2023 超大型積體電路電腦輔助設計概論

2023 Introduction to VLSI CAD

Lab 12

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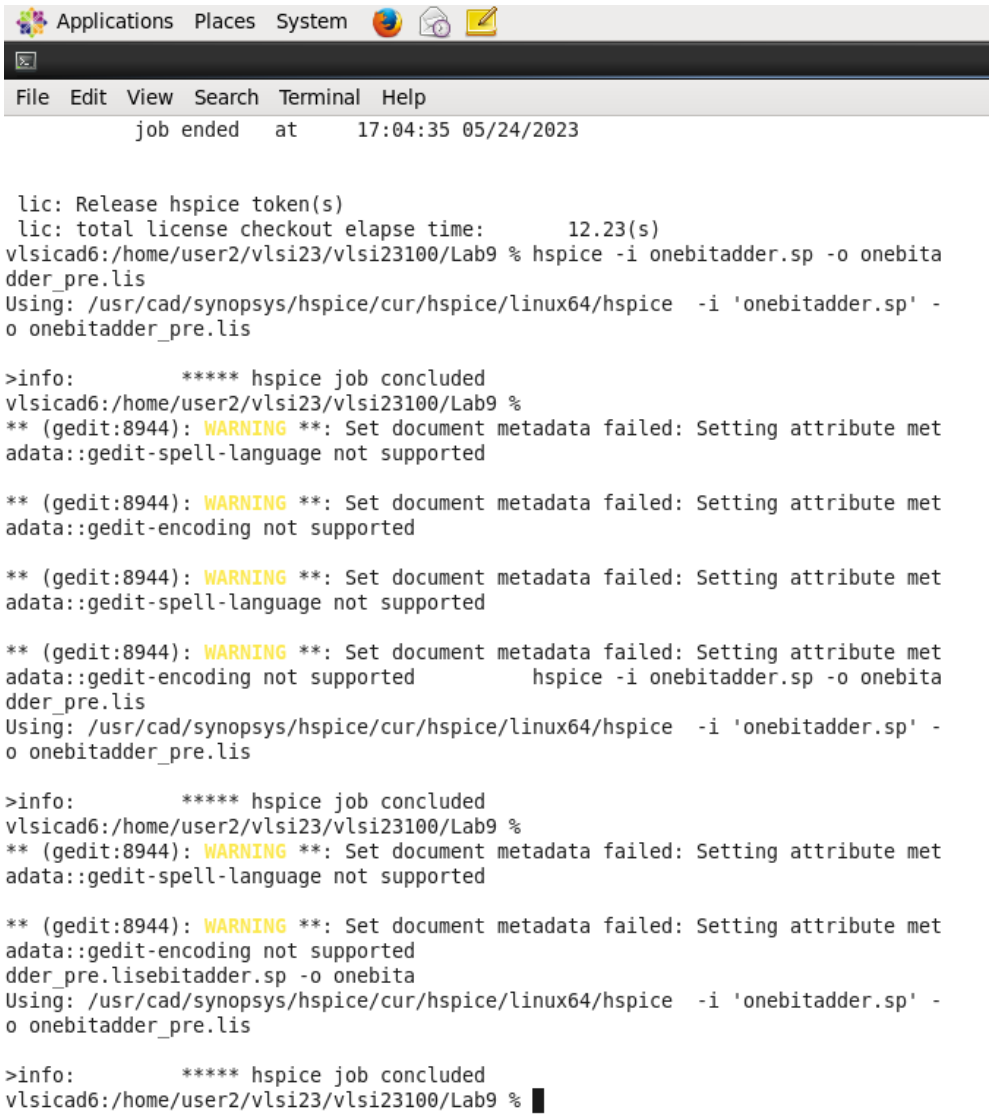
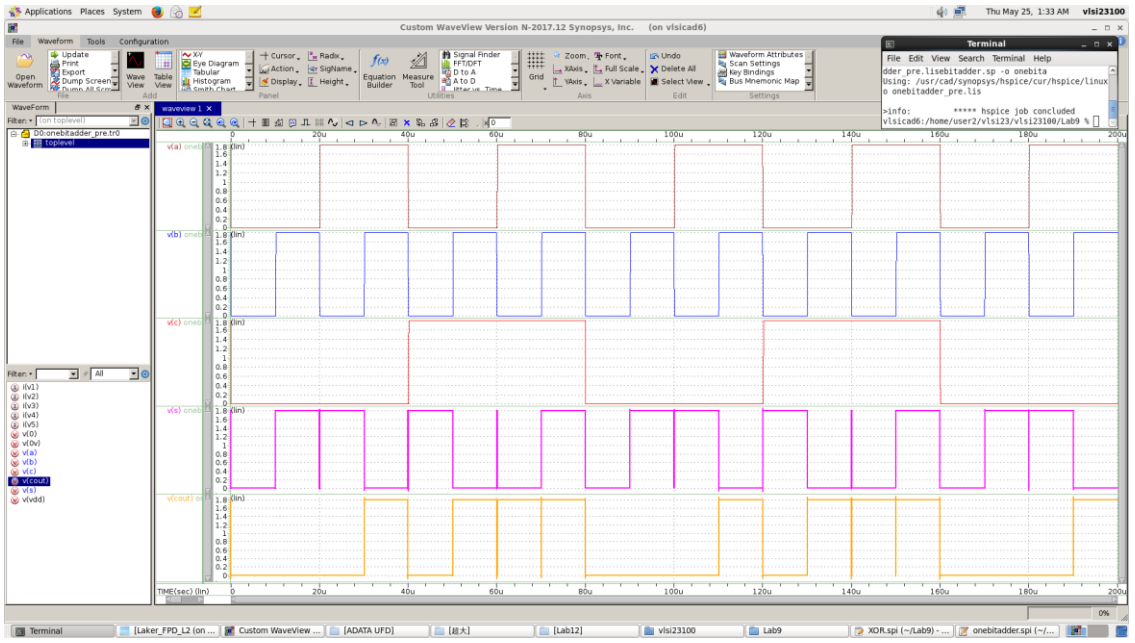
※作業要求的圖請使用**電腦截圖程式**截取，請勿用手機拍照的方式繳交

