

# @meGanesha

Project Proposal - Digital Building Blocks

# Team Members

- Irfan Nurhakim Hilmi <[@irfannhlm:matrix.org](mailto:@irfannhlm:matrix.org)>
- Randy Revaldo Pratama
- Nur Dawam Abdan Syakuro
- Avila Khadhibyan

# Team Background

- **Academic Experience**  
All members just finished 3rd year in Electrical Engineering, Institut Teknologi Bandung (ITB), Indonesia
- **Work Experience**  
All members have worked with SkyWater 130 nm PDK using IIC-OSIC-TOOLS and perform basic schematic design, simulation, and layout

# Project Information

- Goal

Create efficient pass transistor logic (PTL)-based multiplexers as standard cells. Provide full characterization for open-source library integration.

- Design

The plan is to design 4-1 MUX using transmission gates. The target is less area with similar (or better) characteristics than standard multiplexers. The target drive strength is X3 and X4.

- Application

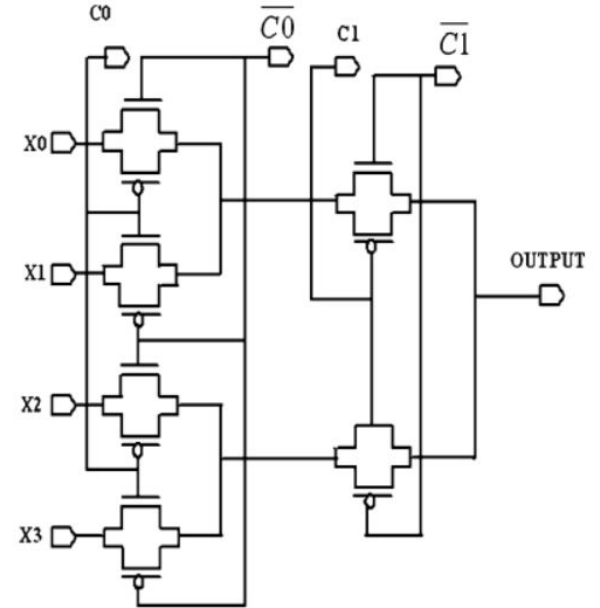
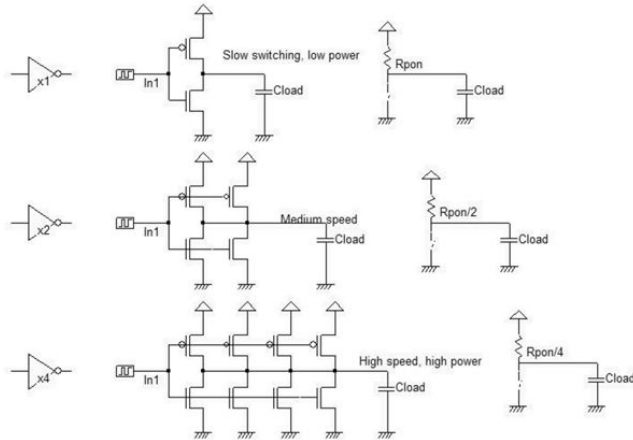
Original idea is to use these cells for area-efficient barrel shifters, but can definitely be used for other macro cells.

- References

M. Mishra and S. Akashe, "High performance, low power 200 Gb/s 4:1 MUX with TGL in 45 nm technology," *Appl. Nanosci.*, vol. 4, no. 8, pp. 889–895, Dec. 2014, doi: 10.1007/s13204-013-0206-0

# Preliminary Research

The circuit schematic can be seen on the right.  
The variation in drive strength can be achieved  
by enlarging the transistor sizes.



# Timeline

[illegible]

# Milestones

- Schematic & Simulation
  - Deep research & experimentation
  - Final schematic decision
  - Functional & timing analysis
- Physical Implementation
  - Layout creation
  - DRC & LVS
- Post-Layout Tasks
  - Parasitic extraction
  - Simulation with the extracted parasitics
  - Characterization
  - Integration

# Task Distribution

- Schematic & Simulation: Randy
- Physical Implementation
  - Layout creation: Avila
  - DRC & LVS: Irfan
- Post-Layout Tasks
  - Parasitic extraction: Irfan
  - Simulation with the extracted parasitics: Avila
  - Characterization: Dawam
  - Integration: Dawam

# Questions, Suggestions, Doubts

- Any suggestions on effective task allocation?
- Is it better if each person work on different variations, or stay with 4 people for one cell?
- Possibility of adding demux design if too simple?