# Lab 3 – Placement and Routing

- Due: 2pm, Feb. 27 (Mon)

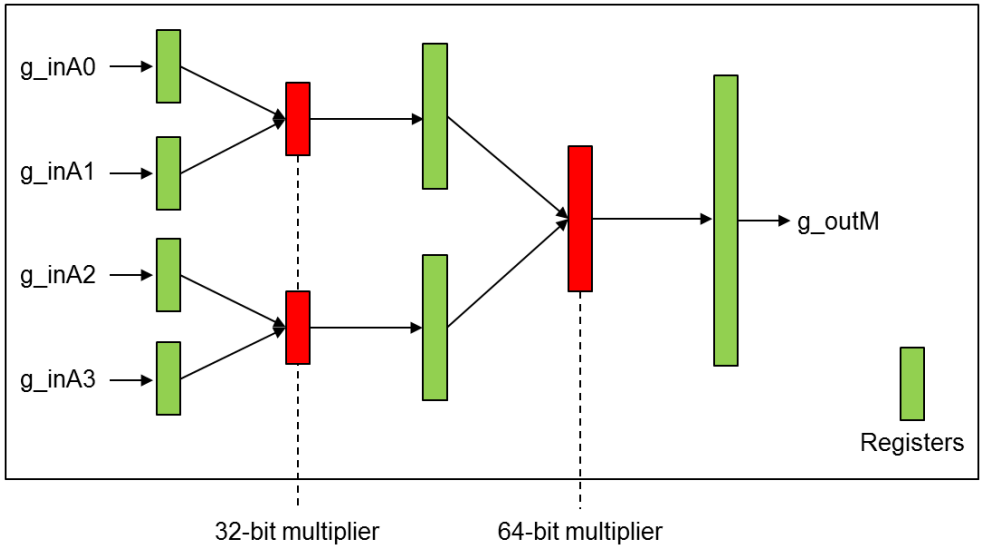
- How to submit
  - **Zip all the files listed in Slide 4-5 and submit in Canvas.**
  - **DO NOT SUBMIT YOUR DESIGN FILES.**

- Read the “tutorial_innovus.pdf” in the “Labs” page carefully.

- Connect to an EECS server.
- Download lab3.zip.
  - wget https://eecs.wsu.edu/~daehyun/teaching/2023_EE434/lab/lab3.zip

# Design

- Four-input 32-bit pipelined multiplier.




- Files: pmul32_4_fm.globals, .view, .v, .sdc
- You will also need the lib directory in tutorial_innovus.zip.

# Spec

- Initial core utilization: 0.5
- Core-to-left, core-to-top, core-to-right, core-to-bottom: 5um
- Top metal layer: 8
- Clock
  - Max. transition time: 50ps
  - Clock skew: 30ps

# Procedure & What to Submit

- Chip outlining
  - (Submit) A screenshot of the layout
- P/G network design
  - (Submit) A screenshot of the layout showing the P/G rings and stripes.
- Placement
  - (Submit) A screenshot of the layout (turn off the visibility of all the metal layers)
  - (Submit) WNS and TNS (not the “reg2reg” values, but the “all” values), the layout density, the power consumption (total power only), and the wire length. Do not screen capture the values. I need “numbers” like this.
    - WNS: -XXX.XX ns
    - TNS: -XXX.XX ns
    - Density: XX.X %
    - Power: XX.XX mW
    - Wire length: XXX um

# Procedure & What to Submit

- Pre-CTS optimization
  - Perform pre-CTS opt. (This will take some time, 10~30 mins)
  - (Submit) WNS, TNS, density, power
- CTS
  - Perform CTS.
  - (Submit) A screenshot of the clock tree
  - (Submit) WNS, TNS, density, power
- Post-CTS optimization
  - Perform post-CTS opt.
  - (Submit) WNS, TNS, density, power
- Routing
  - Perform routing
  - (Submit) A screenshot of the layout (show all the metal layers)
  - (Submit) WNS, TNS, density, power, wire length

# Procedure & What to Submit

- Post-route optimization
  - Perform post-route opt.
  - (Submit) WNS, TNS, density, power, wire length
- Verification
  - Perform “Verify DRC”.
  - (Submit) # violations and their types (a small table shown in the log)
  - Perform “Verify connectivity”
  - (Submit) # violations

# Procedure & What to Submit

- How to submit
  - Copy and paste the layout images into a word file.
  - At the bottom of the file, make a table and put the values in the table.

| | WNS | TNS | Density | Power | WL |
|---|---|---|---|---|---|
| Placement | | | | | |
| Pre-CTS opt | | | | | |
| CTS | | | | | |
| … | | | | | |