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Vexriscy SoC with UART & AXI-RAM

This example integrates an AXI based RAM onboarded to a Vexriscv SoC.

Instructions:

Copy your demo folder from litex installation directory litex/litex/soc/software/demo and paste it inside your project directory. Use the main.c file provided in this example in the demo application and replace it with the main.c file located inside your newly copied demo folder in project directory.

1. Simulation

We can simulate this IP using litex_sim tool in litex.

Run the following command to generate your SoC:

```
litex_sim --integrated-main-ram-size=0x10000 --cpu-type vexriscv --sim-debug --no-compile-gateware --axiram
```

Run the following command to generate .bin file from .py file:

```
python3 ./demo/demo.py --build-path=build/sim
```

Before running the simulation, you have to create the binary of your application code residing in demo. The python script below converts the application code to demo.bin, which is later loaded on to the RAM.

Run the following command to execute your application:

```
litex_sim --integrated-main-ram-size=0x10000 --cpu-type vexriscv --ram-init=demo.bin --sim-debug --axiram
```

Output:

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```
TEST-1: PASSED
TEST-3: PASSED
TEST-4: PASSED
TEST-5: PASSED
TEST-5: PASSED
TEST-6: PASSED
TEST-7: PASSED
```

2. Hardware

Connect your Digilent Basys3 board with your machine. We will be using the same design which we used in simulation to verify on the board. The following board file written in python creates the same SoC and later build and load it onto the Basys3 board.

Note: Before using this GPIO design on hardware, we need to replace the board files with the necessary changes provided in the board files directory.

Run the following command to generate your SoC:

```
./../../litex_installation/litex-boards/litex_boards/litex_boards/targets/digilent_basys3.py --integrated-main-ram-size=0x10000 --cpu-type=vexriscv --axiram --build --load --uart-name=serial
```

Run the following command to generate .bin file from .py file:

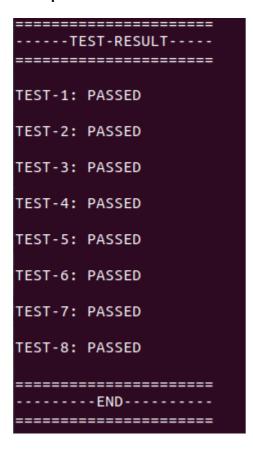
```
python3 ./demo/demo.py --build-path=build/digilent_basys3
```

The litex term tool load the board with the application binary through the COM port.

```
litex_term /dev/ttyUSB1 --kernel=demo.bin
```

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Output:



Application

This test does multiple reads and writes onto the AXI based RAM, this is done through detailed tests.