



DCS Lab 07

Pattern

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Pattern

- 這次Lab寫pattern去測錯誤的design，找到其錯誤
- 這次Lab只需要寫00_TESTBED/pattern.sv
- lab07_1.sv代表第一個spec錯誤的design，依此類推。lab07.sv 是正確的design。
- lab07_x.sv & lab07.sv 都不要動到
- 可以參考之前幾次的pattern和講義

lab07.sv

Input Signal	Bit Width	Definition
clk	1	10 ns Clock for 1 cycle
rst_n	1	Asynchronous reset when reset negedge, all output should be zero
in_number	4	範圍(-8,7)，連續給4個數字。方便之後說明，分別用in_1、in_2、in_3跟in_4代表
mode	2	幾種運算模式，請看下一頁
in_valid	1	in_valid high when giving number

Output Signal	Bit Width	Definition
out_valid	1	High for 1 cycle
out_result	7	High for 1 cycle，計算後的結果，如下頁所示

mode

需先將input四個數值(in_1~in_4)進行排序由小至大，
假設以下經過排序後sort_1最小， sort_4最大

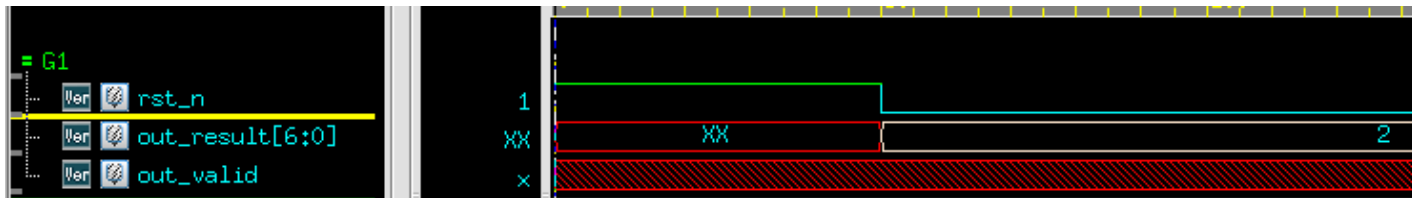
Input signal :mode	
0	$\text{out_number} = \text{sort_1} + \text{sort_2}$
1	$\text{out_number} = \text{sort_2} - \text{sort_1}$
2	$\text{out_number} = \text{sort_4} - \text{sort_3}$
3	$\text{out_number} = \text{sort_1} - \text{sort_4}$

Specifications

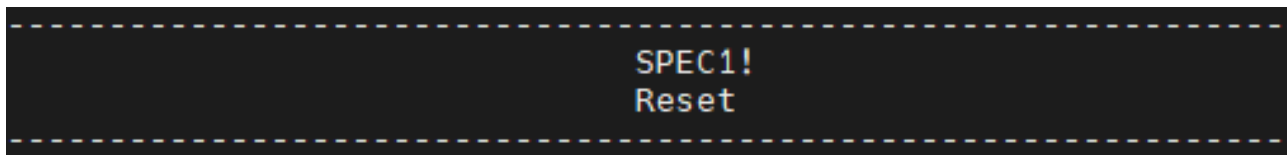
- Top module name : lab07 (File name: lab07.sv)
 - **Spec1** : reset後output signal要歸零
 - **Spec2** : 計算完吐完值後1cycle , out_valid要歸零 (out_valid只維持1cycle)
 - **Spec3** : input data 給完之前 , out_valid不能為high
 - **Spec4** : 100cycle內要計算完成(out_valid為high)
 - **Spec5** : function要對(前一頁的公式會有錯要檢查出來)
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- 註:請用random多跑幾組去檢測(建議100以上)

