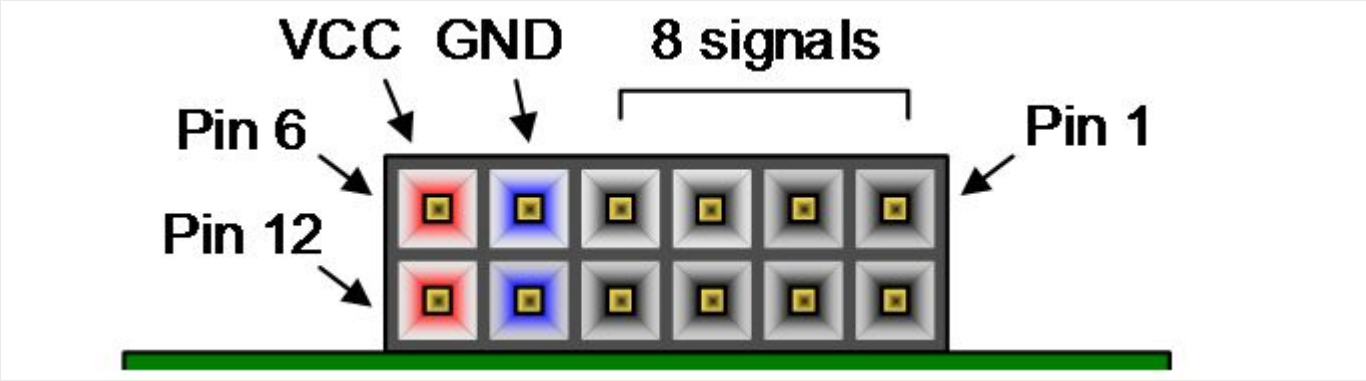
A quick word on PMOD

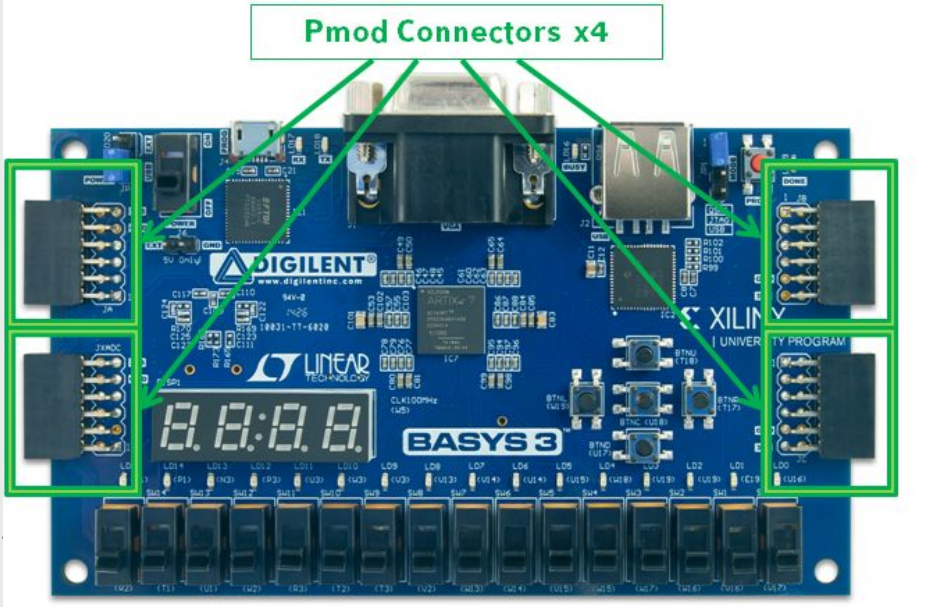
What is Pmod?

