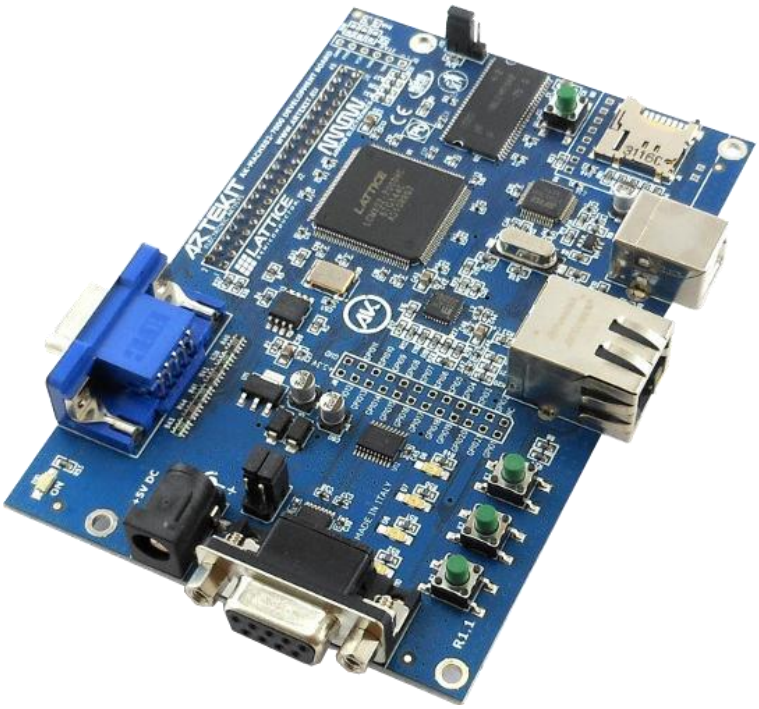
Forza 4 ASCII Game

Demo for the AK-MACHX02-7000



Contents

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About this document

Revision history

The table below displays the revision history for the chapters in this manual.

Chapter	Date	Revision	Changes made
All	August 2013	1.0	First publication

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Regarding this document

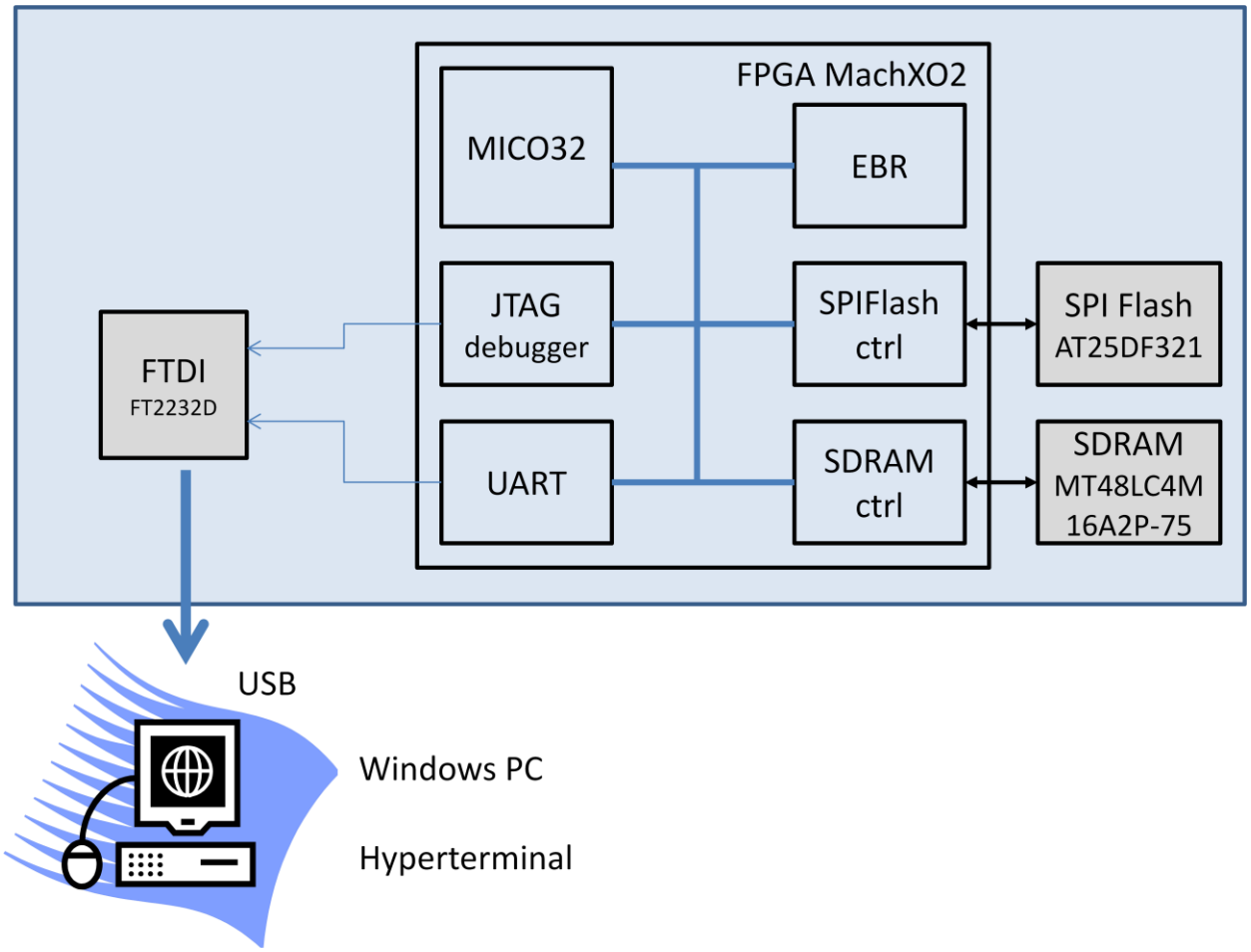
	Prepared:	Document name:	
	Ferrari Fabrizio	UART Connect 4 demo guide	
	Approved:	Date:	Revision:
	Ferrari Fabrizio	05/08/2013	Preliminary