Output & Waveform

- Waveform SPEC1 error
 - reset後output signal要歸零

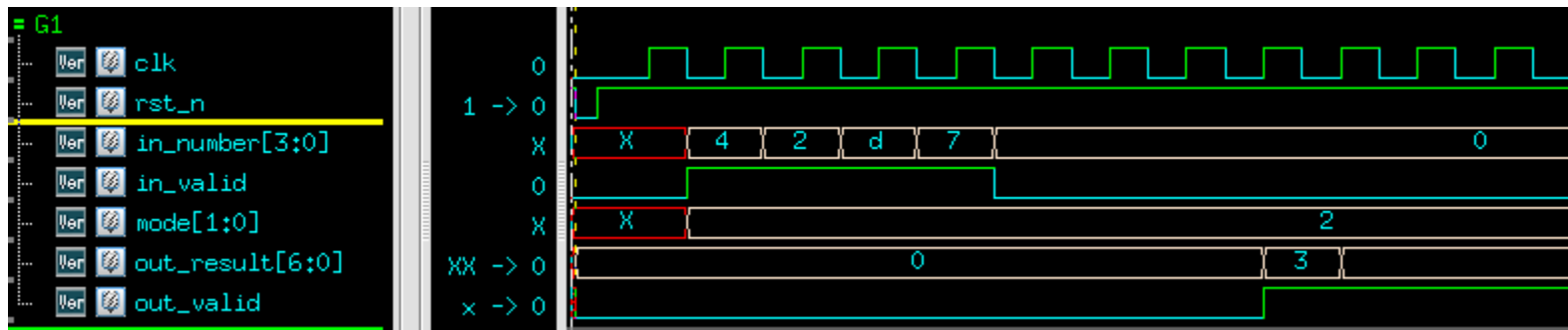


out_result , out_valid要在reset後設為0



Output & Waveform

- Waveform SPEC2 error
 - 計算完吐完值後1cycle，out_valid要歸零(out_valid只維持1cycle)