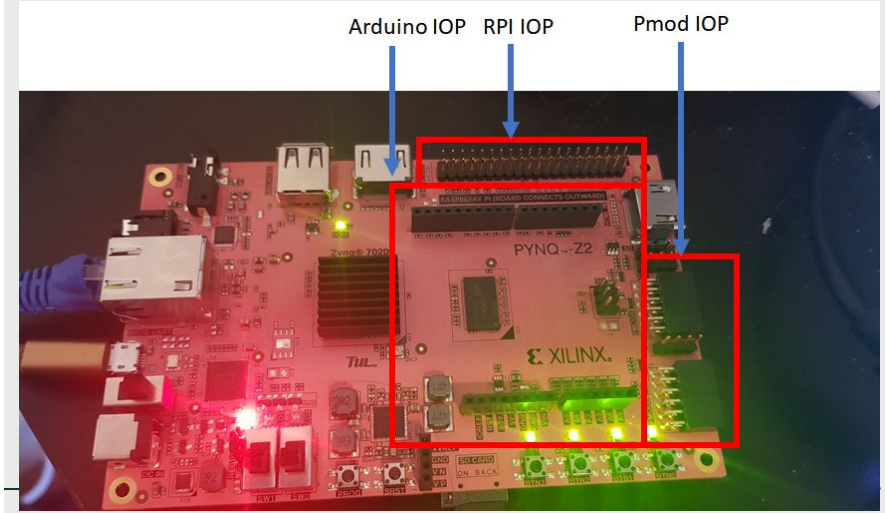
- **Pmod** stands for **Peripheral Module**.
- It is a small hardware add-on interface commonly used with **FPGA boards**, microcontroller boards, and embedded systems.
- Pmods let you quickly connect external hardware without designing a custom PCB.

- Examples of Pmod add-ons:
  - Sensors
  - LCD/OLED displays
  - ADC/DAC boards
  - Bluetooth/Wi-Fi/GPS modules
  - SPI, UART, and I2C peripherals

- I will be using:
  - GPIO Pmod
- I Plan to Use
  - SPI Flash Memory Chip Pmod
  - SD Card Pmod


VCC
GND
8 signals
Pin 6
Pin 1
Pin 12


Pmod Connectors x4
DIGILENT
BASYS 3


Arduino IOP
RPI IOP
Pmod IOP
PYNQ-Z2
XILINX

Just another option in the constraint file

It should already be in your 133 / 233 Constraint File.

```
##Pmod Header JA
##Sch name = JA1
set_property PACKAGE_PIN J1 [get_ports {P_LEDS[0]}]
set_property IOSTANDARD LVCMOS33 [get_ports {P_LEDS[0]}]
#Sch name = JA2
set_property PACKAGE_PIN L2 [get_ports {P_LEDS[1]}]
set_property IOSTANDARD LVCMOS33 [get_ports {P_LEDS[1]}]
#Sch name = JA3
set_property PACKAGE_PIN J2 [get_ports {P_LEDS[2]}]
set_property IOSTANDARD LVCMOS33 [get_ports {P_LEDS[2]}]
#Sch name = JA4
set_property PACKAGE_PIN G2 [get_ports {P_LEDS[3]}]
set_property IOSTANDARD LVCMOS33 [get_ports {P_LEDS[3]}]
##Sch name = JA7
#set_property PACKAGE_PIN H1 [get_ports {JA[4]}]
#   set_property IOSTANDARD LVCMOS33 [get_ports {JA[4]}]
##Sch name = JA8
#set_property PACKAGE_PIN K2 [get_ports {JA[5]}]
#   set_property IOSTANDARD LVCMOS33 [get_ports {JA[5]}]
##Sch name = JA9
#set_property PACKAGE_PIN H2 [get_ports {JA[6]}]
#   set_property IOSTANDARD LVCMOS33 [get_ports {JA[6]}]
#Sch name = JA10
set_property PACKAGE_PIN G3 [get_ports MOTOR_PIN]
set_property IOSTANDARD LVCMOS33 [get_ports MOTOR_PIN]
```

Multiple Partitions. DFX

For DFX Basics. Ryan made an AMAZING. Literal. Step-by-step guide with a screenshots on every step here:
DFX tutorial for Block Design using the Basys 3

