RISC-V SoC and Firmware Development

Lab: 03

Table Of Content

- SoC Peripherals (How SoC will connect with Peripherals).
- BootFlow, Clk, PLL, Reset.

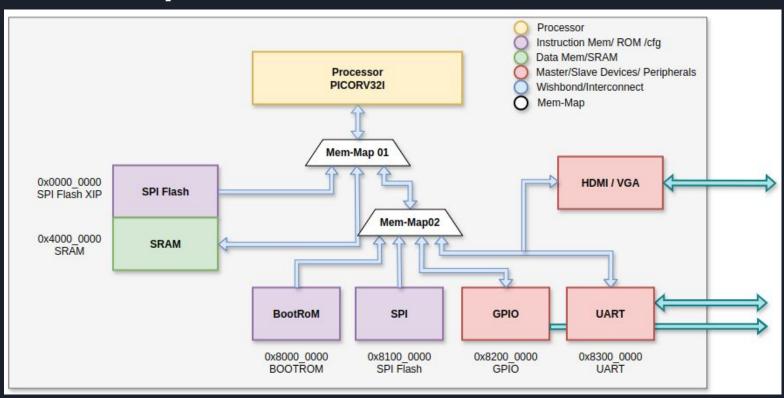
 Compact, lightweight System on Chip (SoC) based on RISC-V architecture Integrates a RISC-V core with essential peripherals

PERIPHERALS

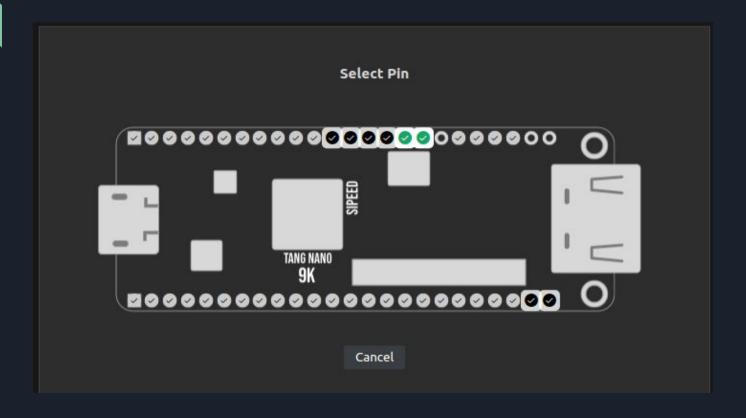
- UART (Universal Asynchronous Receiver-Transmitter) GPIO (General Purpose Input/Output)
- Boot RAM,flash SPI,GPIOs

