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

QEMU Ultibo Bare Metal
SerialConnection
07/22/21

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

https://en.m.wikipedia.org/wiki/QEMU

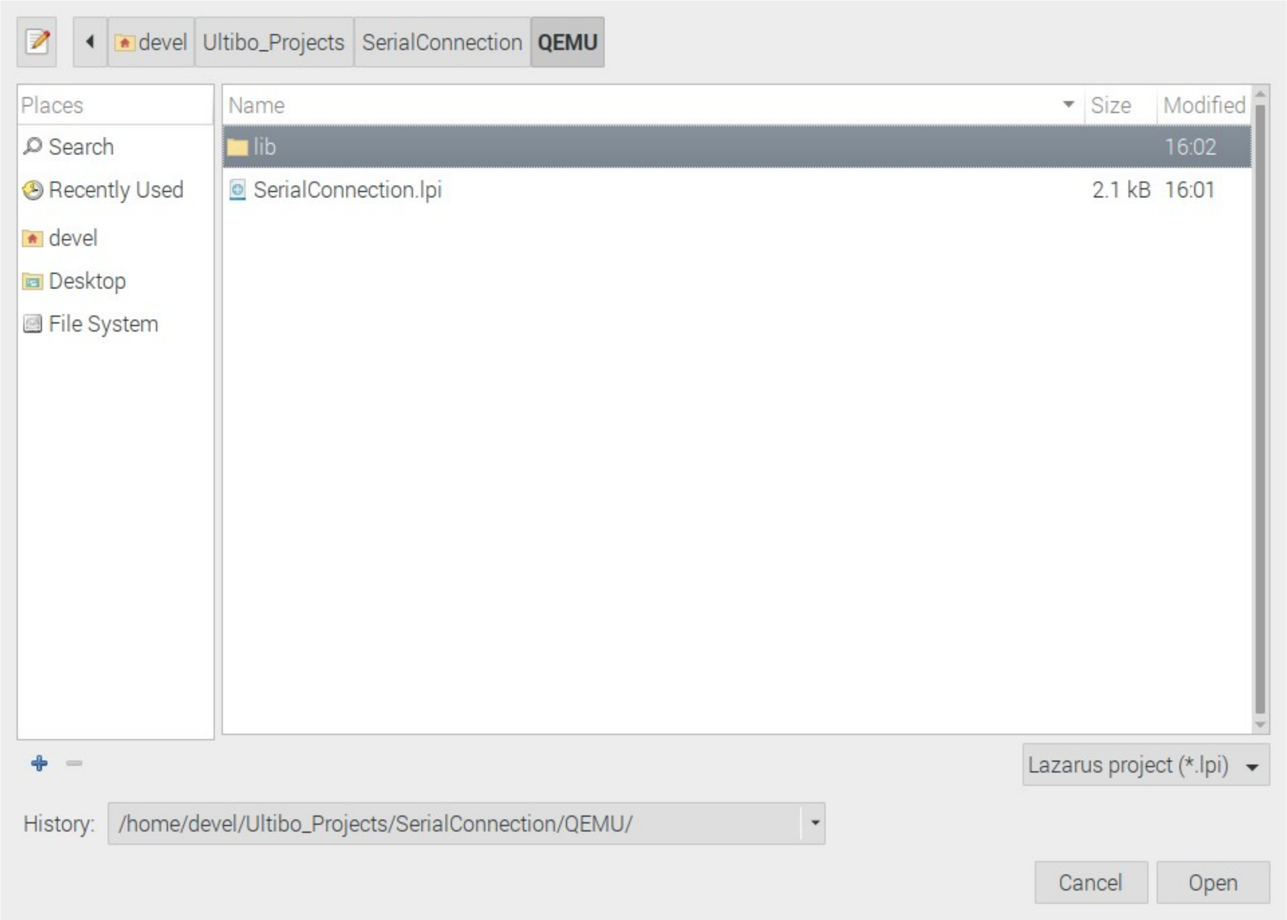
QEMU is a hosted virtual machine monitor: it emulates the machine's processor through dynamic binary translation and provides a set of different hardware and device models for the machine, enabling it to run a variety of guest operating systems. It also can be used with Kernel-based Virtual Machine (KVM) to run virtual machines at near-native speed (by taking advantage of hardware extensions such as Intel VT-x). QEMU can also do emulation for user-level processes, allowing applications compiled for one architecture to run on another.[3]

Note : Additional software is needed to run QEMU "sudo apt-get install qemu-system-arm". The following programs are added.