Copyright information

Forza 4 ASCII Game

General description

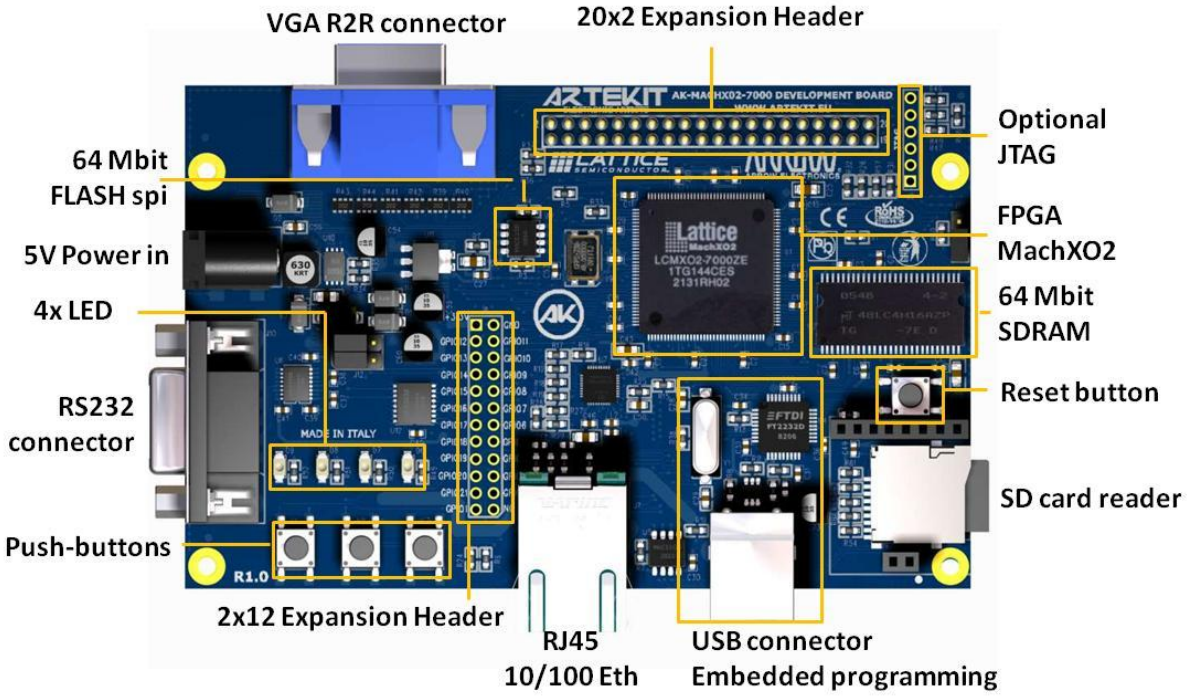
This document describes the “Forza 4” Mico32 demo.
The demo shows a MICO32 ANSI C application running on a low cost Flash based Lattice MachXO2 FPGA.



In order to run/modify this demo you need the Artekit board only. Programming tool is embedded on the Artekit board and Diamond software can be downloaded for free from Lattice web site.

The demo is the well know “connect4” game running through UART Serial Interface:
http://en.wikipedia.org/wiki/Connect_Four
Using onboard switch it is possible to switch the UART on the Edge RS232 connector or to USB FTDI UART.