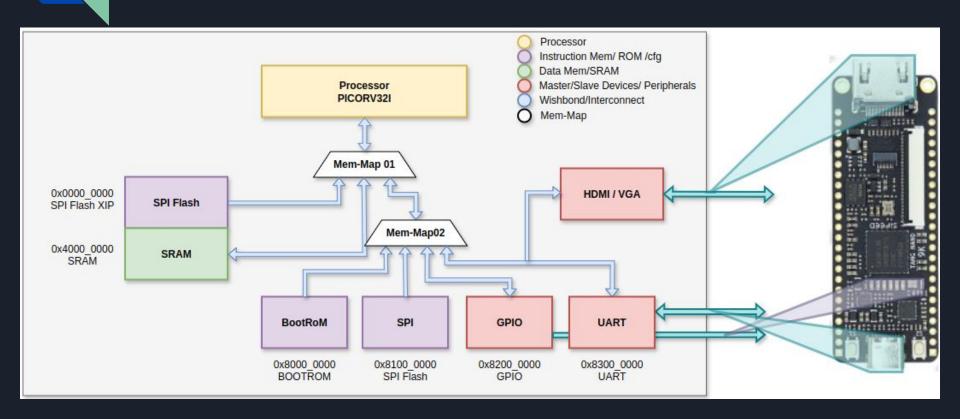
Role in project

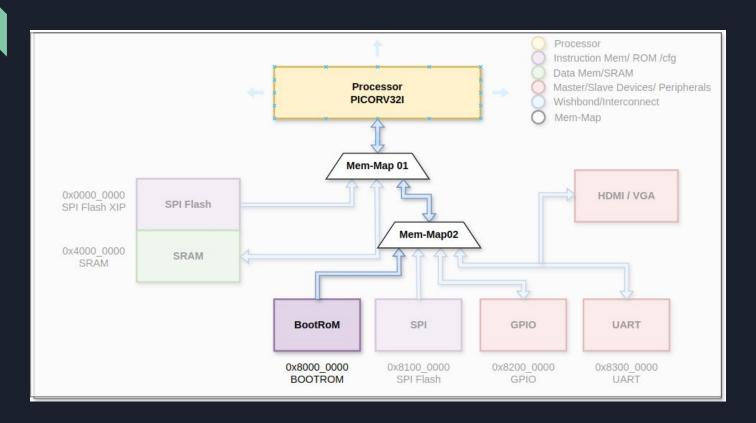
- Serves as the central processing unit for managing game logic
- Handles interactions between the FPGA and external interfaces.
- HDMI for display the game
- UART for keyboard input for game