https://github.com/ryancramuh/fpga-embedded/tree/dfx-demos/dfx_w_RTL

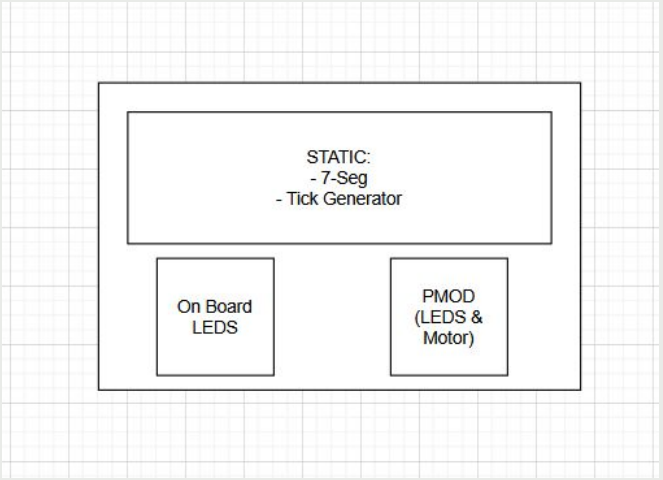
Having multiple Reconfigurable Blocks

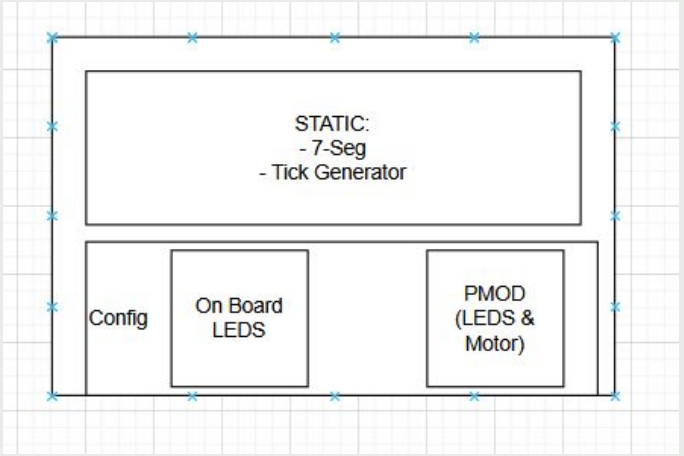
Say you have P-Block A & P-Block B

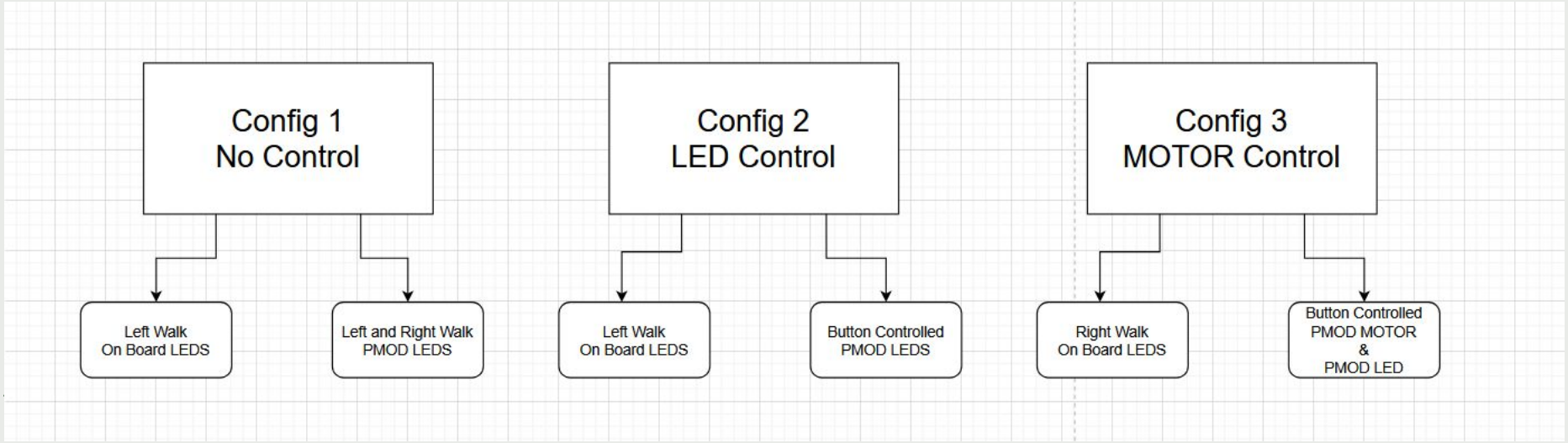
1. Have your I/O control many things. Switch between what you're controlling/ inputting to by reconfiguring a block.