ARTEKIT MACHXO2-7000 Evaluation Board



The AK-MACHX02-7000 development board is a full-featured hardware platform to evaluate the Lattice MachX02 PLD Line. The complete schematics of the board are provided and can be download from the Artekit website.

AK-MACHX02-7000 Main components

The AK-MACHX02-7000 Development board features the following components:

- Lattice MACHX02-7000 PLD
- 10/100 Mb Ethernet adapter with link/speed LEDs
- 32Mb (4MB) serial data flash
- 64Mb (8MB) DRAM
- 1 RS232 (TX/RX only)
- VGA output using R2R method
- 2 x expansion connector
- 4 user LED
- 4 user KEY
- Lattice JTAG programmer/debug cable on board
- 25 MHz clock oscillator
- Powered from USB cable or external 5V DC power supply

Demo contents

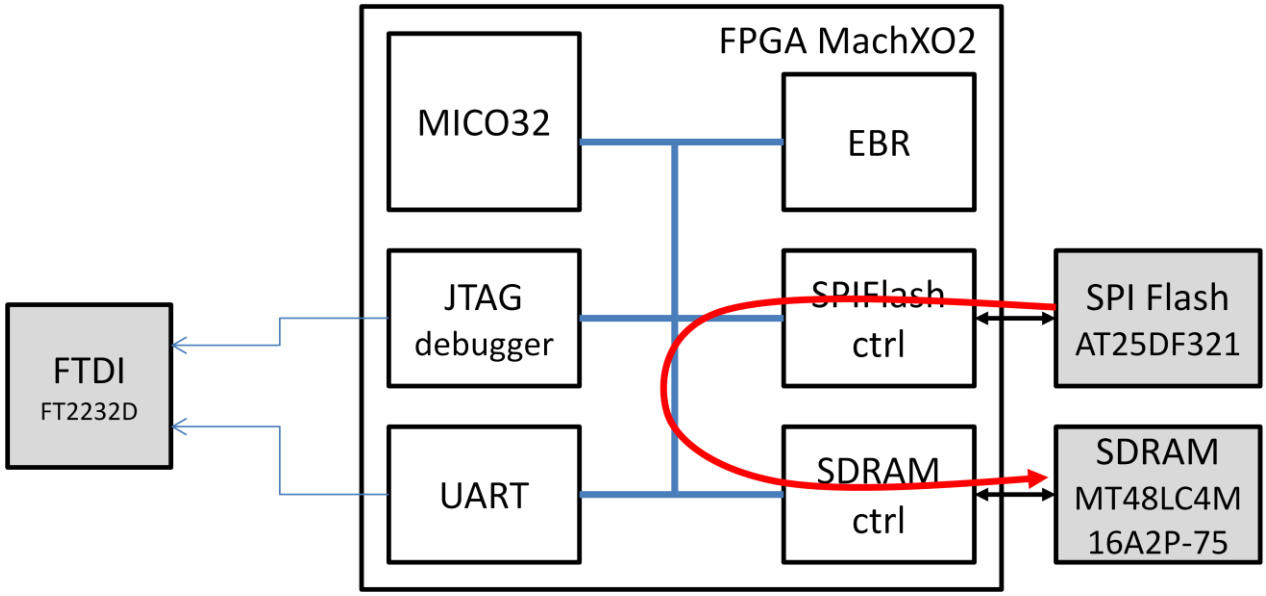
The database is based on Diamond version 2.2.

Database contents	
/diamond	Contains the diamond database
/msb/platform_rev0	Contains all Eclipse MICO32 MSB Platform database
/software	Contains all Eclipse MICO32 MSB Software database
/goild	Contains a copy of the bug free SDRAM controller
/simulation	empty
/doc	empty
Workspace	eclipse workspace

It is possible to place database everywhere on the disk and import projects into Diamond and eclipse. Better to place database in C:\work\project\artekit_demos\forza4_rev0.

Project description

The demo shows:
[1] The ability of the MICO32 to boot from External low cost external SPI Flash Memory, prepend a code re-locator to exe file (coping to SDRAM the execution file) and then to change the environment to run in SDRAM
[2] the ability to manage a simple program using printf and stdin/out/err to UART
[3] the ability to debug using eclipse features