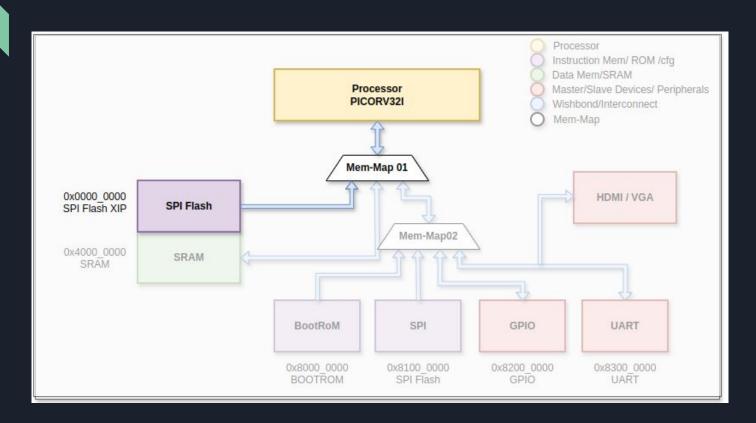


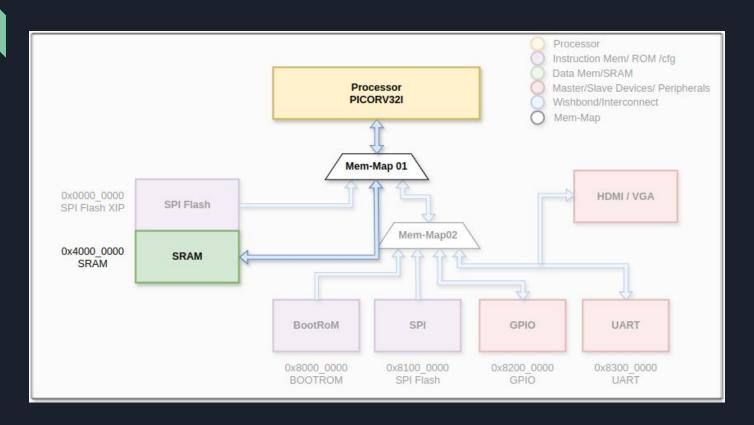
PORT NAME LOCATION PORT OPTIONS tmds_d_p[0] 71,70 8ma Drive tmds_d_p[1] 73,72 8ma Drive tmds_d_p[2] 75,74 8ma Drive tmds_clk_p 69,68 8ma Drive, Pull Up, LVCMOS33 ser_tx 17 8ma Drive, Pull Up, LVCMOS33 flash_cdb 60 8ma Drive, Pull Up, LVCMOS33 glo[6] 3 8ma Drive, Pull Up, LVCMOS33 gpio[6] 16 8ma Drive, Pull Up gpio[4] 15 8ma Drive, Pull Up gpio[3] 14 8ma Drive, Pull Up gpio[1] 11 8ma Drive, Pull Up gpio[1] 11 8ma Drive, Pull Up gpio[1] 10 8ma Drive, Pull Up gpio[1] 10 8ma Drive, Pull Up, LVCMOS33 flash_mosi 61 8ma Drive, Pull Up, LVCMOS33 ser_rx 18 Pull Up, LVCMOS33 reseth 4 Pull Up	Constraints		+ Add From Template + Add Constraint
tmds_d_p[0] 71,70 8ma Drive tmds_d_p[1] 73,72 8ma Drive tmds_d_p[2] 75,74 8ma Drive tmds_clk_p 69,68 8ma Drive ser_tx 8ma Drive, Pull Up, LVCMOS33 flash_csb 60 8ma Drive, Pull Up, LVCMOS33 flash_clk 59 8ma Drive, Pull Up opio[0] 3 8ma Drive, Pull Up opio[3] 16 8ma Drive, Pull Up opio[4] 15 8ma Drive, Pull Up opio[2] 14 8ma Drive, Pull Up opio[2] 13 8ma Drive, Pull Up opio[1] 11 8ma Drive, Pull Up opio[1] 11 8ma Drive, Pull Up opio[1] 10 8ma Drive, Pull Up flash_miso 62 8ma Drive, Pull Up, LVCMOS33 flash_mosi 61 8ma Drive, Pull Up, LVCMOS33 ser_rx 18 Pull Up, LVCMOS33 resetn 4 Pull Up, LVCMOS33			
tmds_d_p[t] 73,72 8ma Drive tmds_d_p[2] 75,74 8ma Drive tmds_clk_p 69,68 8ma Drive, Pull Up, LVCMOS33 ser_tx 17 8ma Drive, Pull Up, LVCMOS33 flash_csb 60 8ma Drive, Pull Up, LVCMOS33 flash_clk 59 8ma Drive, Pull Up, LVCMOS33 gpio[6] 3 8ma Drive, Pull Up gpio[6] 16 8ma Drive, Pull Up gpio[8] 14 8ma Drive, Pull Up gpio[9] 13 8ma Drive, Pull Up gpio[1] 11 8ma Drive, Pull Up gpio[0] 10 8ma Drive, Pull Up flash_miso 62 8ma Drive, Pull Up, LVCMOS33 flash_mosi 61 8ma Drive, Pull Up, LVCMOS33 ser_rx 18 Pull Up, LVCMOS33 resetn 4 Pull Up	PORT NAME	LOCATION	PORT OPTIONS
tmds_d_p[2] 75,74 8ma Drive tmds_clk_D 69,68 8ma Drive, Pull Up, LVCMO533 ser_tx 17 8ma Drive, Pull Up, LVCMO533 flash_csb 60 8ma Drive, Pull Up, LVCMO533 flash_clk 59 8ma Drive, Pull Up, LVCMO533 spio[6] 3 8ma Drive, Pull Up spio[5] 16 8ma Drive, Pull Up spio[4] 15 8ma Drive, Pull Up spio[7] 13 8ma Drive, Pull Up spio[8] 11 8ma Drive, Pull Up spio[9] 11 8ma Drive, Pull Up flash_miso 62 8ma Drive, Pull Up, LVCMO533 flash_mosi 61 8ma Drive, Pull Up, LVCMO533 ser_rx 18 Pull Up, LVCMO533 resetn 4 Pull Up, LVCMO533	tmds_d_p[0]	71,70	8ma Drive
tmds_clk_p 69,68 8ma Drive ser_tx 17 8ma Drive, Pull Up, LVCMOS33 flash_csb 60 8ma Drive, Pull Up, LVCMOS33 flash_clk 59 8ma Drive, Pull Up gpio[6] 3 8ma Drive, Pull Up gpio[7] 16 8ma Drive, Pull Up gpio[8] 15 8ma Drive, Pull Up gpio[9] 14 8ma Drive, Pull Up gpio[1] 11 8ma Drive, Pull Up gpio[1] 11 8ma Drive, Pull Up gpio[0] 10 8ma Drive, Pull Up flash_miso 62 8ma Drive, Pull Up, LVCMOS33 flash_mosi 61 8ma Drive, Pull Up, LVCMOS33 ser_rx 18 Pull Up, LVCMOS33 resetn 4 Pull Up	tmds_d_p[1]	73,72	8ma Drive
ser_tx 17 8ma Drive, Pull Up, LVCMOS33 flash_csb 60 8ma Drive, Pull Up, LVCMOS33 flash_clk 59 8ma Drive, Pull Up, LVCMOS33 gpio[6] 3 8ma Drive, Pull Up gpio[5] 16 8ma Drive, Pull Up gpio[4] 15 8ma Drive, Pull Up gpio[3] 14 8ma Drive, Pull Up gpio[2] 13 8ma Drive, Pull Up gpio[1] 11 8ma Drive, Pull Up gpio[0] 10 8ma Drive, Pull Up flash_miso 62 8ma Drive, Pull Up, LVCMOS33 flash_mosi 61 8ma Drive, Pull Up, LVCMOS33 ser_x 18 Pull Up, LVCMOS33 resetn 4 Pull Up	tmds_d_p[2]	75,74	8ma Drive