/usr/bin/qemu-img /usr/bin/qemu-nbd /usr/bin/qemu-system-aarch64
/usr/bin/qemu-io /usr/bin/qemu-pr-helper /usr/bin/qemu-system-arm

The command line for starting **Lazarus IDE (Ultibo Edition) "~/ultibo/core/lazarus.sh"**

Project/Project Open

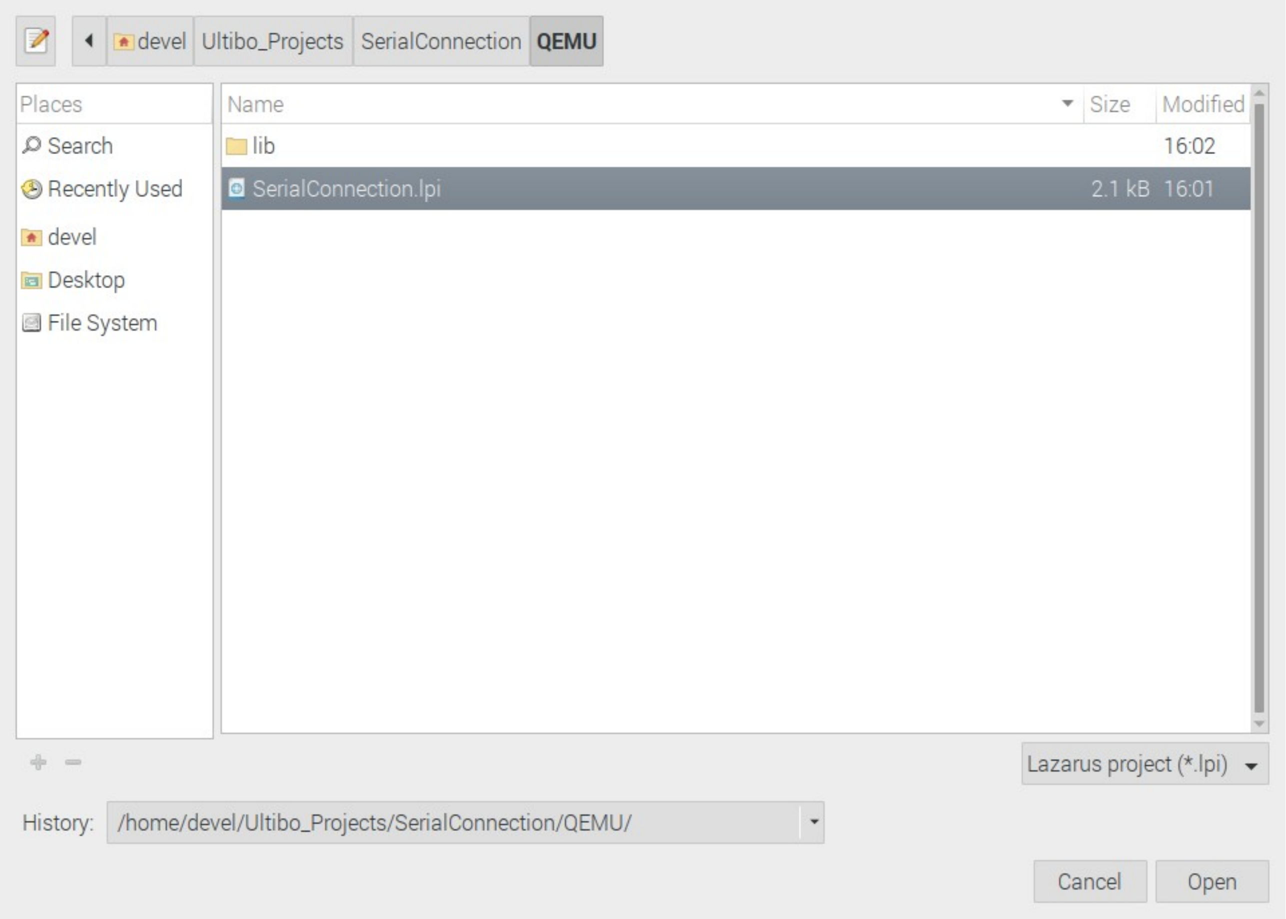


Name	Size	Modified
lib		16:02
SerialConnection.lpi	2.1 kB	16:01

Lazarus project (*.lpi)