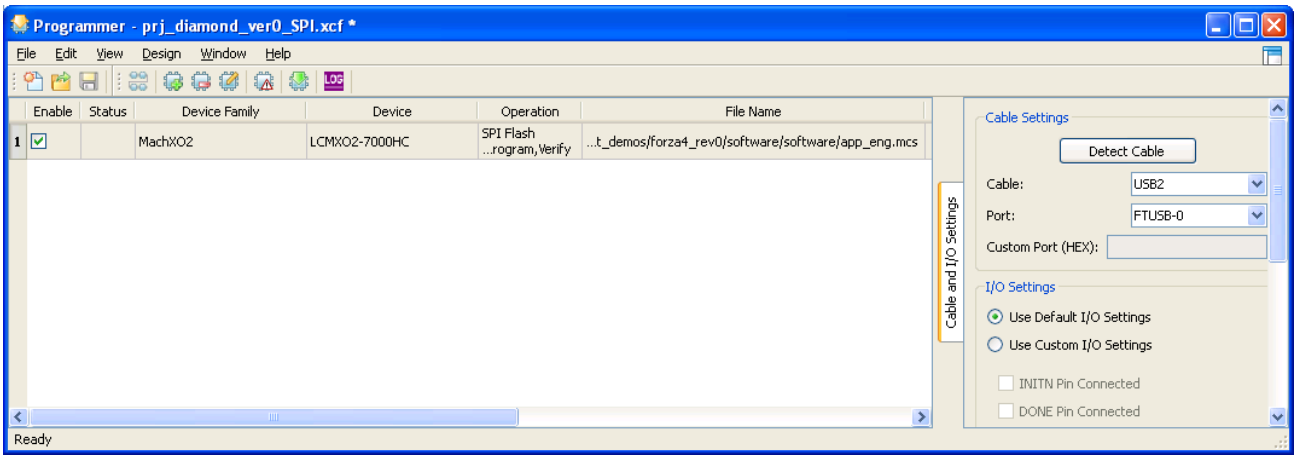
The platform has an internal EBR. It is possible to run the application into the EBR.

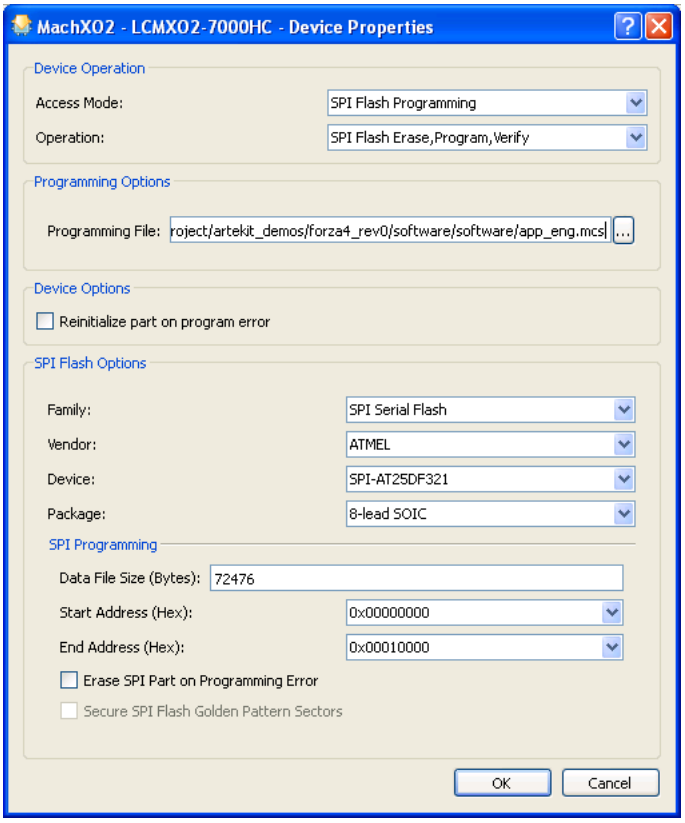
Demo usage description

Step 1: program the SPI Flash with executable SW

Using the Diamond programmer, program the external SPI Flash with
C:\work\project\artekit_demos\forza4_rev0\software\software\app_eng.mcs

Following figures show how to configure the Diamond Programmer.
Remember to connect the USB cable.