※Report 檔請以 pdf 的格式繳交

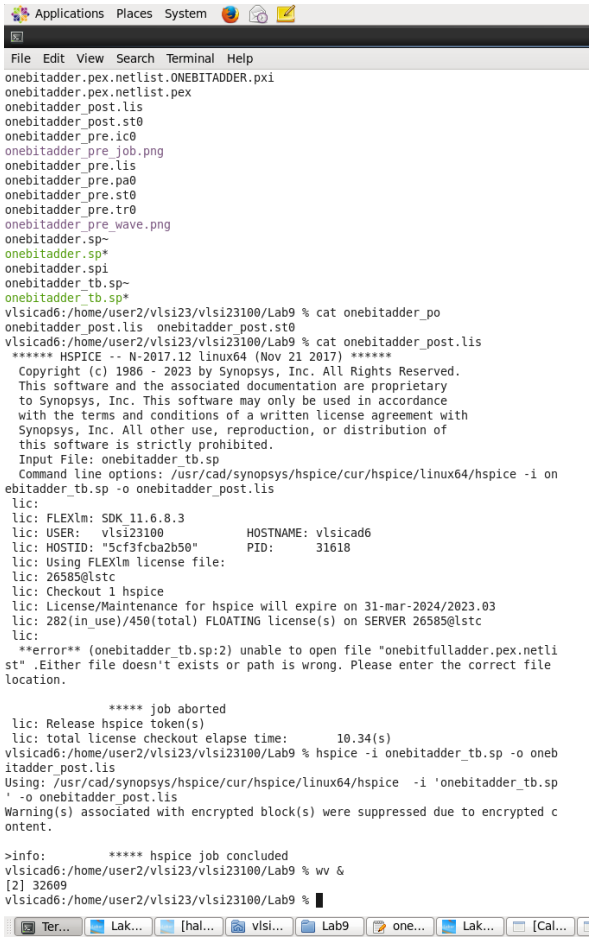
- Full Adder
  - Presim
    - 請截取 terminal 顯示 job concluded 的圖