History: /home/devel/Ultibo_Projects/SerialConnection/QEMU/

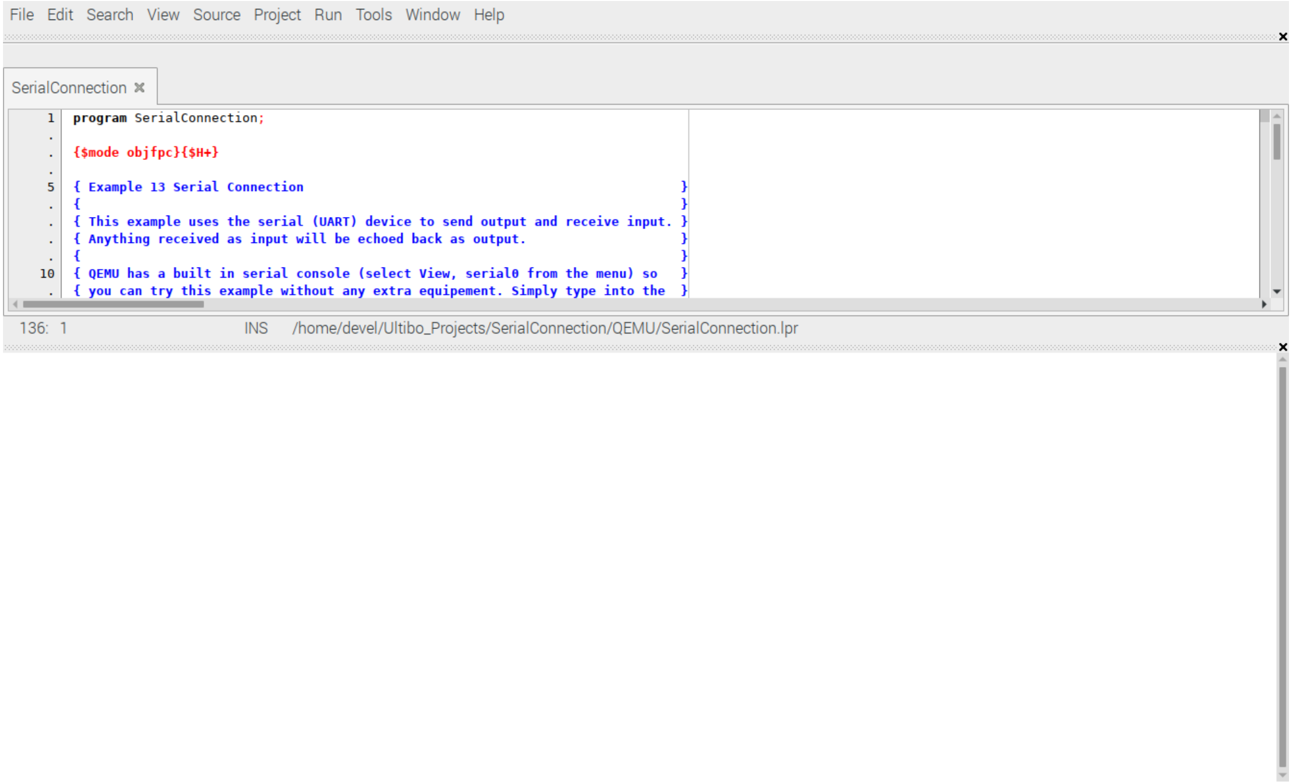
Laz0



Name	Size	Modified
lib		16:02
SerialConnection.lpi	2.1 kB	16:01

History: /home/devel/Ultibo_Projects/SerialConnection/QEMU/

Depress Open

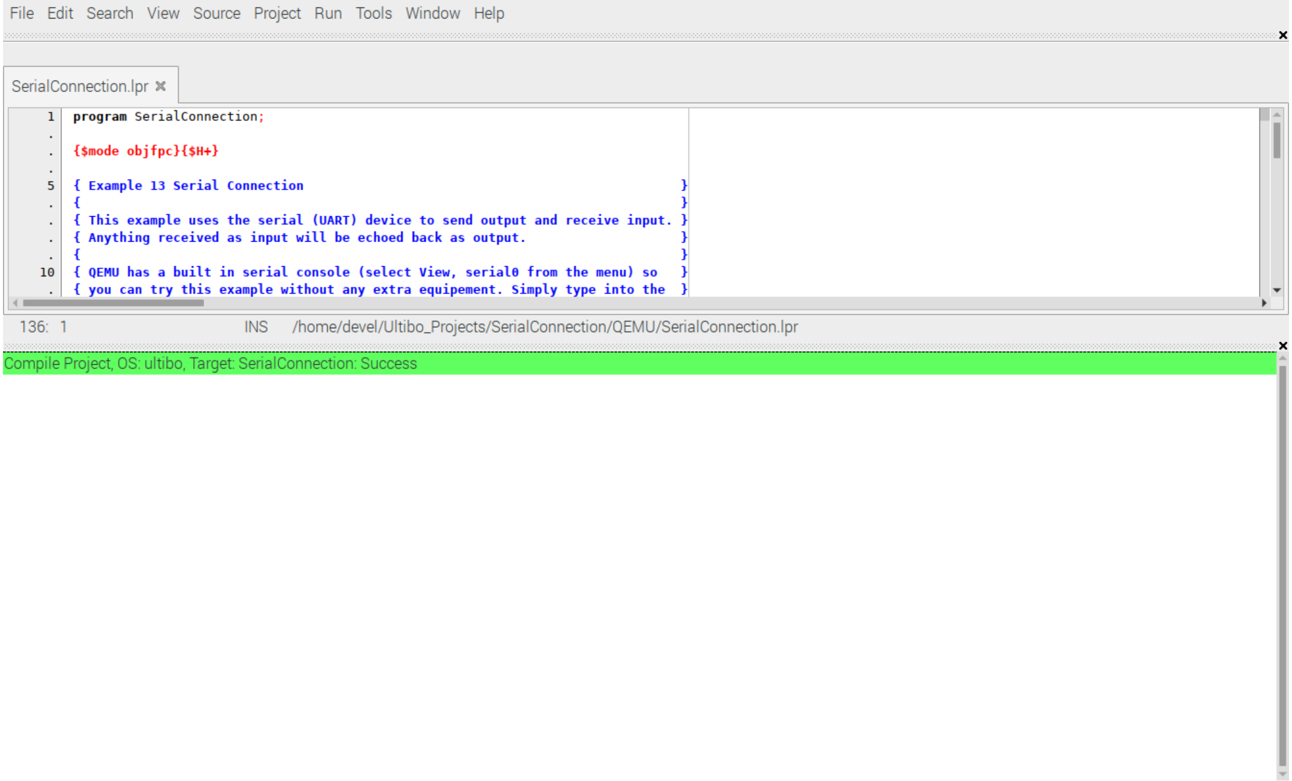


```
program SerialConnection;

{$mode objfpc}{$H+}

{ Example 13 Serial Connection                                         }
{                                                                      }
{ This example uses the serial (UART) device to send output and receive input. }
{ Anything received as input will be echoed back as output.            }
{                                                                      }
{ QEMU has a built in serial console (select View, serial0 from the menu) so   }
{ you can try this example without any extra equipement. Simply type into the  }
```

136: 1   INS   /home/devel/Ultibo_Projects/SerialConnection/QEMU/SerialConnection.lpr

Laz0

Run/Compile The kernel.bin is created when the Grean bar appers.



```
program SerialConnection;

{$mode objfpc}{$H+}

{ Example 13 Serial Connection                                              }
{                                                                           }
{ This example uses the serial (UART) device to send output and receive input. }
{ Anything received as input will be echoed back as output.                 }
{                                                                           }
{ QEMU has a built in serial console (select View, serial0 from the menu) so  }
{ you can try this example without any extra equipement. Simply type into the }
```