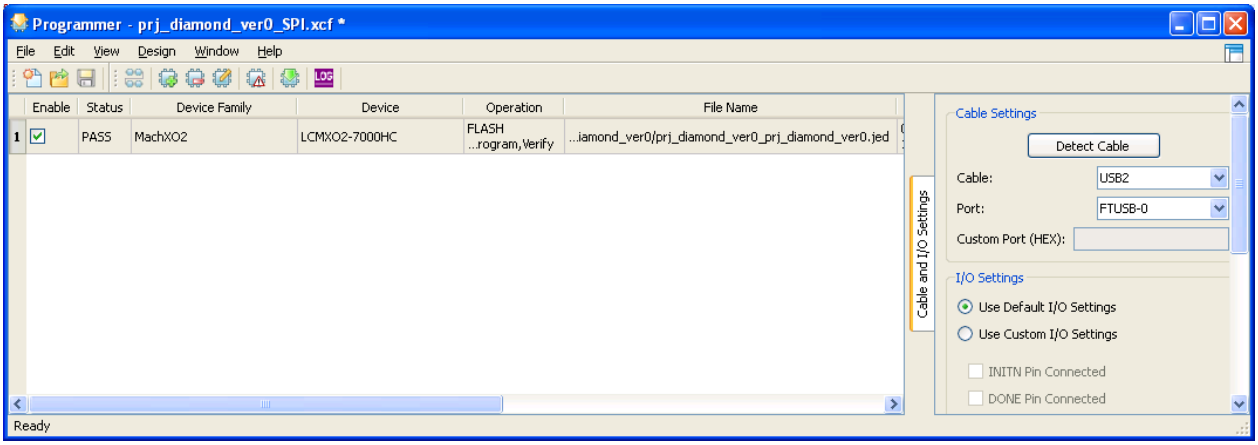




Press 'program' and in 11 seconds the Flash is programmed through JTAG

Step 1.1: programming the FPGA

Using Diamond Programmer program now the FPGA with C:\work\project\artekit_demos\forza4_rev0\diamond\prj_diamond_ver0\prj_diamond_ver0_prj_diamond_ver0.jed

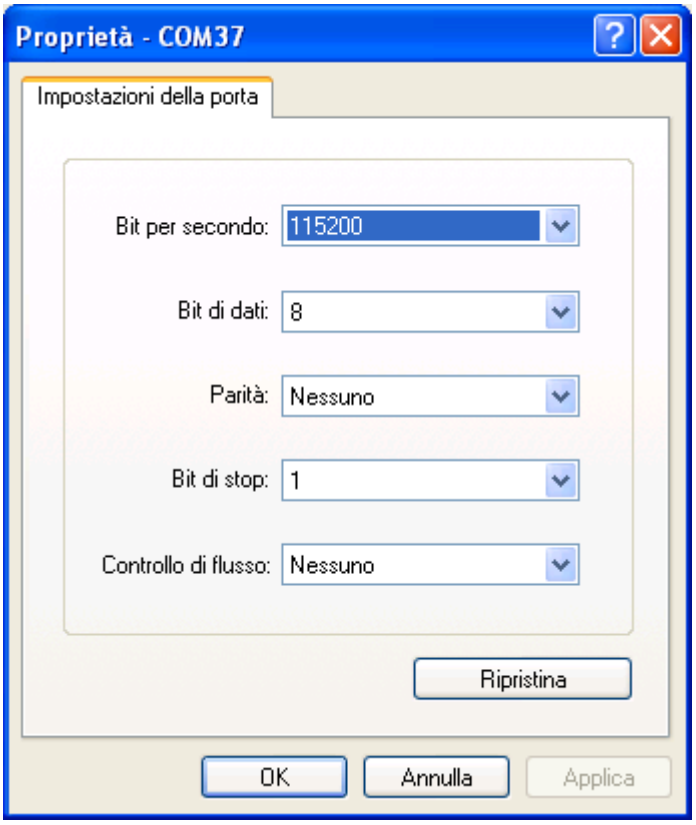


And press 'program'.

The Board is now configured with FPGA internal MICO32 Platform and on the Flash the elf SW with code re-locator.