- 請截取 WaveView 中的波形



- Post-sim
  - 請截取 terminal 顯示 job concluded 的圖



```
File  Edit  View  Search  Terminal  Help
onebitadder.pex.netlist.ONEBITADDER.pxi
onebitadder.pex.netlist.pex
onebitadder_post.lis
onebitadder_post.st0
onebitadder_pre.ic0
onebitadder_pre_job.png
onebitadder_pre.lis
onebitadder_pre.pa0
onebitadder_pre.st0
onebitadder_pre.tr0
onebitadder_pre_wave.png
onebitadder.sp~
onebitadder.sp*
onebitadder.spi
onebitadder_tb.sp~
onebitadder_tb.sp*
vlsicad6:/home/user2/vlsi23/vlsi23100/Lab9 % cat onebitadder_po
onebitadder_post.lis  onebitadder_post.st0
vlsicad6:/home/user2/vlsi23/vlsi23100/Lab9 % cat onebitadder_post.lis
 ****** HSPICE -- N-2017.12 linux64 (Nov 21 2017) ******
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  This software and the associated documentation are proprietary
  to Synopsys, Inc. This software may only be used in accordance
  with the terms and conditions of a written license agreement with
  Synopsys, Inc. All other use, reproduction, or distribution of
  this software is strictly prohibited.
  Input File: onebitadder_tb.sp
  Command line options: /usr/cad/synopsys/hspice/cur/hspice/linux64/hspice -i on
ebitadder_tb.sp -o onebitadder_post.lis
 lic:
 lic: FLEXlm: SDK_11.6.8.3
 lic: USER:   vlsi23100            HOSTNAME: vlsicad6
 lic: HOSTID: "5cf3fcba2b50"       PID:      31618
 lic: Using FLEXlm license file:
 lic: 26585@lstc
 lic: Checkout 1 hspice
 lic: License/Maintenance for hspice will expire on 31-mar-2024/2023.03
 lic: 282(in_use)/450(total) FLOATING license(s) on SERVER 26585@lstc
 lic:
  **error** (onebitadder_tb.sp:2) unable to open file "onebitfulladder.pex.netli
st" .Either file doesn't exists or path is wrong. Please enter the correct file
location.

             ***** job aborted
 lic: Release hspice token(s)
 lic: total license checkout elapse time:       10.34(s)
vlsicad6:/home/user2/vlsi23/vlsi23100/Lab9 % hspice -i onebitadder_tb.sp -o oneb
itadder_post.lis
Using: /usr/cad/synopsys/hspice/cur/hspice/linux64/hspice  -i 'onebitadder_tb.sp
' -o onebitadder_post.lis
Warning(s) associated with encrypted block(s) were suppressed due to encrypted c
ontent.

>info:         ***** hspice job concluded
vlsicad6:/home/user2/vlsi23/vlsi23100/Lab9 % wv &
[2] 32609
vlsicad6:/home/user2/vlsi23/vlsi23100/Lab9 %
```
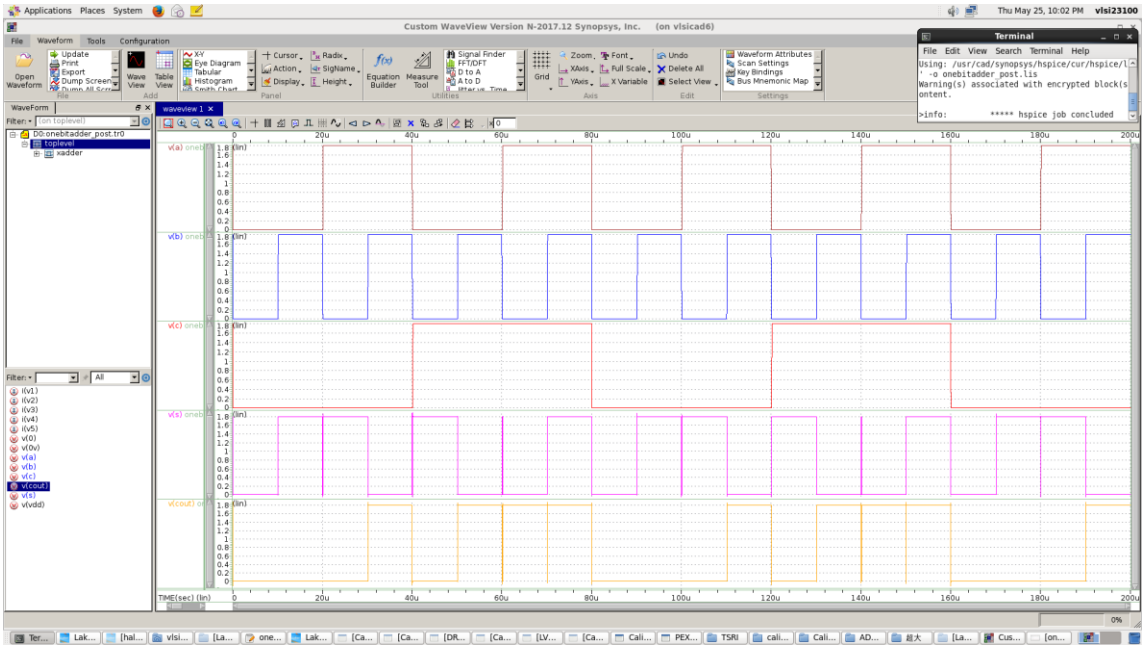
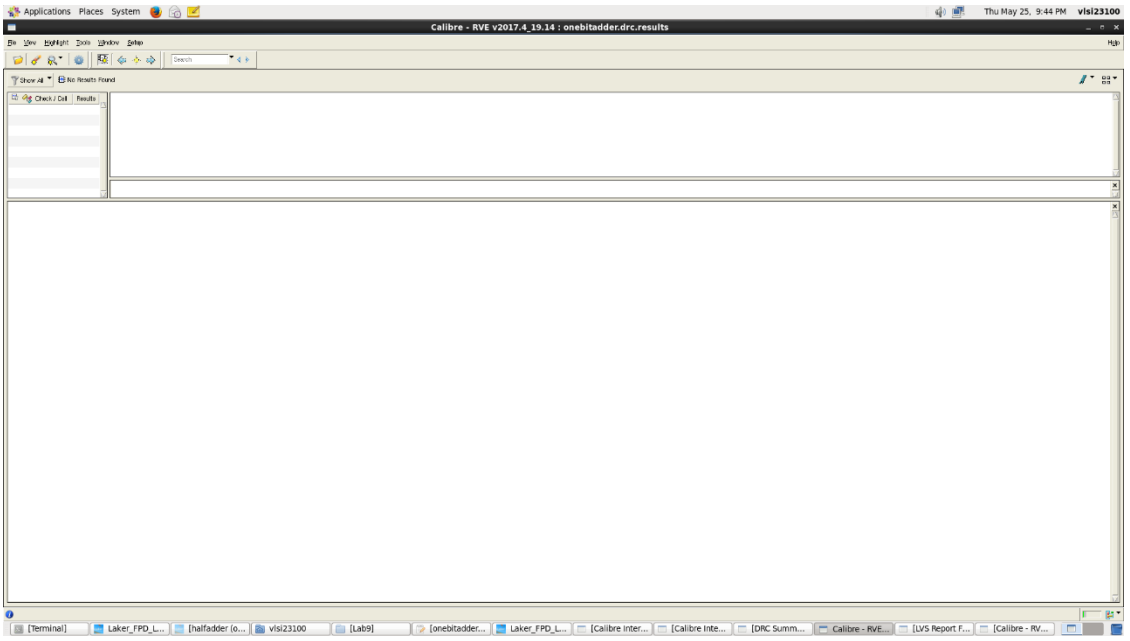