flash_csb 60 8ma Drive, Pull Up, LVCMOS33 flash_clk 59 8ma Drive, Pull Up, LVCMOS33 gpio[6] 3 8ma Drive, Pull Up gpio[7] 16 8ma Drive, Pull Up gpio[8] 14 8ma Drive, Pull Up gpio[9] 13 8ma Drive, Pull Up gpio[1] 11 8ma Drive, Pull Up gpio[0] 10 8ma Drive, Pull Up flash_miso 62 8ma Drive, Pull Up, LVCMOS33 flash_mosi 61 8ma Drive, Pull Up, LVCMOS33 ser_rx 18 Pull Up, LVCMOS33 resetn 4 Pull Up	tmds_clk_p	69,68	8ma Drive
flash_clk 59 8ma Drive, Pull Up, LVCMOS33 gpio[6] 3 8ma Drive, Pull Up gpio[5] 16 8ma Drive, Pull Up gpio[4] 15 8ma Drive, Pull Up gpio[3] 14 8ma Drive, Pull Up gpio[2] 13 8ma Drive, Pull Up gpio[1] 11 8ma Drive, Pull Up gpio[0] 10 8ma Drive, Pull Up, LVCMOS33 flash_miso 62 8ma Drive, Pull Up, LVCMOS33 flash_mosi 61 8ma Drive, Pull Up, LVCMOS33 ser_rx 18 Pull Up, LVCMOS33 resetn 4 Pull Up	ser_tx	17	8ma Drive, Pull Up, LVCMOS33
gpio[6] 3 8ma Drive, Pull Up gpio[5] 16 8ma Drive, Pull Up gpio[4] 15 8ma Drive, Pull Up gpio[3] 14 8ma Drive, Pull Up gpio[2] 13 8ma Drive, Pull Up gpio[1] 11 8ma Drive, Pull Up gpio[0] 10 8ma Drive, Pull Up flash_miso 62 8ma Drive, Pull Up, LVCMOS33 flash_mosi 61 8ma Drive, Pull Up, LVCMOS33 ser_rx 18 Pull Up, LVCMOS33 resetn 4 Pull Up	flash_csb	60	8ma Drive, Pull Up, LVCMOS33
gpio[5] 16 8ma Drive, Pull Up gpio[4] 15 8ma Drive, Pull Up gpio[3] 14 8ma Drive, Pull Up gpio[2] 13 8ma Drive, Pull Up gpio[1] 11 8ma Drive, Pull Up gpio[0] 10 8ma Drive, Pull Up flash_miso 62 8ma Drive, Pull Up, LVCMOS33 flash_mosi 61 8ma Drive, Pull Up, LVCMOS33 ser_rx 18 Pull Up, LVCMOS33 resetn 4 Pull Up	flash_clk	59	8ma Drive, Pull Up, LVCMOS33
gpio[4] 15 8ma Drive, Pull Up gpio[3] 14 8ma Drive, Pull Up gpio[2] 13 8ma Drive, Pull Up gpio[1] 11 8ma Drive, Pull Up gpio[0] 10 8ma Drive, Pull Up flash_miso 62 8ma Drive, Pull Up, LVCMOS33 flash_mosi 61 8ma Drive, Pull Up, LVCMOS33 ser_rx 18 Pull Up, LVCMOS33 resetn 4 Pull Up	gpio[6]		8ma Drive, Pull Up
gpio[3] 14 8ma Drive, Pull Up gpio[2] 13 8ma Drive, Pull Up gpio[1] 11 8ma Drive, Pull Up gpio[0] 10 8ma Drive, Pull Up flash_miso 62 8ma Drive, Pull Up, LVCMOS33 flash_mosi 61 8ma Drive, Pull Up, LVCMOS33 ser_rx 18 Pull Up, LVCMOS33 resetn 4 Pull Up	gpio[5]	16	8ma Drive, Pull Up
gpio[2] 13 8ma Drive, Pull Up gpio[1] 11 8ma Drive, Pull Up gpio[0] 10 8ma Drive, Pull Up flash_miso 62 8ma Drive, Pull Up, LVCMOS33 flash_mosi 61 8ma Drive, Pull Up, LVCMOS33 ser_rx 18 Pull Up, LVCMOS33 resetn 4 Pull Up	gpio[4]	15	8ma Drive, Pull Up
gpio[1] 11 8ma Drive, Pull Up gpio[0] 10 8ma Drive, Pull Up flash_miso 62 8ma Drive, Pull Up, LVCMOS33 flash_mosi 61 8ma Drive, Pull Up, LVCMOS33 ser_rx 18 Pull Up, LVCMOS33 resetn 4 Pull Up	gpio[3]	14	8ma Drive, Pull Up
gpio[0] 10 8ma Drive, Pull Up flash_miso 62 8ma Drive, Pull Up, LVCMOS33 flash_mosi 61 8ma Drive, Pull Up, LVCMOS33 ser_rx 18 Pull Up, LVCMOS33 resetn 4 Pull Up	gpio[2]	13	8ma Drive, Pull Up
flash_miso 62 8ma Drive, Pull Up, LVCMOS33 flash_mosi 61 8ma Drive, Pull Up, LVCMOS33 ser_rx 18 Pull Up, LVCMOS33 resetn 4 Pull Up	gpio[1]	11	8ma Drive, Pull Up
flash_mosi 61 8ma Drive, Pull Up, LVCMOS33 ser_rx 18 Pull Up, LVCMOS33 resetn 4 Pull Up	gpio[0]	10	8ma Drive, Pull Up
ser_rx 18 Pull Up, LVCMOS33 resetn 4 Pull Up	flash_miso	62	8ma Drive, Pull Up, LVCMOS33
resetn 4 Pull Up	flash_mosi	61	8ma Drive, Pull Up, LVCMOS33
	ser_rx	18	Pull Up, LVCMOS33
To Della Managara	resetn	4	Pull Up
CIK 52 PULL UP, LVCMOS33	clk	52	Pull Up, LVCMOS33