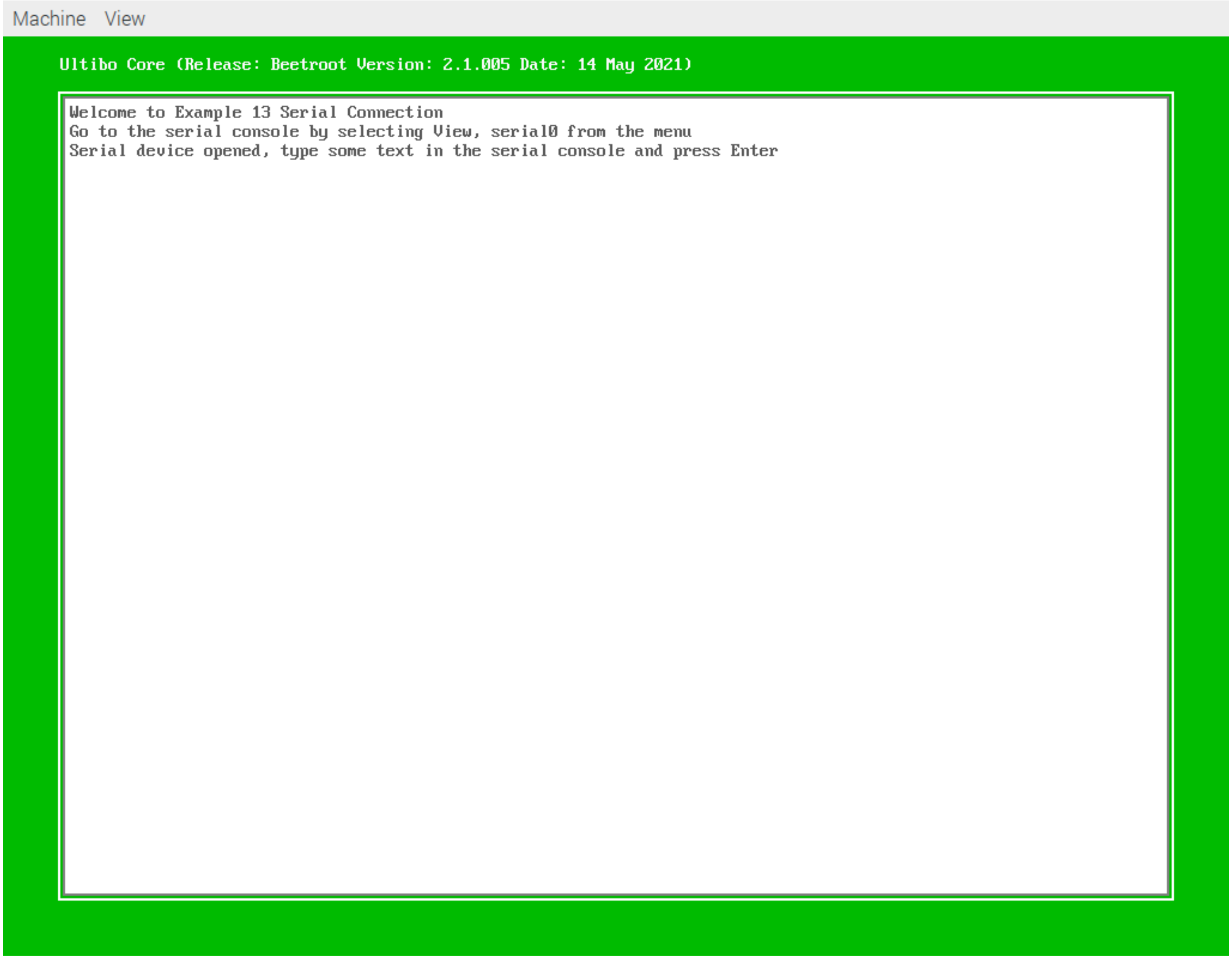
136: 1 INS /home/devel/Ultibo_Projects/SerialConnection/QEMU/SerialConnection.lpr