- 請截取 WaveView 中的波形

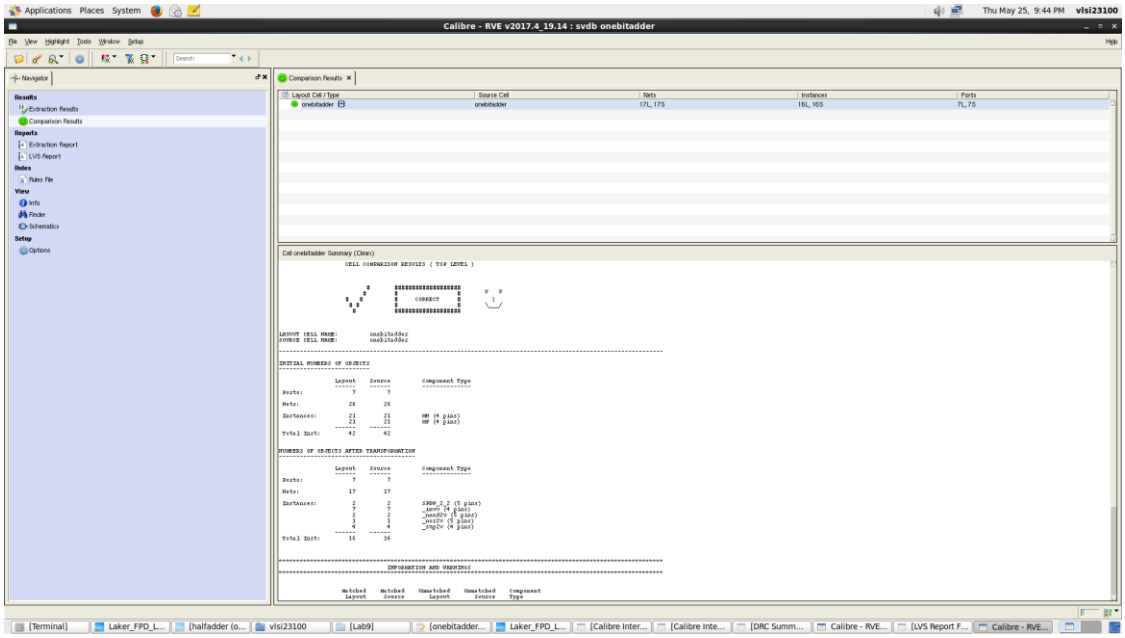


- DRC/LVS 結果

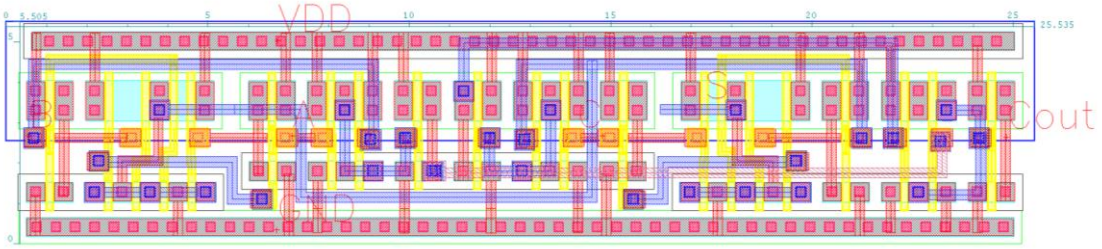
DRC:



LVS:



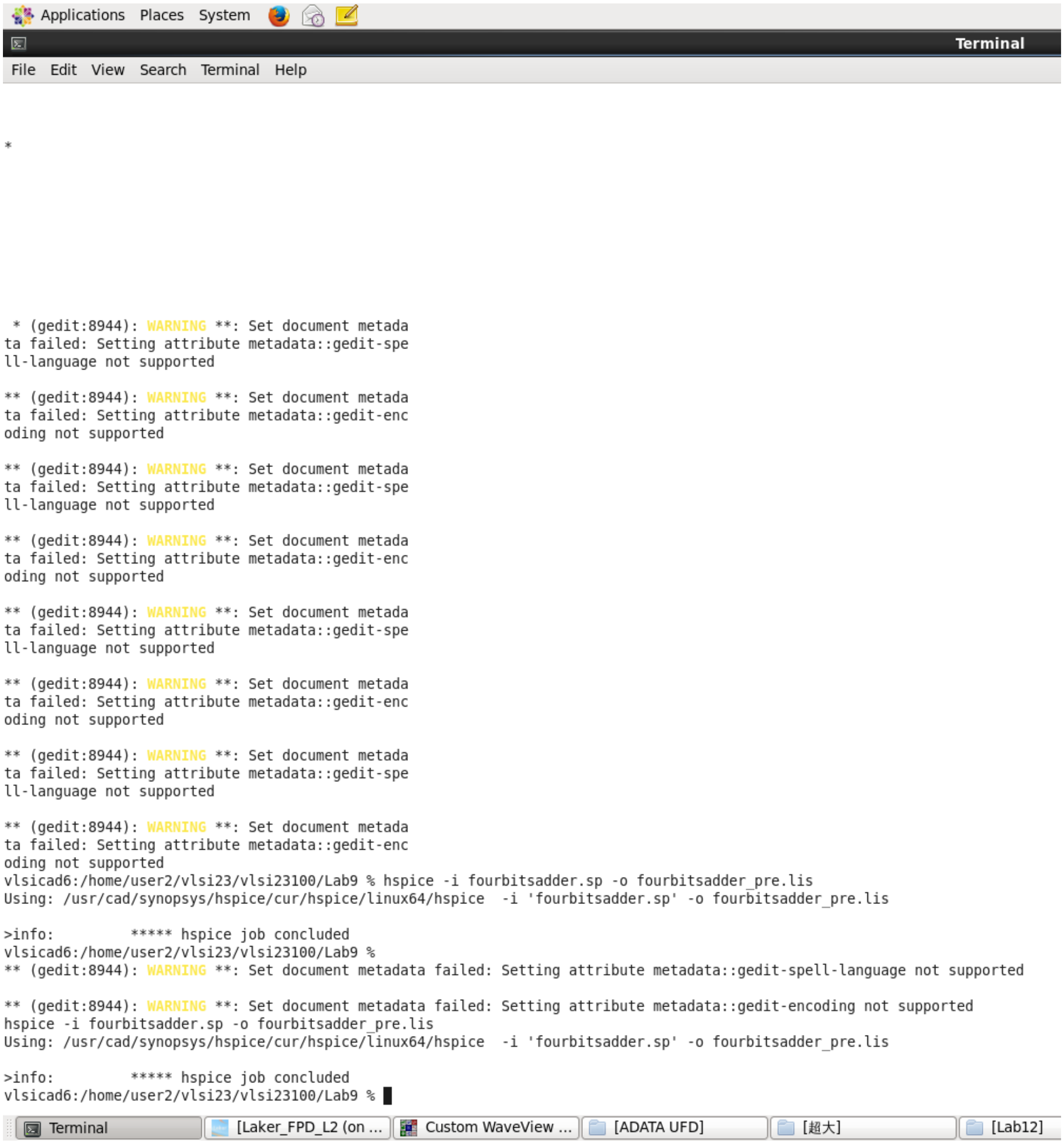
- Layout 截圖



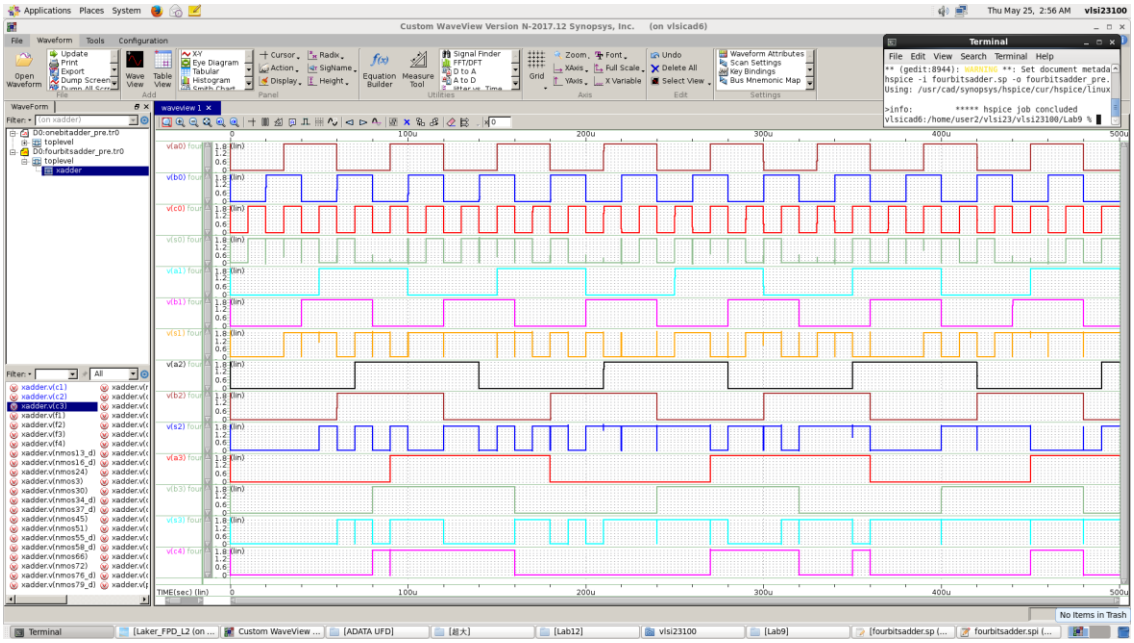
- 嘗試簡單說明 Presim 與 Post-sim 結果比較