2. You're only changing Block A while Block B AND the STATIC module keeps running.

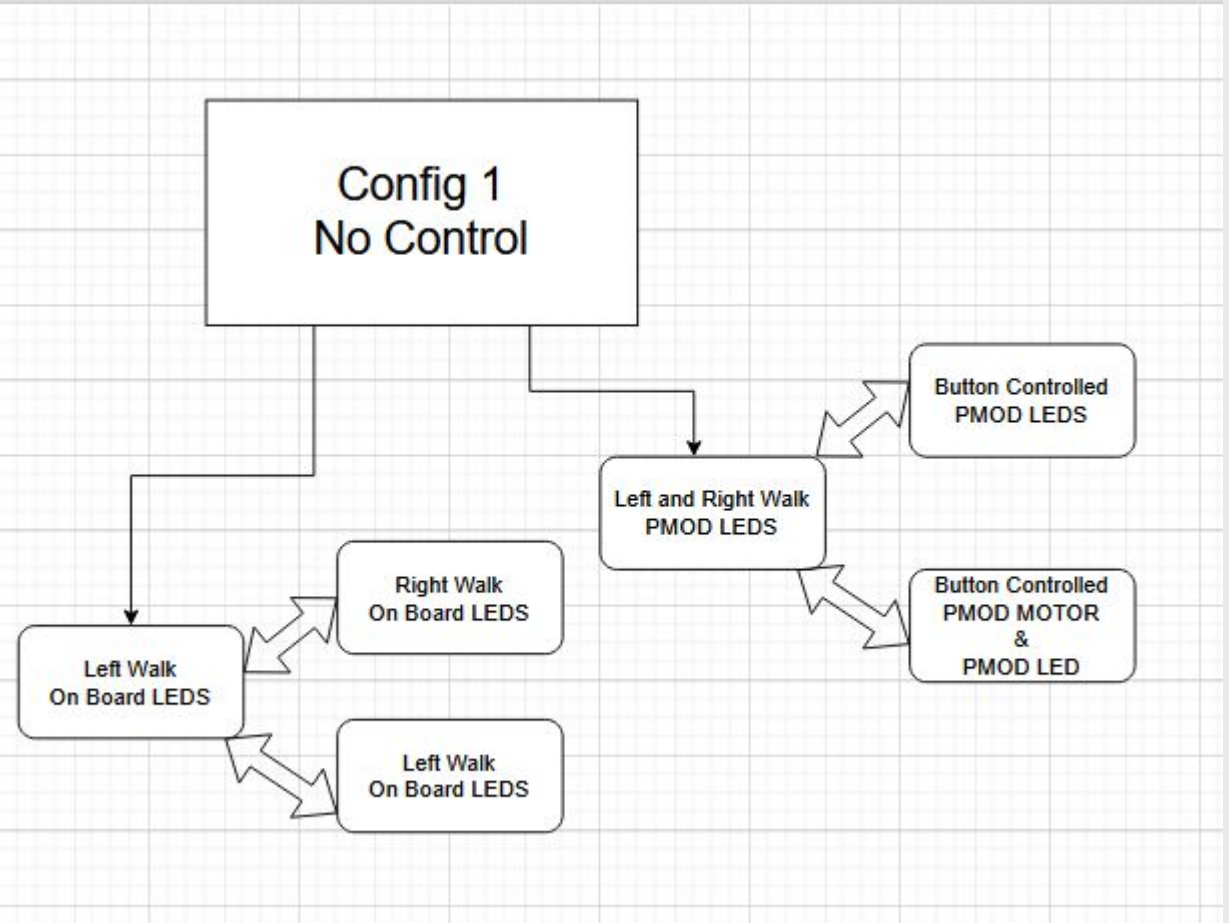
3. Have Pre-Set Configurations


STATIC:
- 7-Seg
- Tick Generator
On Board LEDS
PMOD (LEDS & Motor)


STATIC:
- 7-Seg
- Tick Generator
Config
On Board LEDS
PMOD (LEDS & Motor)


Config 1
No Control
Left Walk
On Board LEDS
Left and Right Walk
PMOD LEDS
Config 2
LED Control
Left Walk
On Board LEDS
Button Controlled
PMOD LEDS
Config 3
MOTOR Control
Right Walk
On Board LEDS
Button Controlled
PMOD MOTOR
&
PMOD LED

