



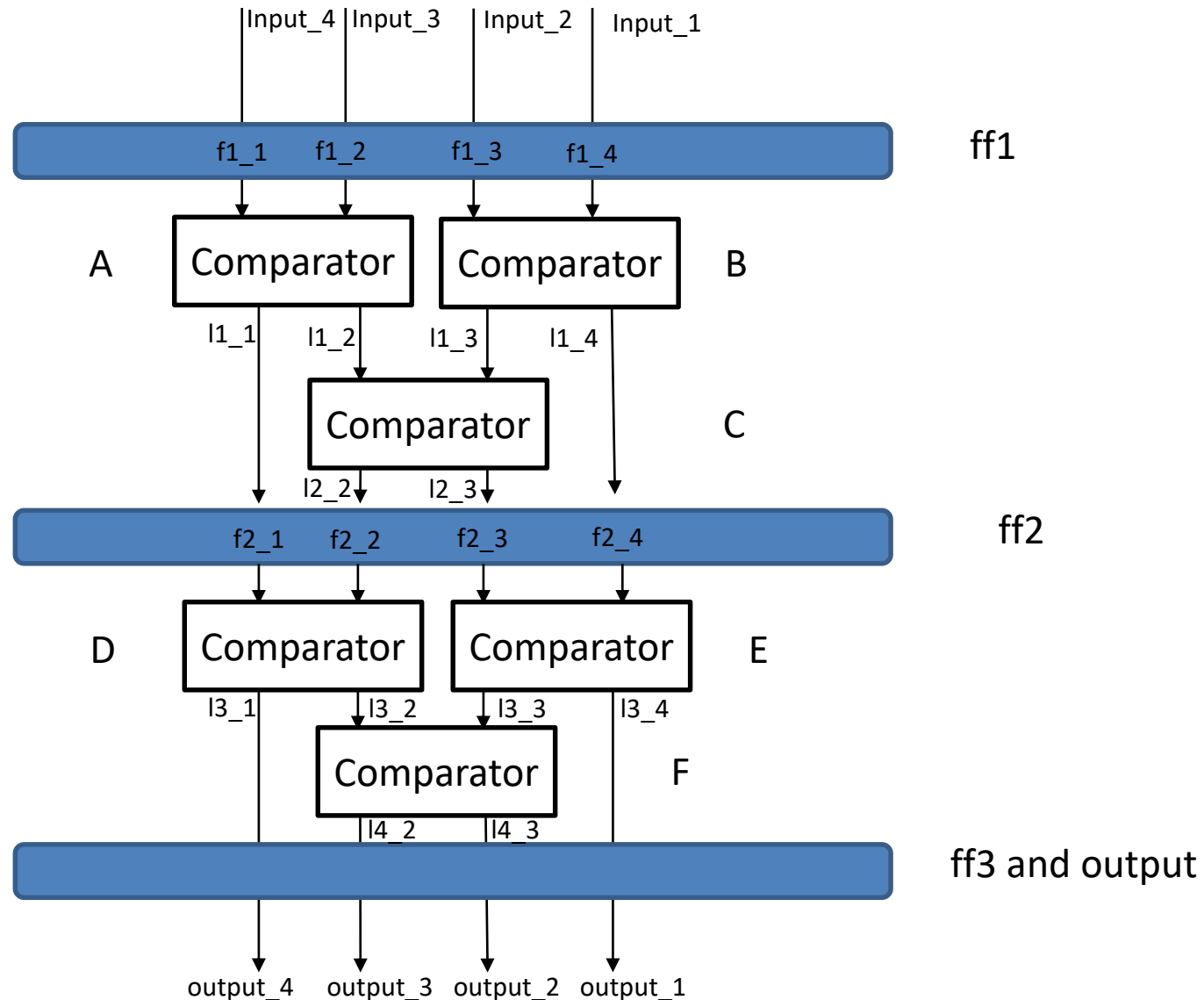
# 2019 DCS Lab 04

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# Sorting with pipeline(debug)

- 數字排序 4,5,1,2 → 5,4,2,1
  - Bubble sort , Merge sort
- Bubble sort
  - Easy for software.
  - Use recursive function ,for loop
- Merge sort
  - Easy for hardware
  - Use comparator

# Block diagram



# Merge Sorting

Input Signal	Bit Width	Definition
in_number1	5	4 random 5-bits numbers
in_number2	5	
in_number3	5	
in_number4	5	
Clk	1	5 ns Clock
rst_n	1	非同步reset 當reset negedge時，所有output須都為0
In_valid	1	當high時，代表in_number開始給值。

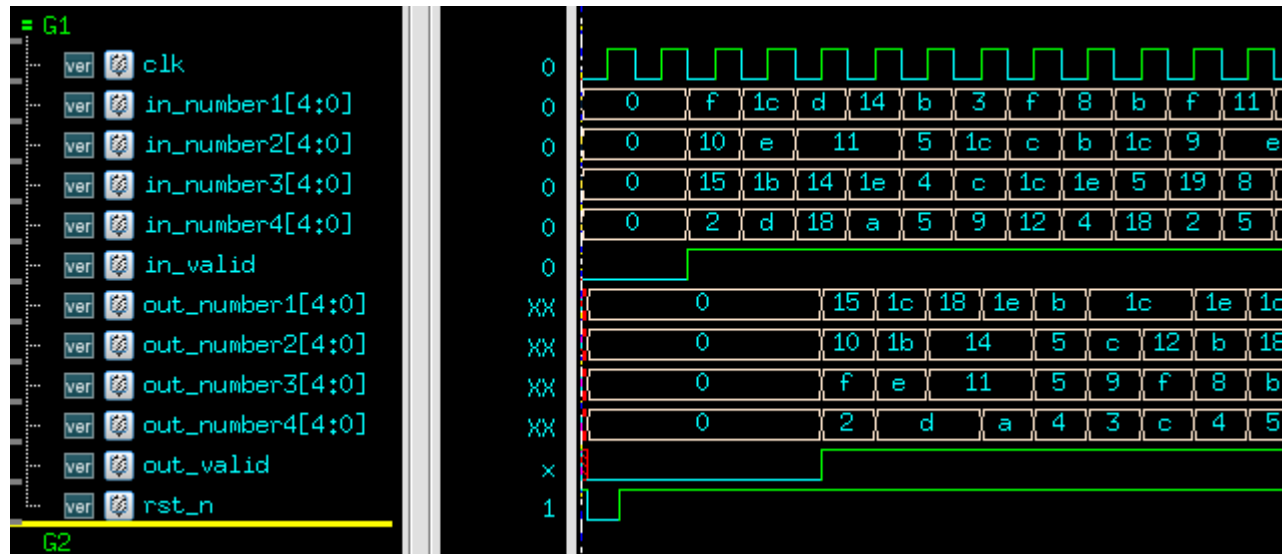
Output Signal	Bit Width	Definition
out_number1	5	Output_1≥Output_2≥Output_3≥Output_4
out_number2	5	
out_number3	5	
out_number4	5	
out_valid	1	隨著out_number有效時，給予high

# Spec

- 01 pass
- 02 without error, latch and timing violated
- 這次LAB屬於Debug型，所以Design(錯誤的)已經附在資料夾內，請修正錯誤的Design。
- 之後作業可參考這次LAB助教提供的程式碼中的coding style, pipeline寫法，較為容易debug與理解。

# Output & Waveform

- Waveform



# Command

- `tar xvf ~dcsta01/Lab04.tar`
- Upload
  - `cd 09_upload`
  - `./01_upload`
  - `./02_download demoX`