  幾乎一樣，只有細微的波形震盪不一樣。

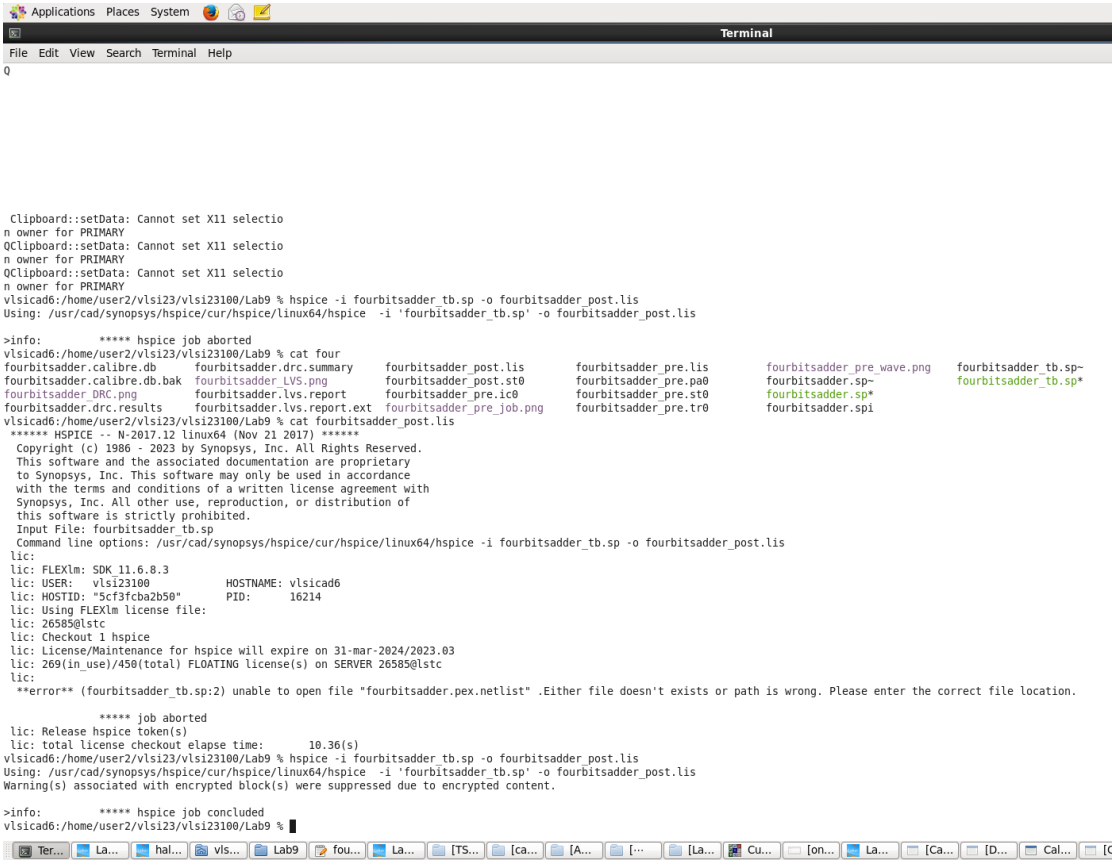
- 4-bit Ripple Carry Adder
  - Presim
    - 請截取 terminal 顯示 job concluded 的圖