Compile Project, OS: ultibo, Target: SerialConnection: Success

qemu

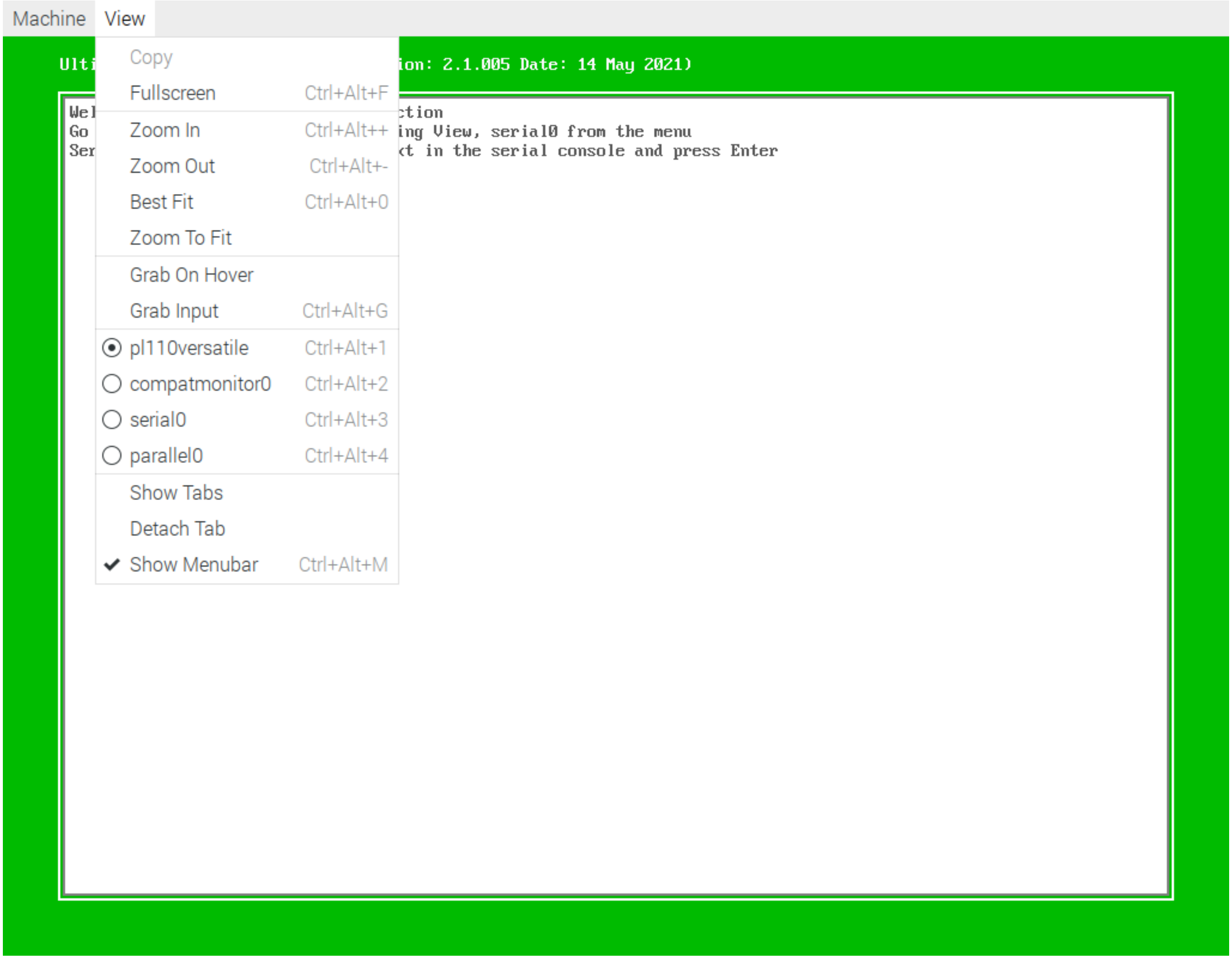
~/Ultibo_Projects/SerialConnection/QEMU

qemu-system-arm -machine versatilepb -cpu cortex-a8 -kernel kernel.bin



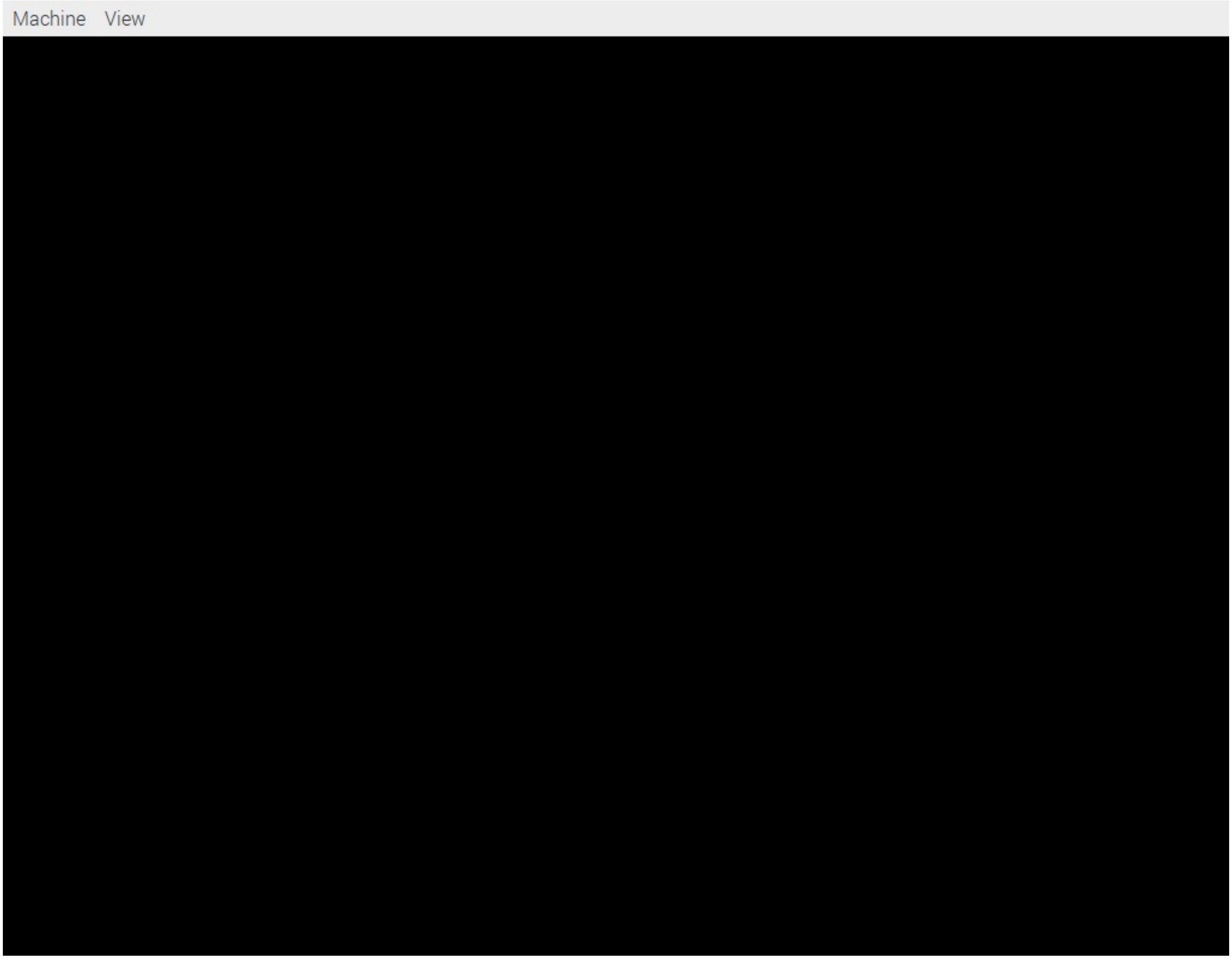
```
Ultibo Core (Release: Beetroot Version: 2.1.005 Date: 14 May 2021)

Welcome to Example 13 Serial Connection
Go to the serial console by selecting View, serial0 from the menu
Serial device opened, type some text in the serial console and press Enter
```

