**********Draft**********

pibuild
refernce to github notes
Using C with Bare Metal Ultibo
07/10/21

**********Draft**********

This micro sd will run on Rpi3 a Rpi4 4Gb or Rpi4 8Gb PI400 will provide better results.

The standard software provides a lot of software VLC. Libreoffice, Editors, Image viewers, GIMP. Videos can be download and play using VLC.

This version provides the software to learn about FPGAs and Bare Metal by adding 481 packages and several compiled C & Python Tools (autofpga, icestorm, nextpnr, yosys, zipcpu, and verilator). In additons the dependencies (libgtk2.0-dev libcairo2-dev libpango1.0-dev libgdk-pixbuf2.0-dev libatk1.0-dev libghc-x11-dev) for Lazarus IDE (Ultibo-Edition). With https://github.com/develone/Ultibo_Projects you can compile Bare Metal applications for Rpi, Rpi2, Rpi3, and RPi4.

After connecting a keyboard/mouse, usb pwr, supply and HDMI TV. The system will boot to Login screen. These are a few screenshots of a Raspberry Pi that I recently built. This version has additional software installed to support Bare Metal development. This also has the software to do Synthesis of Verilog Code using Yosys. yosys -V
Yosys 0.9+4052 (git sha1 0ccc7229, gcc 8.3.0-6+rpi1 -fPIC -Os). The Synthesis output needs to Placed & Routed using nextpnr. nextpnr-ice40 -V
nextpnr-ice40 -- Next Generation Place and Route (Version 4419c36d). The output of nextpnr creates a catzip.bin bitstream which can be used to program the FPGA. The catzip.bin needs to be tested if the clock frequency is not to high using icestorm. icetime -d hx8k -c 40 catzip.asc
// Reading input .asc file..
// Reading 8k chipdb file..
// Creating timing netlist..
// Timing estimate: 18.37 ns (54.44 MHz)
// Checking 25.00 ns (40.00 MHz) clock constraint: PASSED.

These are software packages needed to work with FPGAs autofpga, icestorm, nextpnr, yosys, zipcpu, and verilator.


Tatiana
Shut Down
Log In
acer

After entering the correct passwd user devel will be logged in to DeskTop.

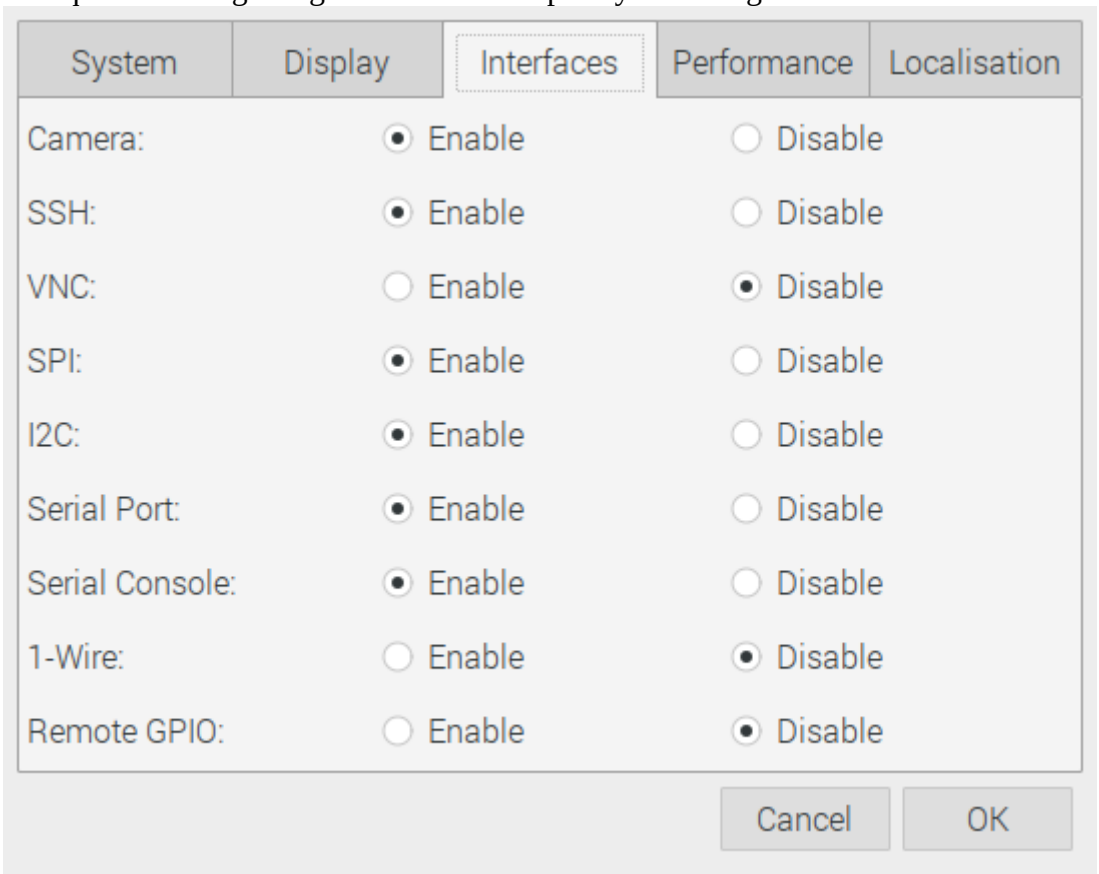
Users can use ssh to make remote connection to the newly created Raspberry Pi.

```
File  Edit  Tabs  Help
devel@mypi3-20:~ $ ssh -Y tatiana
devel@tatiana's password:
Linux tatiana 5.10.17-v7+ #1421 SMP Thu May 27 13:59:01 BST 2021 armv7l

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Thu Jul  8 21:23:01 2021 from 192.168.1.245
devel@tatiana:~ $ uname -a
Linux tatiana 5.10.17-v7+ #1421 SMP Thu May 27 13:59:01 BST 2021 armv7l GNU/Linu
x
devel@tatiana:~ $
```

