Digital Integrated Circuits

Homework#6 2024.12.12 (Due: 2025.01.08 23:59 ADFP Cloud 2.0)

- **Using ADFP standard V_T technology with VDD = 0.8V**
- **Tutorial File:** /RAID2/COURSE/2024_Fall/DIC/DICTA01/DIC_Document/DIC2024_A DFP-Layout-Tutorial.pdf
- **Design Rules:** ~/ADFP_PDF/ADFP039_N16ADFP_DRM_V1.1_1.pdf

(1) Design an inverter with arbitrary number of fin in Virtuoso using:

i. Schematic with Pre-Sim Simulation. (Input Waveform 0→1→0 with rise time 0V~0.8V and fall time 0.8V~0V equal to 10ps.) (10%)

ii. Layout with 0 DRC error (except dummy and density issues), 0 LVS error, and Post-Sim Simulation. (20%)

(2) Design a 4-bit **Ripple Carry Adder** in Virtuoso using:

i. Schematic with Pre-Sim Simulation. (rise time and fall time = 10ps with following input signals) (20%)

Pattern	time	A[3:0]	B[3:0]	C_{in}	Out[4:0]
0	0ps	4'b0000	4'b0000	1'b0	5'b00000
1	10ps	4'b1010	4'b0101	1'b1	5'b10000
2	10ps + 2T	4'b1100	4'b0011	1'b0	5'b01111
3	10ps + 3T	4'b1111	4'b1111	1'b1	5'b11111

(Note: T = maximum propagation delay of your adder)

ii. Layout with 0 DRC error (except dummy and density issues), 0 LVS error, and Post-Sim Simulation. (30%)

(3) Performance Ranking (Area * Propagation Delay) (20%)

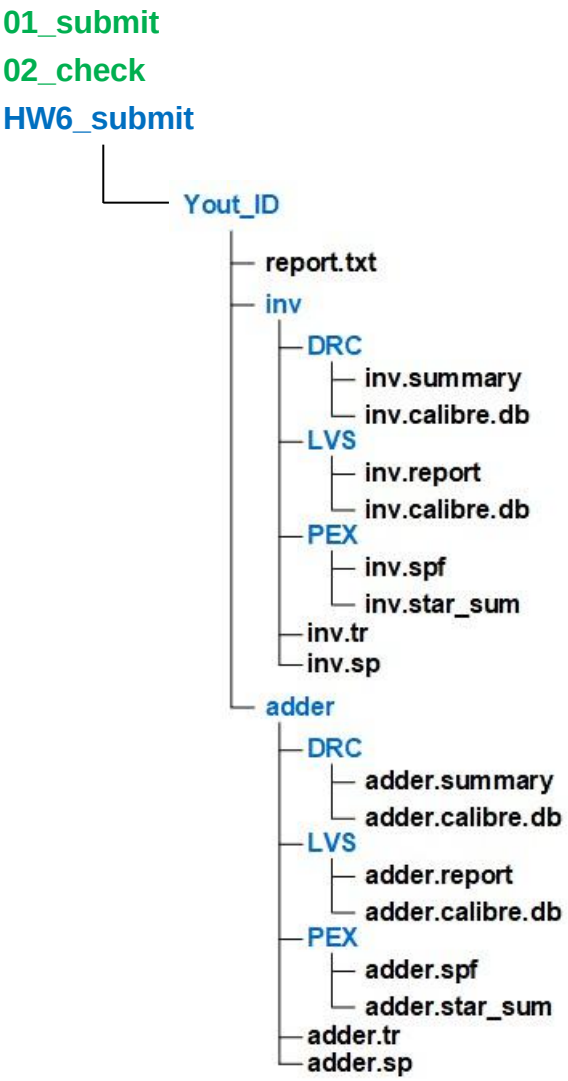
i. Area of Chip Boundary (μm^2)

ii. Propagation Delay (ps): (Delay of **[Pattern$_1$]** + **[Pattern$_2$]** + **[Pattern$_3$]**)

Submission:

1. Make a directory using **Your_ID**
2. Create **inv** directory, **adder** directory, and copy **report.txt** in **Your_ID**
   Template file of **report.txt**:
   /RAID2/COURSE/2024_Fall/DIC/DICTA01/DIC_Final_Submission/report.txt
3. create **DRC**, **LVS**, **PEX** directories and organize them as the hierarchy below.