View



```
Ulti                                     ion: 2.1.005 Date: 14 May 2021)

 Wel                                     ction
 Go                                      ing View, serial0 from the menu
 Ser                                     xt in the serial console and press Enter
```

Check serial0



Note: Type in the serial0 This might need additional options qemu-system-arm for it to be sent out the serial port.

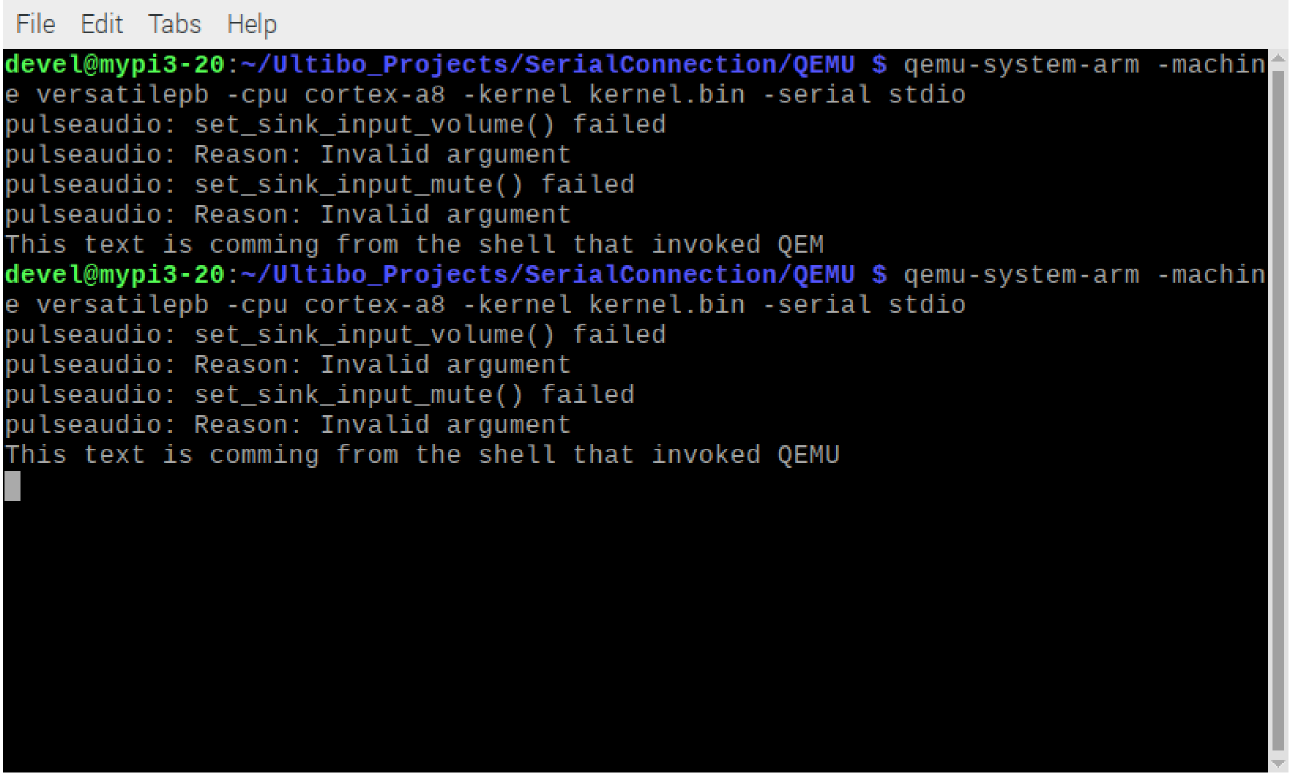
https://ultibo.org/forum/viewtopic.php?p=11627#p11627

by Ultibo Wed Jul 21, 2021 9:01 pm
I tested the Serial Connection example with and without the -serial stdio parameter and it also works, remember the example doesn't echo any characters or display anything on screen until you press the Enter key so you won't see anything in the serial console until then.

