

Vexriscv 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-gateway --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:

```
=====
-----TEST-RESULT-----
=====

TEST-1: PASSED
TEST-2: PASSED
TEST-3: PASSED
TEST-4: PASSED
TEST-5: PASSED
TEST-6: PASSED
TEST-7: PASSED
TEST-8: PASSED

=====
-----END-----
=====
```

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/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
```

Output:

```
=====
-----TEST-RESULT-----
=====

TEST-1: PASSED
TEST-2: PASSED
TEST-3: PASSED
TEST-4: PASSED
TEST-5: PASSED
TEST-6: PASSED
TEST-7: PASSED
TEST-8: PASSED

=====
-----END-----
=====
```

Application

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