Intel® Agilex® 7 FPGA - Helloworld Design on Nios® V/m Processor

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Revision: 1

Contents

1. Theory of Operation

Nios® V/m Processor-based Helloworld example design on the Intel Agilex® 7 FPGA F-Series FPGA Development Kit.

a. Block Diagram

```
                    ┌─────────────────────────┐
                    │                         │
                    │                         │
                    │       Nios® V/m         │
                    │                         │
                    │                         │
                    └─────────────────────────┘
                               ↕
         ┌──────────────────────────────────────────┐
         │              Bus Interface               │
         └──────────────────────────────────────────┘
              ↕                        ↕
        ┌───────────┐           ┌───────────┐        ■ AXI/Avalon Interface
        │ On-Chip   │           │   JTAG    │
        │ Memory- II│           │   UART    │
        └───────────┘           └───────────┘
```
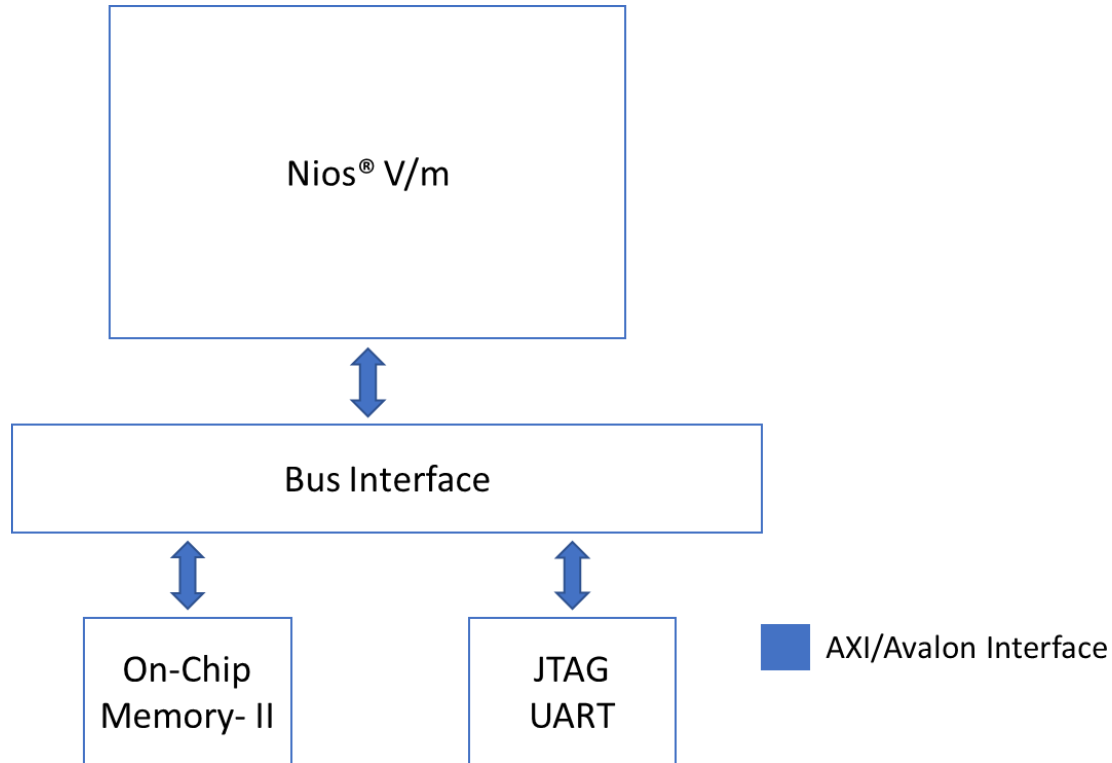
b. IP Cores used

The following IPs are used in this design.

- NIOSV/m soft processor core
- On Chip RAM
- JTAG UART

2. Executing the Design on Devkit

a. Creating the Design

Note: Please refer to the readme.txt file in the package for the steps to create the design, application and generate the programing files.

- Unpackage/extract the design in your working directory
- Locate the "ready_to_test" folder within the package
- The folder contains the necessary files for executing the application on the board. Refer to the readme file for the steps to program the application files on the board.
- Validate the design by observing the prints on the terminal

b. Expected Results

The following is the output as observed on the JTAG UART terminal. The output is analogous to the logic from the application code. Users should be able to observe same output on their terminal/setup.