Step 2 Configure the UART

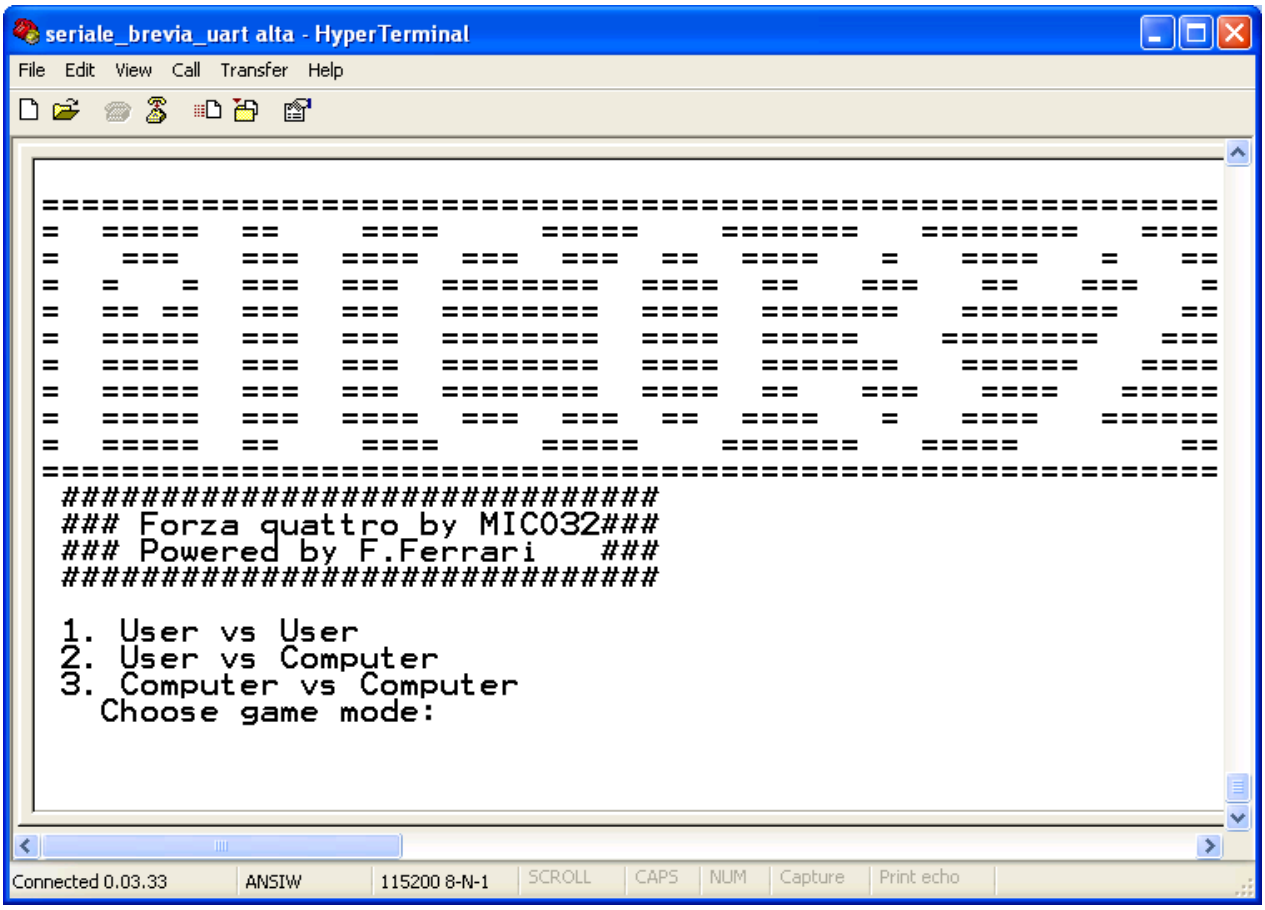
You can use RS232 cable or use the USB UART with the same cable you used to program the board.
First you have to identify the COM number of the USB or RS232 connector COM.
Open a Hyper Terminal and configure as in the figure.



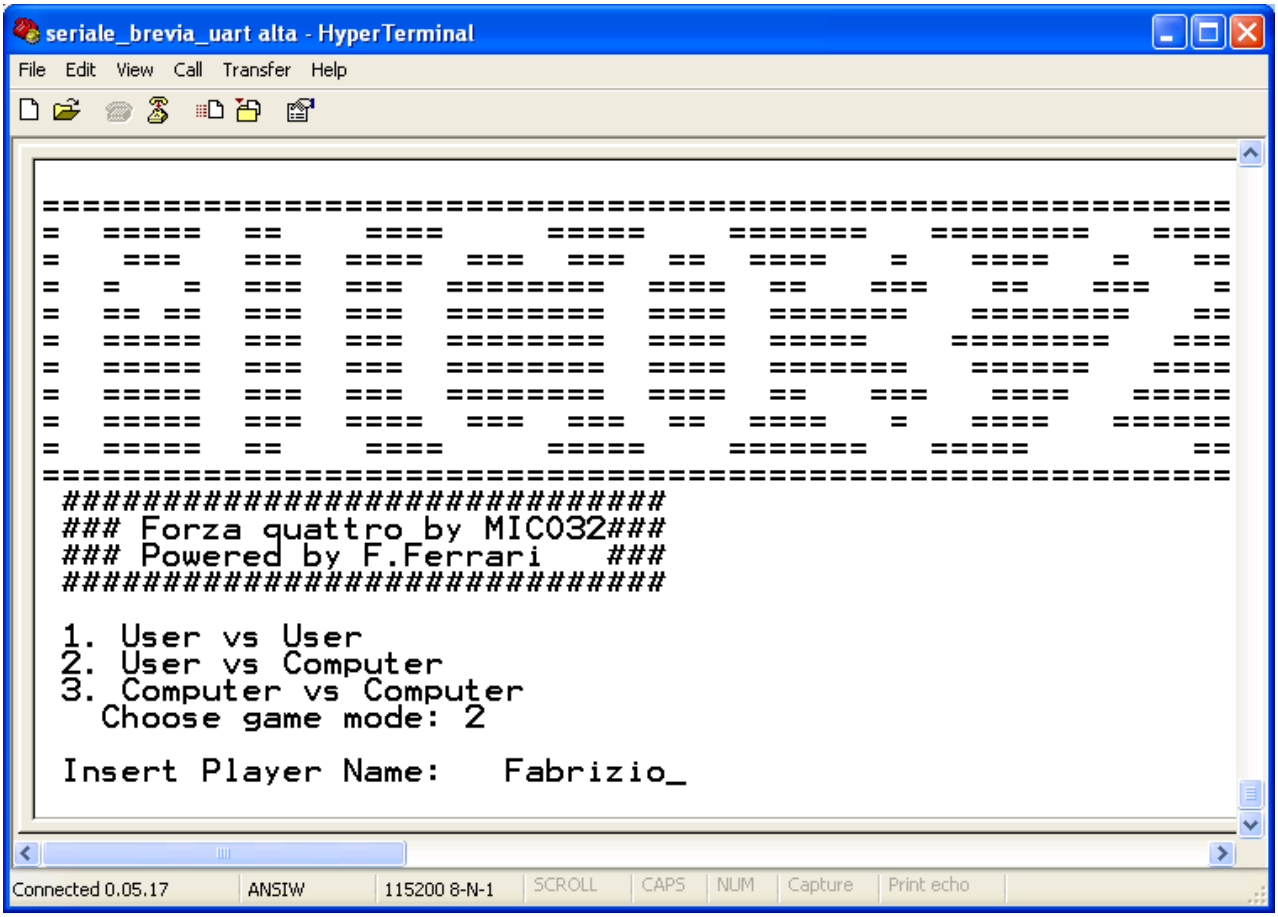
Now press connect and reset the board (K4 button, near the micro SD card slot).