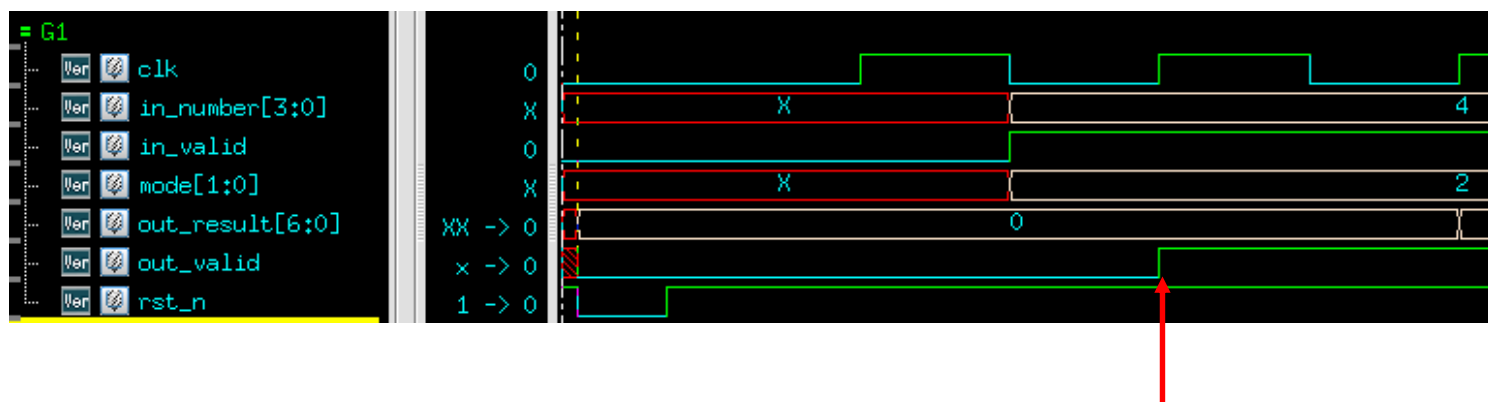


out_valid要在output後設為0
只能維持1cycle

SPEC2!
Output should be zero after check

Output & Waveform

- Waveform SPEC3 error
 - input data 給完之前，out_valid不能為high

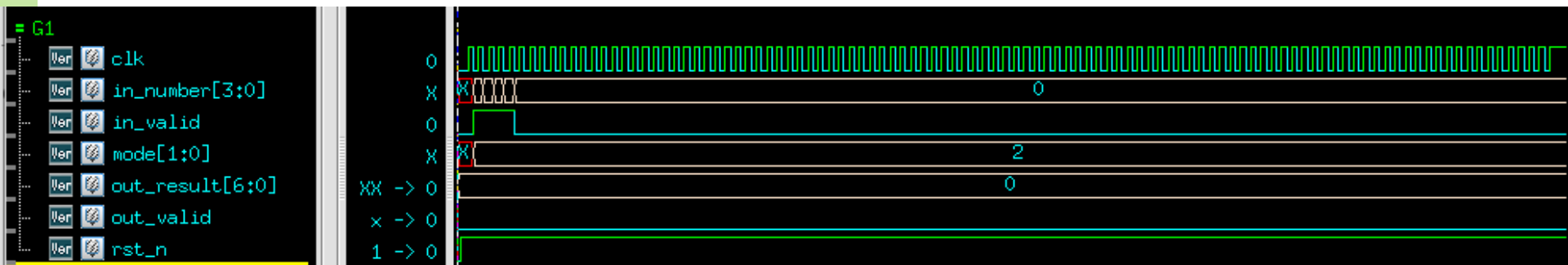


out_valid在data給完之前必須為0

SPEC3!
Outvalid should be zero before give data finish

Output & Waveform

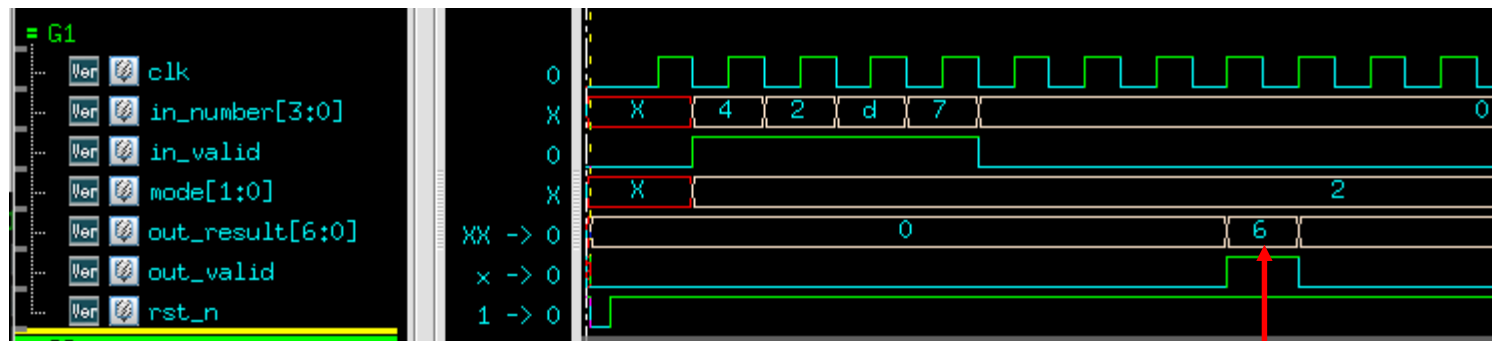
- Waveform SPEC4 error
 - 100cycle內要計算完成(out_valid為high)



SPEC4!
The execution latency are over 100 cycles

Output & Waveform

- Waveform SPEC5 error
 - function要對(前幾頁的公式會有錯要檢查出來)



正確答案為3

SPEC5!	
YOUR:	6
GOLDEN:	3

Command

- `tar -xvf ~dcsta01/Lab07.tar`
- `./01_run_spec1` : run for check spec1(should display SPEC1 Fail)
- `./01_run_spec2` : run for check spec2(should display SPEC2 Fail)
- `./01_run_spec3` : run for check spec3(should display SPEC3 Fail)
- `./01_run_spec4` : run for check spec3(should display SPEC4 Fail)
- `./01_run_spec5` : run for check spec4(should display SPEC5 Fail)
- `./01_run` : run for right design(should display Congratulation)
- You should Pass all spec!

Command

- 請參考pattern.sv裡這段，需要各自秀出SPEC1.2.3.4.5等資訊，以免助教demo時抓不到

```

$display ("-----");
$display ("                                SPEC1!");
$display ("                                Reset");
$display ("-----");

$display ("-----");
$display ("                                SPEC2!");
$display ("                                Output should be zero after check");
$display ("-----");

$display ("-----");
$display ("                                SPEC3!");
$display ("                                Outvalid should be zero before give data finish");
$display ("-----");

$display ("-----");
$display ("                                SPEC4!");
$display ("                                The execution latency are over 100  cycles");
$display ("-----");

$display ("-----");
$display ("                                SPEC5!");
$display ("                                YOUR:  %d                                ",out_result);
$display ("                                GOLDEN: %d                                ",golden);
$display ("-----");

```

Command

- `tar -xvf ~dcsta01/Lab07.tar`
- Upload
 - `cd 09_upload`
 - `./01_upload`
 - `./02_download demoX`

Tips

- CYCLE 記得要給值喔~
- 不然模擬會卡住

DCS期末考時間調查

- https://docs.google.com/forms/d/1TQUNoeKz_CyL1bApmBnhDQeGk9n4mLZxjQUUZA-aeqc/viewform