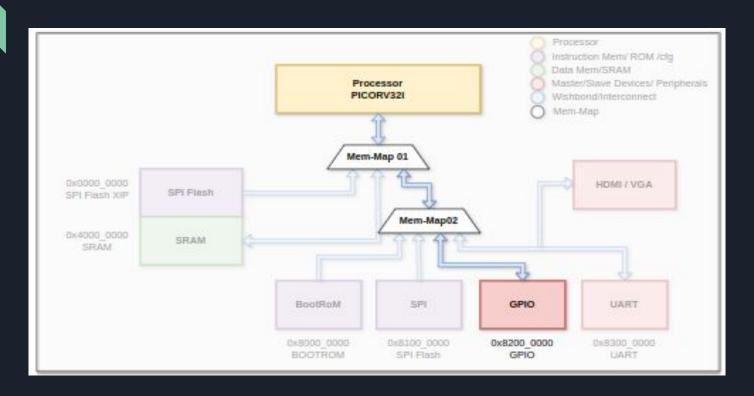












TESTIMONIAL

Author:

Abdul Muheet Ghani, Research Associate at MERL-UITU.

Under The Supervision Of:

<u>Dr.Ali Ahmed</u> (Team Lead MERL).

<u>Sponsored By:</u> Edmund from <u>Symbiotic EDA</u>. for sponsoring FPGA.

<u>Thanks:</u> <u>Lushay Lab</u> (They've provided crucial resources and guidance throughout the project)