- 請截取 WaveView 中的波形



- Post-sim
  - 請截取 terminal 顯示 job concluded 的圖



```
 Clipboard::setData: Cannot set X11 selectio
n owner for PRIMARY
QClipboard::setData: Cannot set X11 selectio
n owner for PRIMARY
QClipboard::setData: Cannot set X11 selectio
n owner for PRIMARY
vlsicad6:/home/user2/vlsi23/vlsi23100/Lab9 % hspice -i fourbitsadder_tb.sp -o fourbitsadder_post.lis
Using: /usr/cad/synopsys/hspice/cur/hspice/linux64/hspice  -i 'fourbitsadder_tb.sp' -o fourbitsadder_post.lis

>info:         ***** hspice job aborted
vlsicad6:/home/user2/vlsi23/vlsi23100/Lab9 % cat four
fourbitsadder.calibre.db      fourbitsadder.drc.summary     fourbitsadder_post.lis        fourbitsadder_pre.lis         fourbitsadder_pre_wave.png    fourbitsadder_tb.sp~
fourbitsadder.calibre.db.bak  fourbitsadder_LVS.png         fourbitsadder_post.st0        fourbitsadder_pre.pa0         fourbitsadder.sp~             fourbitsadder_tb.sp*
fourbitsadder_DRC.png         fourbitsadder.lvs.report      fourbitsadder_pre.ic0         fourbitsadder_pre.st0         fourbitsadder.sp*
fourbitsadder.drc.results     fourbitsadder.lvs.report.ext  fourbitsadder_pre_job.png     fourbitsadder_pre.tr0         fourbitsadder.spi
vlsicad6:/home/user2/vlsi23/vlsi23100/Lab9 % cat fourbitsadder_post.lis
 ****** HSPICE -- N-2017.12 linux64 (Nov 21 2017) ******
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  with the terms and conditions of a written license agreement with
  Synopsys, Inc. All other use, reproduction, or distribution of
  this software is strictly prohibited.
  Input File: fourbitsadder_tb.sp
  Command line options: /usr/cad/synopsys/hspice/cur/hspice/linux64/hspice -i fourbitsadder_tb.sp -o fourbitsadder_post.lis
 lic:
 lic: FLEXlm: SDK_11.6.8.3
 lic: USER:   vlsi23100            HOSTNAME: vlsicad6
 lic: HOSTID: "5cf3fcba2b50"       PID:      16214
 lic: Using FLEXlm license file:
 lic: 26585@lstc
 lic: Checkout 1 hspice
 lic: License/Maintenance for hspice will expire on 31-mar-2024/2023.03
 lic: 269(in_use)/450(total) FLOATING license(s) on SERVER 26585@lstc
 lic:
  **error** (fourbitsadder_tb.sp:2) unable to open file "fourbitsadder.pex.netlist" .Either file doesn't exists or path is wrong. Please enter the correct file location.

              ***** job aborted
 lic: Release hspice token(s)
 lic: total license checkout elapse time:       10.36(s)
vlsicad6:/home/user2/vlsi23/vlsi23100/Lab9 % hspice -i fourbitsadder_tb.sp -o fourbitsadder_post.lis
Using: /usr/cad/synopsys/hspice/cur/hspice/linux64/hspice  -i 'fourbitsadder_tb.sp' -o fourbitsadder_post.lis
Warning(s) associated with encrypted block(s) were suppressed due to encrypted content.

>info:         ***** hspice job concluded
vlsicad6:/home/user2/vlsi23/vlsi23100/Lab9 %
```
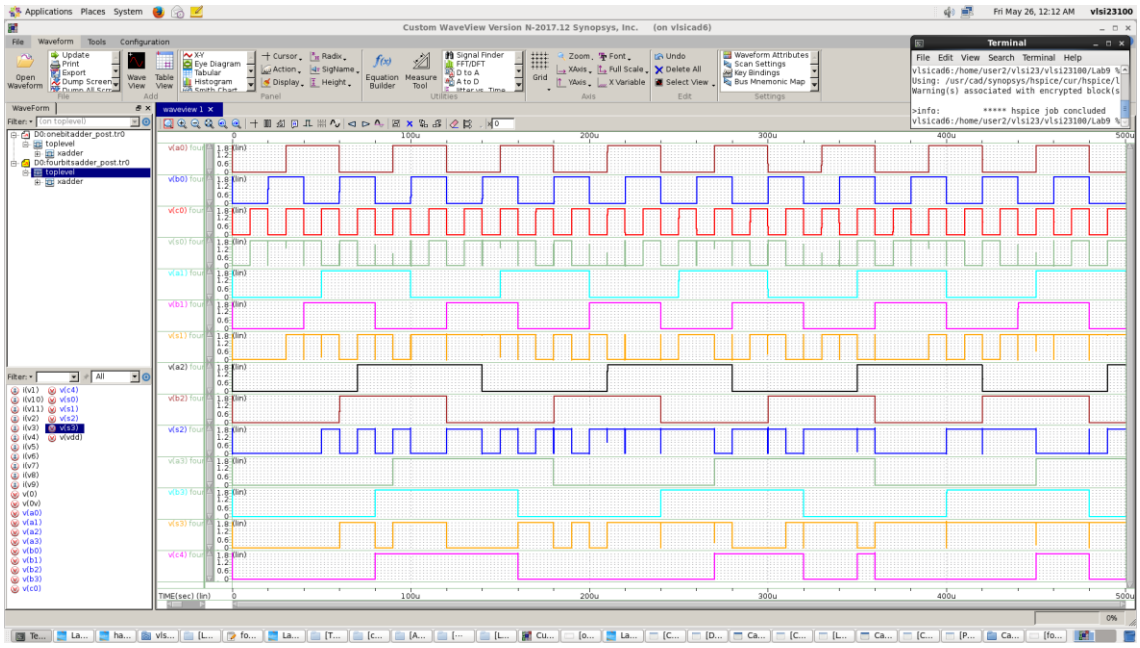
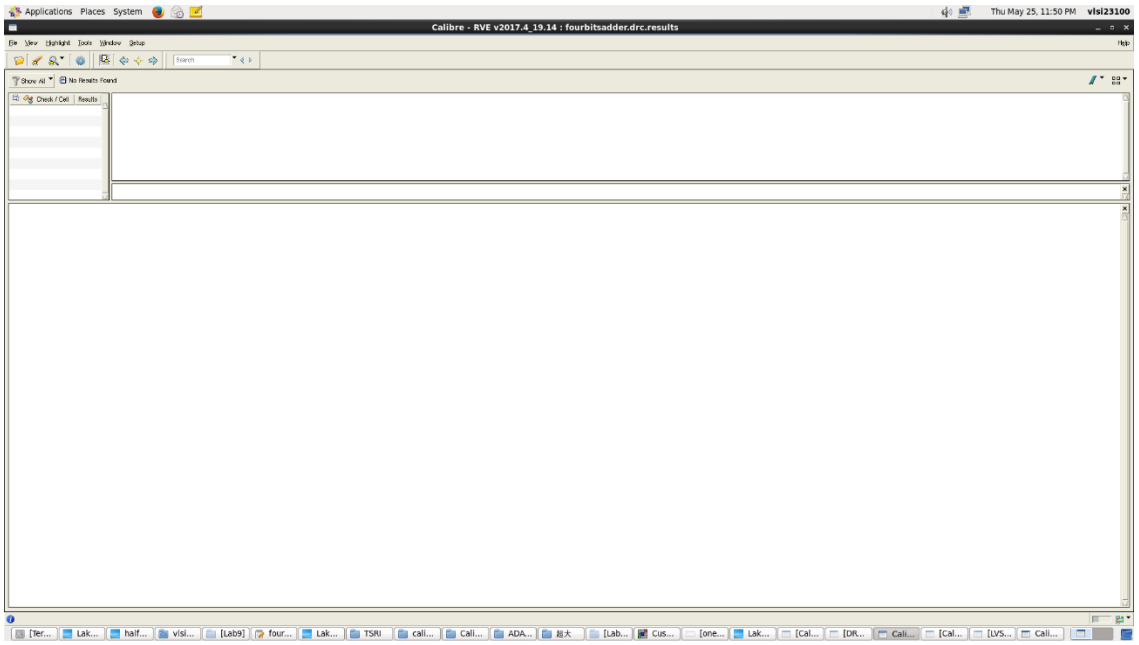