4. Edit **report.txt** and make sure you have submitted all the files.
5. Link submission scripts: `ln -s ~DICTA03/01_submit`
   `ln -s ~DICTA03/02_check`
6. Create a **"HW6_submit"** folder: `mkdir HW6_submit`
   "HW6_submit" should be created in the same directory as the scripts.
7. Put your submission files in **"HW6_submit".**

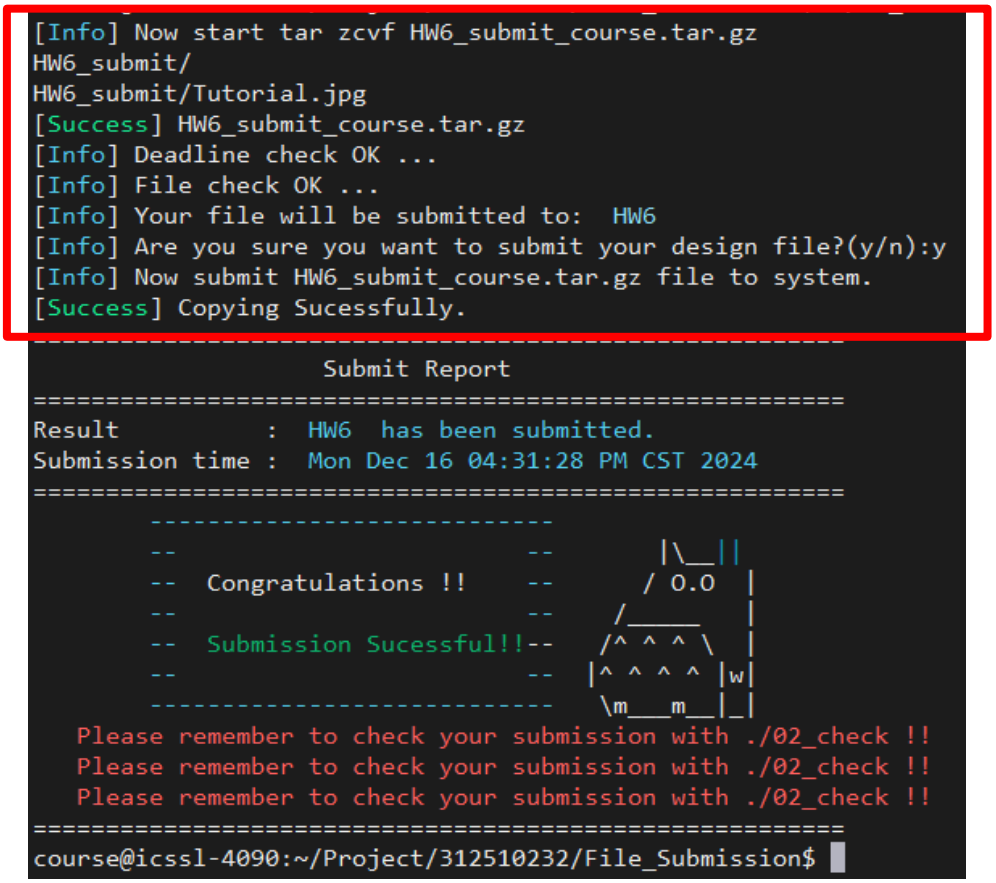


8. Run 01_submit: `./01_submit`

```
[Info] Now start tar zcvf HW6_submit_course.tar.gz
HW6_submit/
HW6_submit/Tutorial.jpg
[Success] HW6_submit_course.tar.gz
[Info] Deadline check OK ...
[Info] File check OK ...
[Info] Your file will be submitted to:  HW6
[Info] Are you sure you want to submit your design file?(y/n):
```

9. Type **“y”** to continue.

   Please make sure there are no errors, such as “file not found”, after running ./01_submit.



Make sure there are no any error

10. Run 02_check: **`./02_check`**

    The submission file will be downloaded in the **“HW6_submit_[your server account]_check”** folder.

    Please make sure there are no errors, such as “file not found”, after running ./02_check.