The Partial BitStream Part



Make Sure all your Configs are the children of 1 Implementation

Reconfigurable Module Associations with Partition Definitions

Reconfigurable Module	Partition Definition
LED_LeftWalk	reconfig_OnBoardLEDS
LED_rightWalk	reconfig_OnBoardLEDS
PMOD_LeftRight	reconfig_PMOD
PMOD_LightControl	reconfig_PMOD
PMOD_MotorCNTRL	reconfig_PMOD
PMOD_MotorON	reconfig_PMOD
PMOD_MotorPULSE	reconfig_PMOD

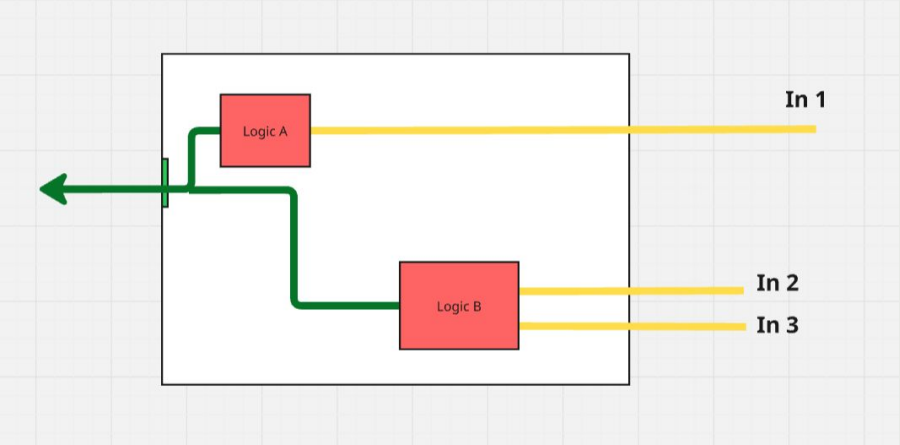
Configurations

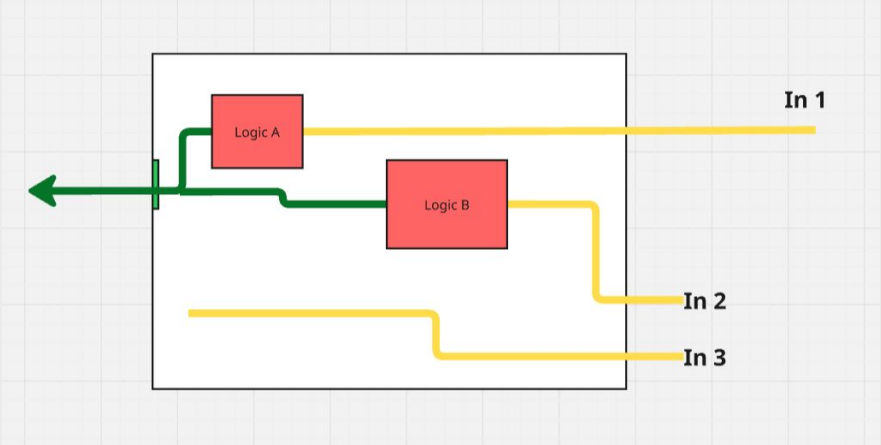
Configuration Name	RECONFIG_LEDS	RECONFIG_PMOD
config_LightControl	LED_LeftWalk	PMOD_LightControl
config_MotorControl	LED_rightWalk	PMOD_MotorCNTRL
config_noControl	LED_LeftWalk	PMOD_LeftRight

Configuration Runs

Name	Configuration	Parent	Constraints	Run
impl_1	config_noControl	synth_1	constrs_1 (active)	V
impl_NOcnrl	config_noControl	synth_1	constrs_1 (active)	V
impl_MOTOR_CNRL	config_MotorControl	impl_NOcnrl	constrs_1 (active)	V
impl_LED_CNRL	config_LightControl	impl_NOcnrl	constrs_1 (active)	V