- 請截取 WaveView 中的波形

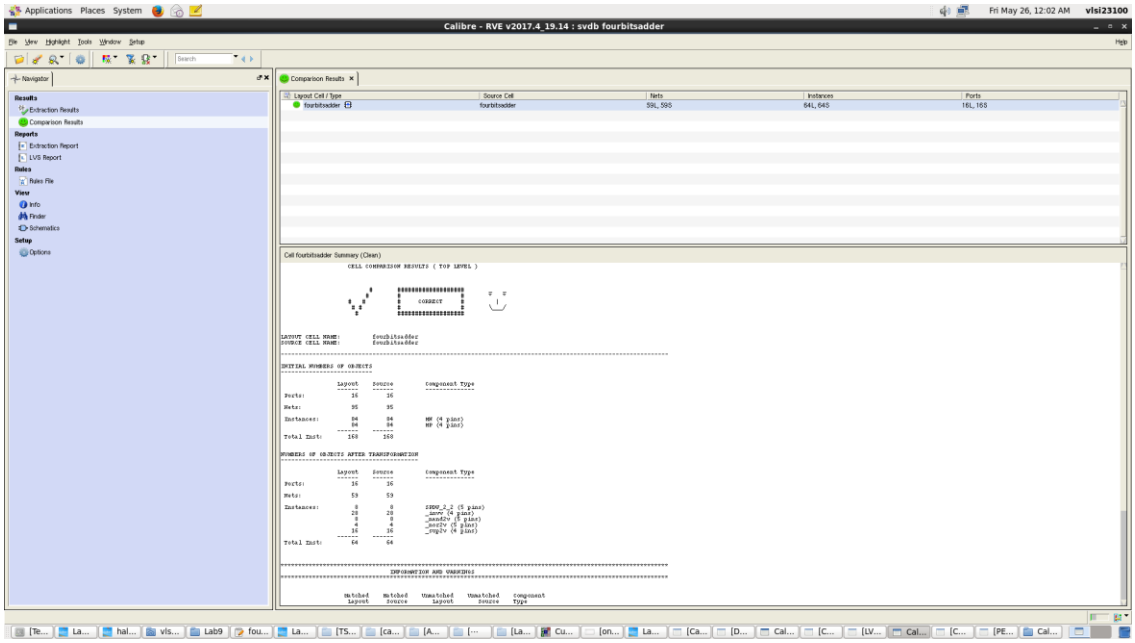


- DRC/LVS 結果

DRC:



LVS:

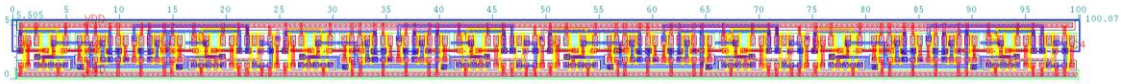


- Layout 截圖(顯示長寬)

  長:100.07

  寬:5.505

  面積:550.88535



- 嘗試簡單說明 Presim 與 Post-sim 結果比較

  Output 的波形在 input 的值變化時有時會突然有突波出現，

  且 Presim 和 Post-sim 出現的位置不盡相同，突然變化的值也

  都不一樣，但最後都會回到正確的值。

- 心得討論

  在做此 Lab 時發現不同 gate 的 PIMP 和 NIMP 其實可以共用，

這可以省下非常多面積，也發現若是小的元件畫的好，大的元件可以非常有效率的接完線就完成了，更發現 and 和 or 的佈局非常像。