HAL OS:

```
Hello world, this is the Nios V/m cpu checking in 0...
Hello world, this is the Nios V/m cpu checking in 1...
Hello world, this is the Nios V/m cpu checking in 2...
Hello world, this is the Nios V/m cpu checking in 3...
Hello world, this is the Nios V/m cpu checking in 4...
Hello world, this is the Nios V/m cpu checking in 5...
Hello world, this is the Nios V/m cpu checking in 6...
Hello world, this is the Nios V/m cpu checking in 7...
Hello world, this is the Nios V/m cpu checking in 8...
Hello world, this is the Nios V/m cpu checking in 9...
Hello world, this is the Nios V/m cpu checking in 10...
Hello world, this is the Nios V/m cpu checking in 11...
Hello world, this is the Nios V/m cpu checking in 12...
Hello world, this is the Nios V/m cpu checking in 13...
Hello world, this is the Nios V/m cpu checking in 14...
Hello world, this is the Nios V/m cpu checking in 15...
Hello world, this is the Nios V/m cpu checking in 16...
Hello world, this is the Nios V/m cpu checking in 17...
Hello world, this is the Nios V/m cpu checking in 18...
Hello world, this is the Nios V/m cpu checking in 19...
Hello world, this is the Nios V/m cpu checking in 20...
Hello world, this is the Nios V/m cpu checking in 21...
Hello world, this is the Nios V/m cpu checking in 22...
Hello world, this is the Nios V/m cpu checking in 23...
Hello world, this is the Nios V/m cpu checking in 24...
Hello world, this is the Nios V/m cpu checking in 25...
Hello world, this is the Nios V/m cpu checking in 26...
Hello world, this is the Nios V/m cpu checking in 27...
Hello world, this is the Nios V/m cpu checking in 28...
Hello world, this is the Nios V/m cpu checking in 29...
Hello world, this is the Nios V/m cpu checking in 30...
```

```
Hello world, this is the Nios V/m cpu checking in 70...
Hello world, this is the Nios V/m cpu checking in 71...
Hello world, this is the Nios V/m cpu checking in 72...
Hello world, this is the Nios V/m cpu checking in 73...
Hello world, this is the Nios V/m cpu checking in 74...
Hello world, this is the Nios V/m cpu checking in 75...
Hello world, this is the Nios V/m cpu checking in 76...
Hello world, this is the Nios V/m cpu checking in 77...
Hello world, this is the Nios V/m cpu checking in 78...
Hello world, this is the Nios V/m cpu checking in 79...
Hello world, this is the Nios V/m cpu checking in 80...
Hello world, this is the Nios V/m cpu checking in 81...
Hello world, this is the Nios V/m cpu checking in 82...
Hello world, this is the Nios V/m cpu checking in 83...
Hello world, this is the Nios V/m cpu checking in 84...
Hello world, this is the Nios V/m cpu checking in 85...
Hello world, this is the Nios V/m cpu checking in 86...
Hello world, this is the Nios V/m cpu checking in 87...
Hello world, this is the Nios V/m cpu checking in 88...
Hello world, this is the Nios V/m cpu checking in 89...
Hello world, this is the Nios V/m cpu checking in 90...
Hello world, this is the Nios V/m cpu checking in 91...
Hello world, this is the Nios V/m cpu checking in 92...
Hello world, this is the Nios V/m cpu checking in 93...
Hello world, this is the Nios V/m cpu checking in 94...
Hello world, this is the Nios V/m cpu checking in 95...
Hello world, this is the Nios V/m cpu checking in 96...
Hello world, this is the Nios V/m cpu checking in 97...
Hello world, this is the Nios V/m cpu checking in 98...
Hello world, this is the Nios V/m cpu checking in 99...
Bye world!
```

uCOS-II:

```
Hello from main...
Task1 -- TOS: 0x299f0, BOS: 0x279f4
Task2 -- TOS: 0x2b9f0, BOS: 0x299f4
Task3 -- TOS: 0x2d9f0, BOS: 0x2b9f4
Stat -- TOS: 0x2e868, BOS: 0x2e06c
Idle -- TOS: 0x2f068, BOS: 0x2e86c
Hello from task1: 0

Hello from task2: 0

Hello from task3: 0

Hello from task3: 1

Hello from task2: 1

Hello from task3: 2

Hello from task1: 1

Hello from task3: 3

Hello from task2: 2

Hello from task3: 4

Hello from task3: 5

Hello from task2: 3

Hello from task1: 2

Hello from task3: 6

Hello from task3: 7

Hello from task2: 4
```

FreeRTOS:

```
Hello FreeRTOS from main...
Hello from task1: 0

Hello from task2: 0

Hello from task3: 0

Hello from task3: 1

Hello from task2: 1

Hello from task3: 2

Hello from task1: 1

Hello from task3: 3

Hello from task2: 2

Hello from task3: 4

Hello from task2: 3

Hello from task1: 2

Hello from task2: 4

Hello from task1: 3

Hello from task1: 4
```