Step 3: Play the game

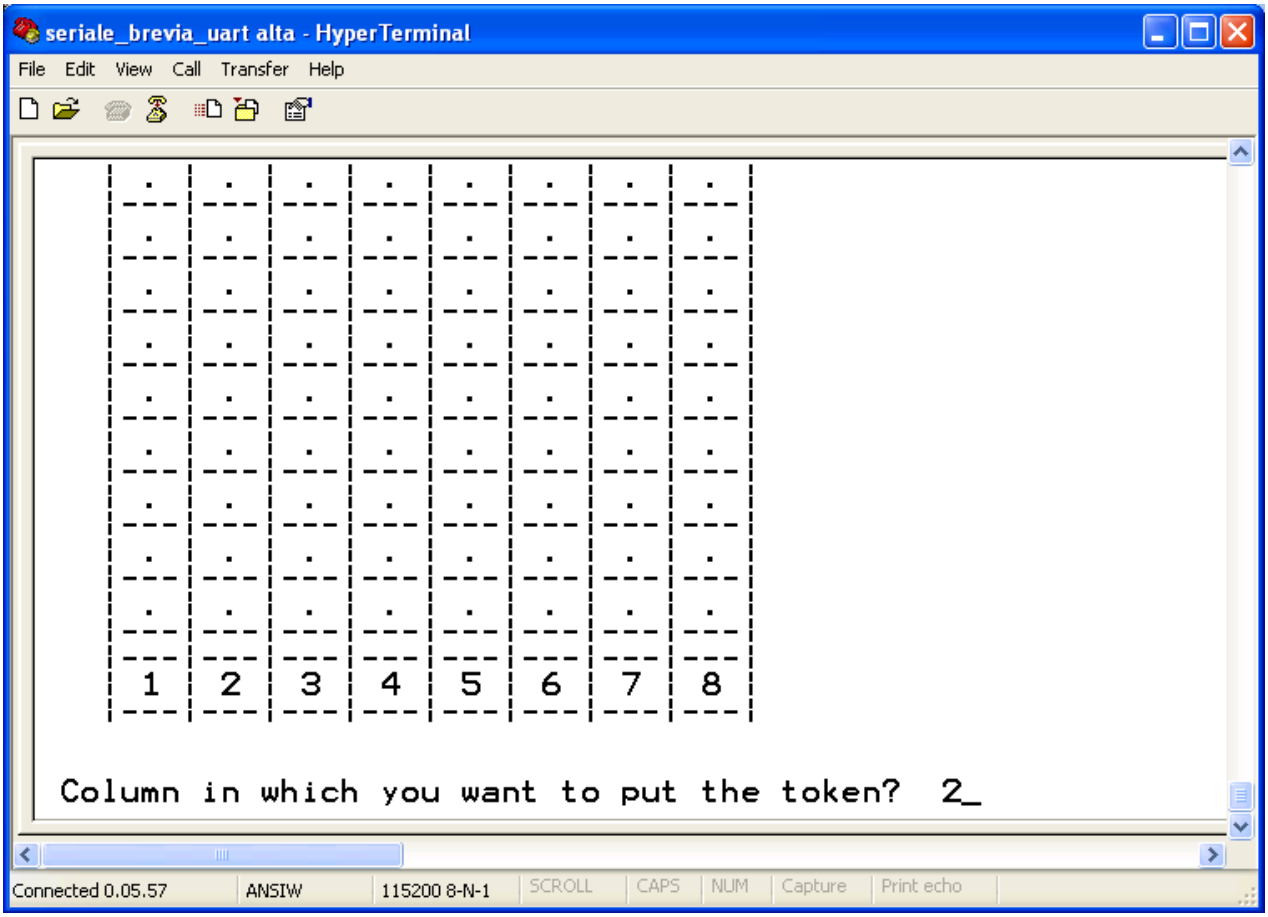
The initial Hyper terminal screen is like the following:

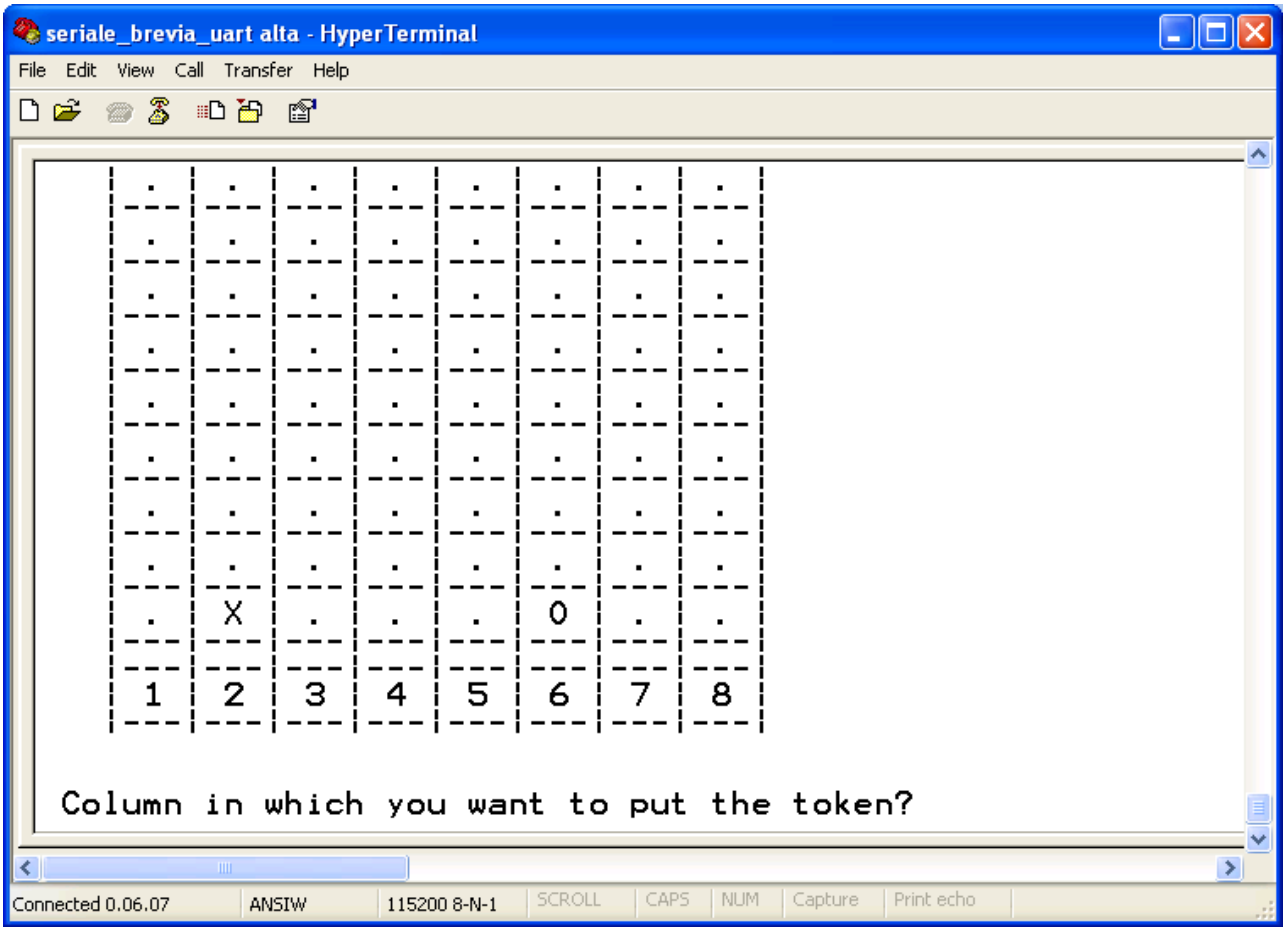


Make your choice and insert Player name.



And now you can Play:




seriale_brevia_uart alta - HyperTerminal
File Edit View Call Transfer Help
1 2 3 4 5 6 7 8
Column in which you want to put the token?
Connected 0.06.07
ANSIW
115200 8-N-1
SCROLL
CAPS
NUM
Capture
Print echo