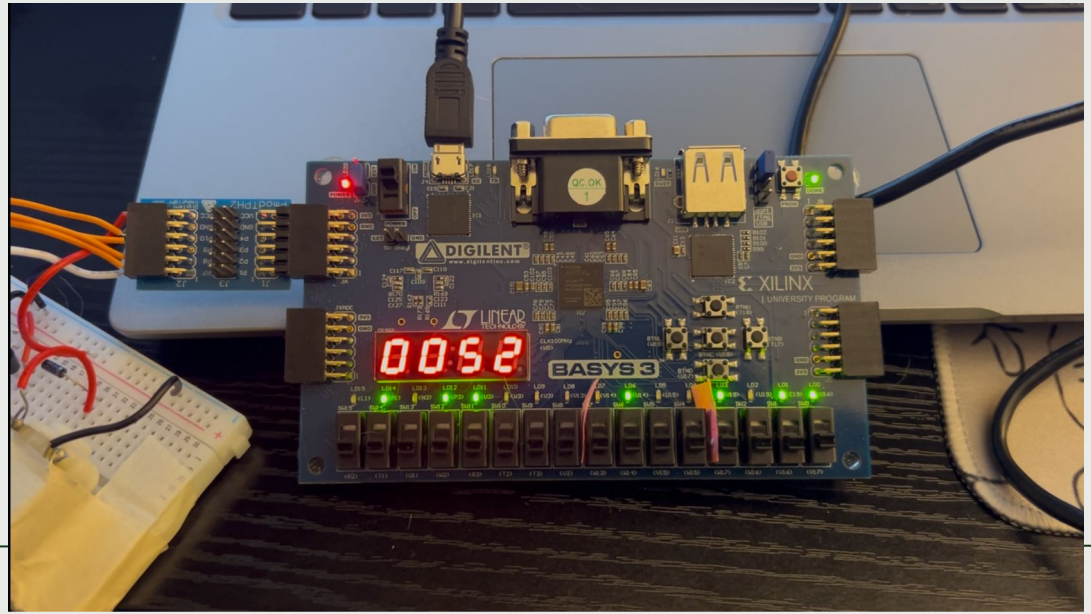
If not...





Literally Happened to me

Supposed be a On Board LED Right Walk. Just some randomness. Had to fix it in the DFX, and re-synthesize...