This does require enabling using Preferences/Raspberry Pi Configuration.



This is also where the Hostname and if a prompt is required to Log in is performed.

I also have a simulation of the software in the FPGA.

To start the simulator with no trace ./arm-main.tb is run ~/pi400/catzip/sim/verilated
if the -d option is used the VCD file trace.vcd is generated.

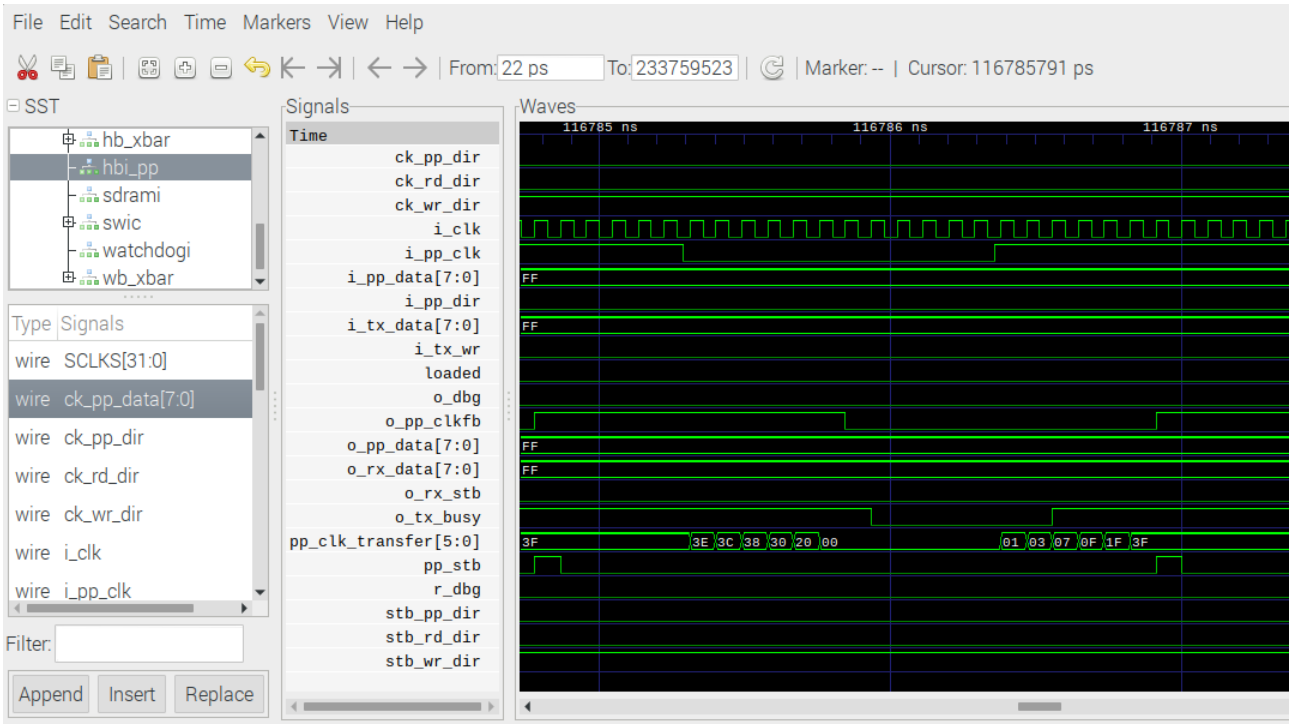
Shell 1

./arm-main_tb
Listening on port 8363
Listening on port 8364
> T
> Z
Accepted CMD connection
< A01000015R
> A01000015R20210707
< [CLOSED]

Shell 2

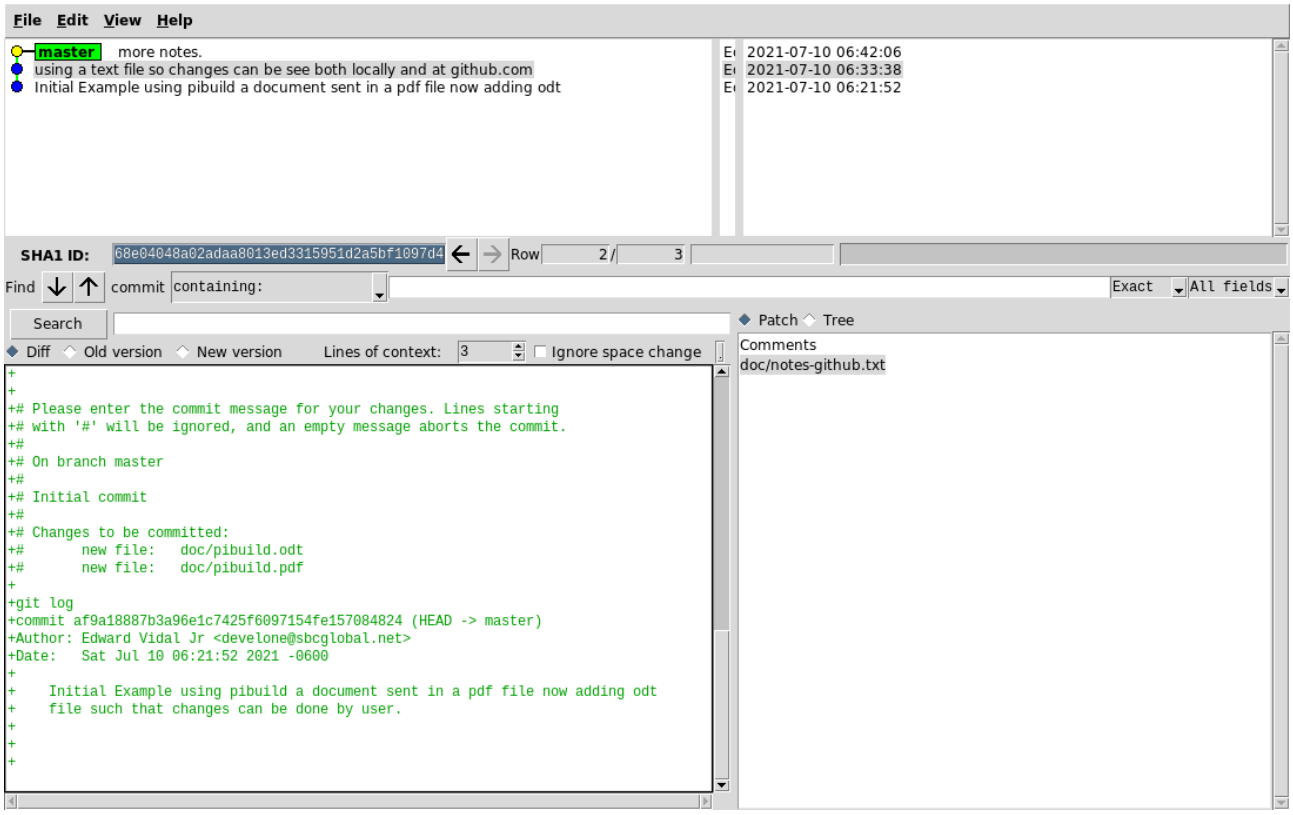
./arm-wbregs version
01000014 (VERSION) : [.!..] 20210707

The VCD file was created by using the simulator with -d option and the command ./arm-wbregs version

