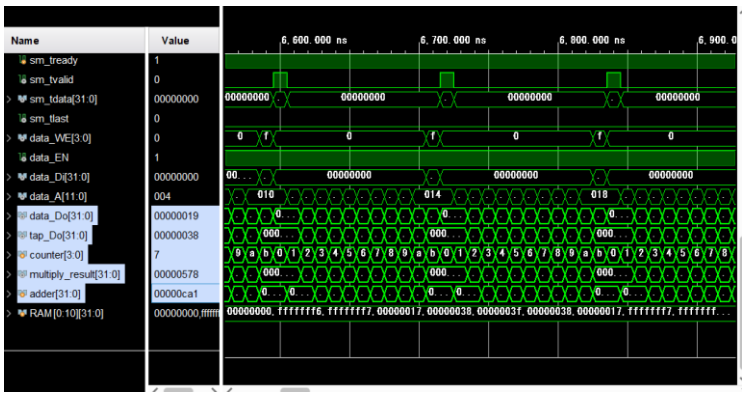
Axilite read: 黃線開始



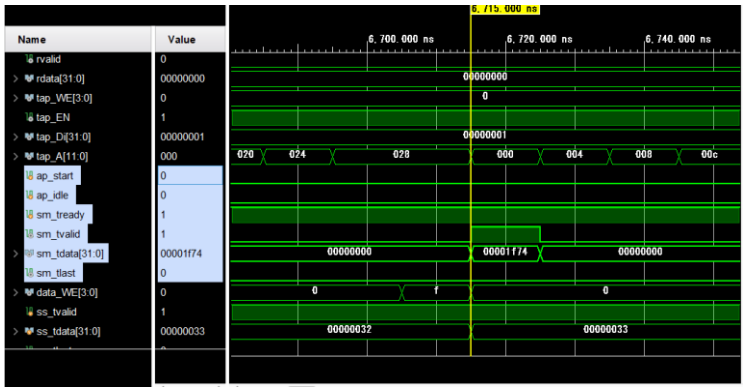
Axistream write:



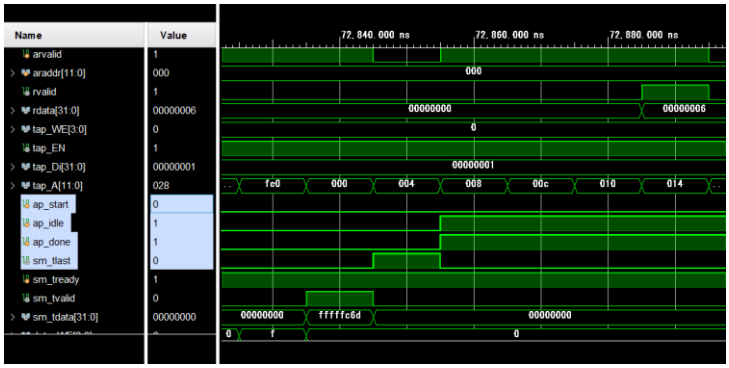
Fir operation



Stream read:



做完後 ap_idle 跟 ap_done 拉起來




```
[PASS] [Pattern        591] Golden answer:       -2379, Your answer:       -2379
[PASS] [Pattern        592] Golden answer:       -2196, Your answer:       -2196
[PASS] [Pattern        593] Golden answer:       -2013, Your answer:       -2013
[PASS] [Pattern        594] Golden answer:       -1830, Your answer:       -1830
[PASS] [Pattern        595] Golden answer:       -1647, Your answer:       -1647
[PASS] [Pattern        596] Golden answer:       -1464, Your answer:       -1464
OK: exp =           0, rdata =           0
------End the data input(AXI-Stream)------
[PASS] [Pattern        597] Golden answer:       -1281, Your answer:       -1281
[PASS] [Pattern        598] Golden answer:       -1098, Your answer:       -1098
[PASS] [Pattern        599] Golden answer:        -915, Your answer:        -915
OK: exp =           2, rdata =           6
OK: exp =           4, rdata =           6
-----------------------------------------
----------Congratulations! Pass-------------
$finish called at time : 72945 ns : File "D:/ibex/lab3/fir_tb.v" Line 391
```