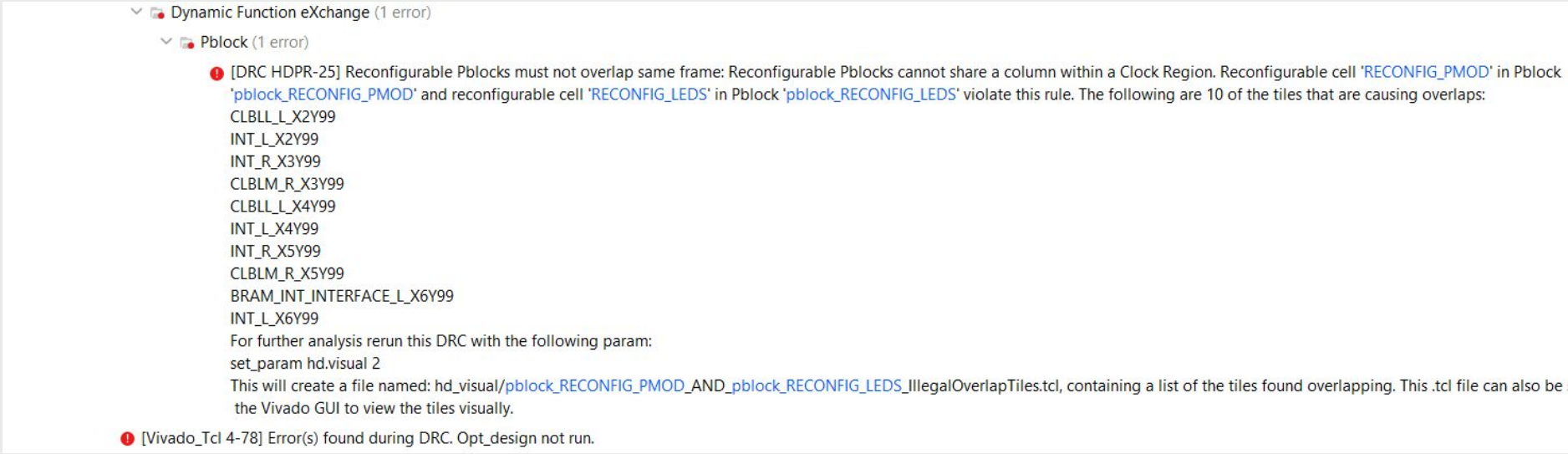
P-Block Drawing Errors

- P-Block Designs that share a Column seems like a no-no

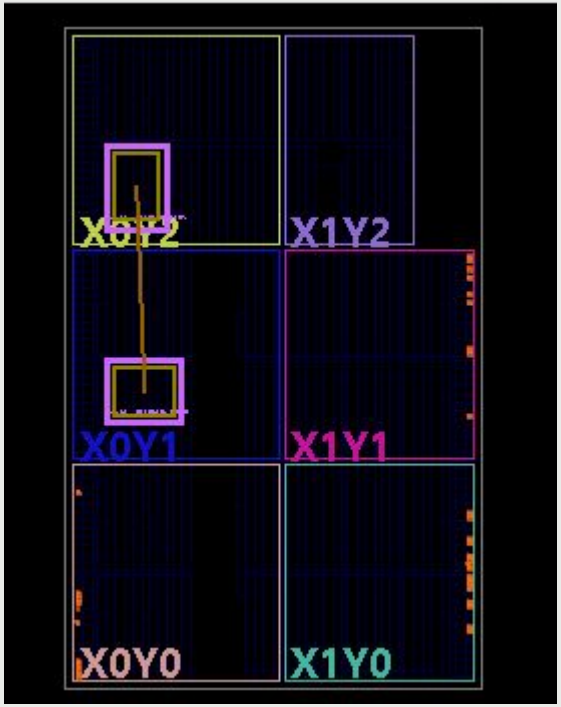
1. Just move it over to the right or left so that they're not on top of each other (Next Slide)

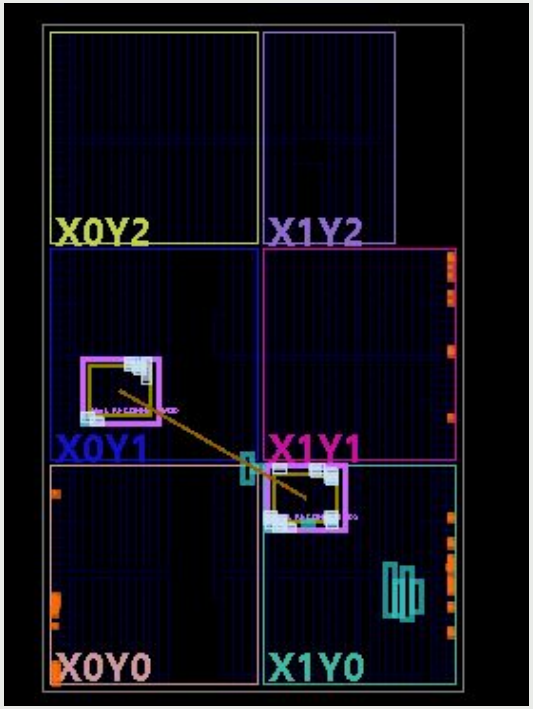
2. Add the 'Snap Mode ON' in the constraints file

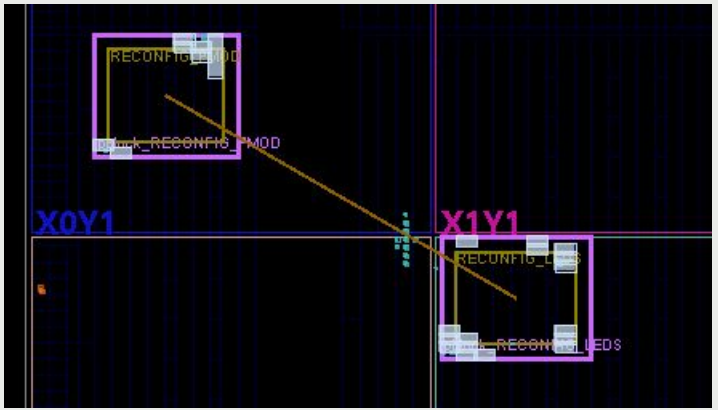
Seems like Row Y99 is the issue



*ChatGPT said X2 through X6 is the issue.


X0Y2
X1Y2
X0Y1
X1Y1
X0Y0
X1Y0


X0Y2
X1Y2
X0Y1
X1Y1
X0Y0
X1Y0


X0Y1
X1Y1

END.

DFX DEMO:

https://www.youtube.com/watch?v=faAjsjYVUXE