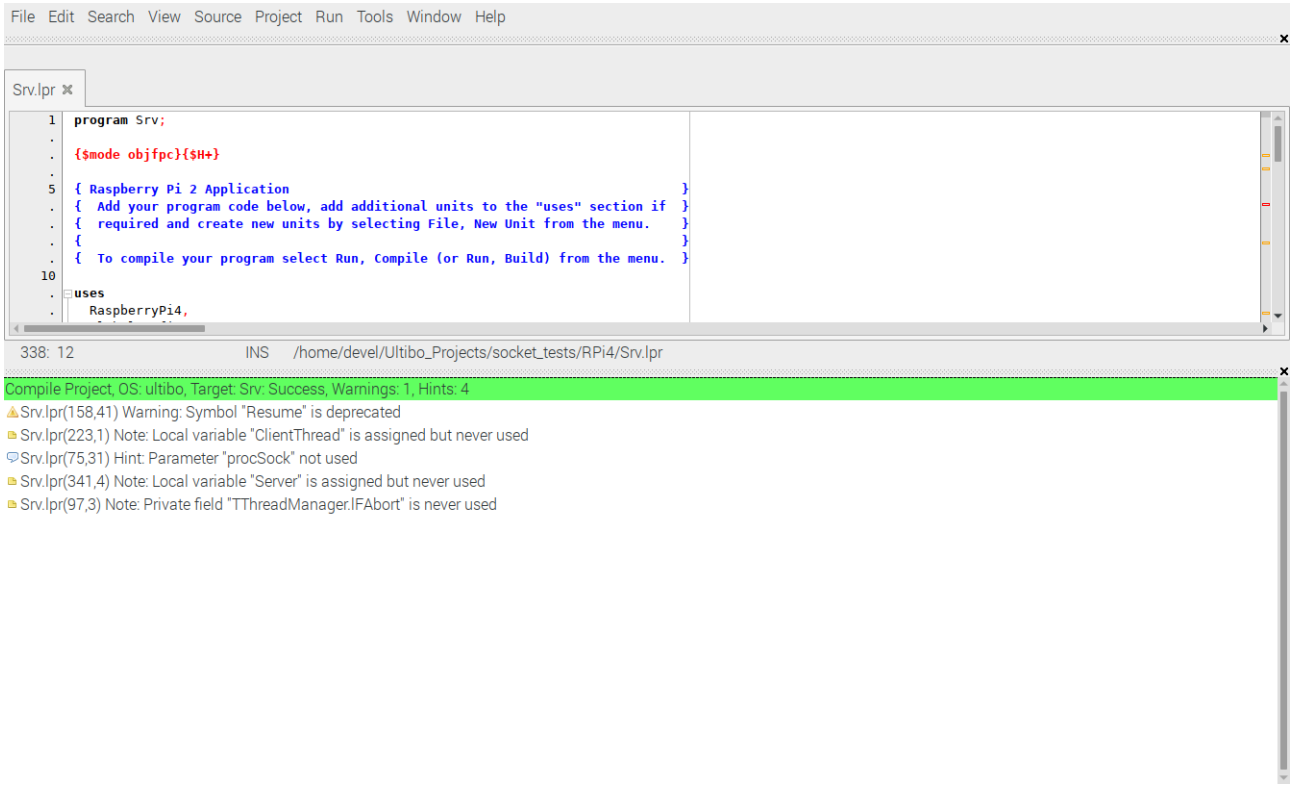


On the Rpi you can gitk & to see the changes made to local repo.

After a more changes.



Using C with Ultibo Bare metal.


File Edit Search View Source Project Run Tools Window Help
Srv.lpr
1 program Srv;
{$mode objfpc}{$H+}
{ Raspberry Pi 2 Application }
{ Add your program code below, add additional units to the "uses" section if }
{ required and create new units by selecting File, New Unit from the menu. }
{ }
{ To compile your program select Run, Compile (or Run, Build) from the menu. }
uses
RaspberryPi4,
338: 12
INS
/home/devel/Ultibo_Projects/socket_tests/RPi4/Srv.lpr
Compile Project, OS: ultibo, Target: Srv: Success, Warnings: 1, Hints: 4
Srv.lpr(158,41) Warning: Symbol "Resume" is deprecated
Srv.lpr(223,1) Note: Local variable "ClientThread" is assigned but never used
Srv.lpr(75,31) Hint: Parameter "procSock" not used
Srv.lpr(341,4) Note: Local variable "Server" is assigned but never used
Srv.lpr(97,3) Note: Private field "TThreadManager.IFAbort" is never used