With the -serial stdio option it takes away the Serial 0 console but the serial port is redirected to the terminal where you launched QEMU from, if you switch back to the terminal and type some characters (after the pulseaudio errors) and then press Enter it will be echoed back and also display on the screen on the example in QEMU.

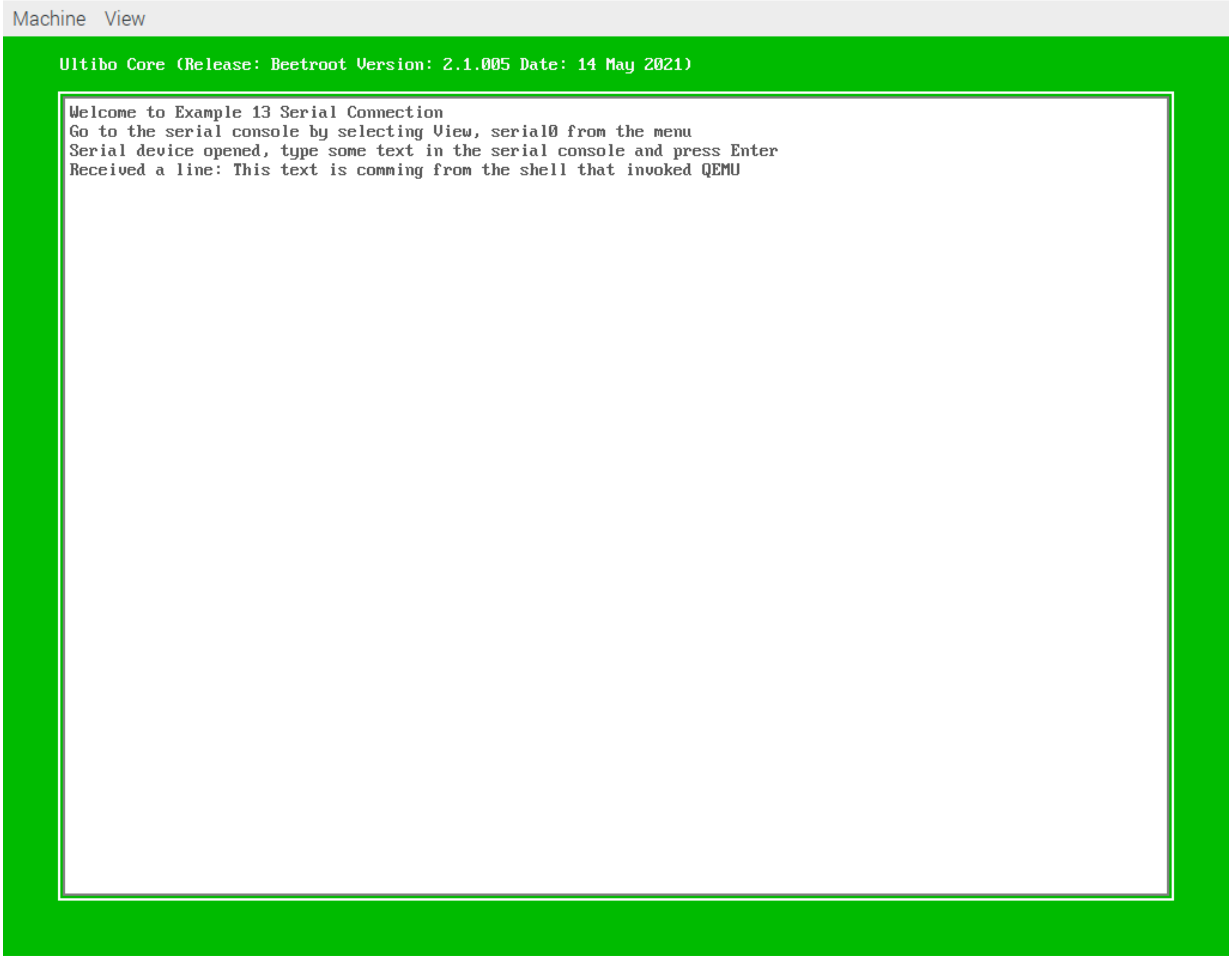
The next 4 images are exchange between the RPi4B 4Gb & Ultibo QEMU.

qemu-system-arm -machine versatilepb -cpu cortex-a8 -kernel kernel.bin -serial stdio



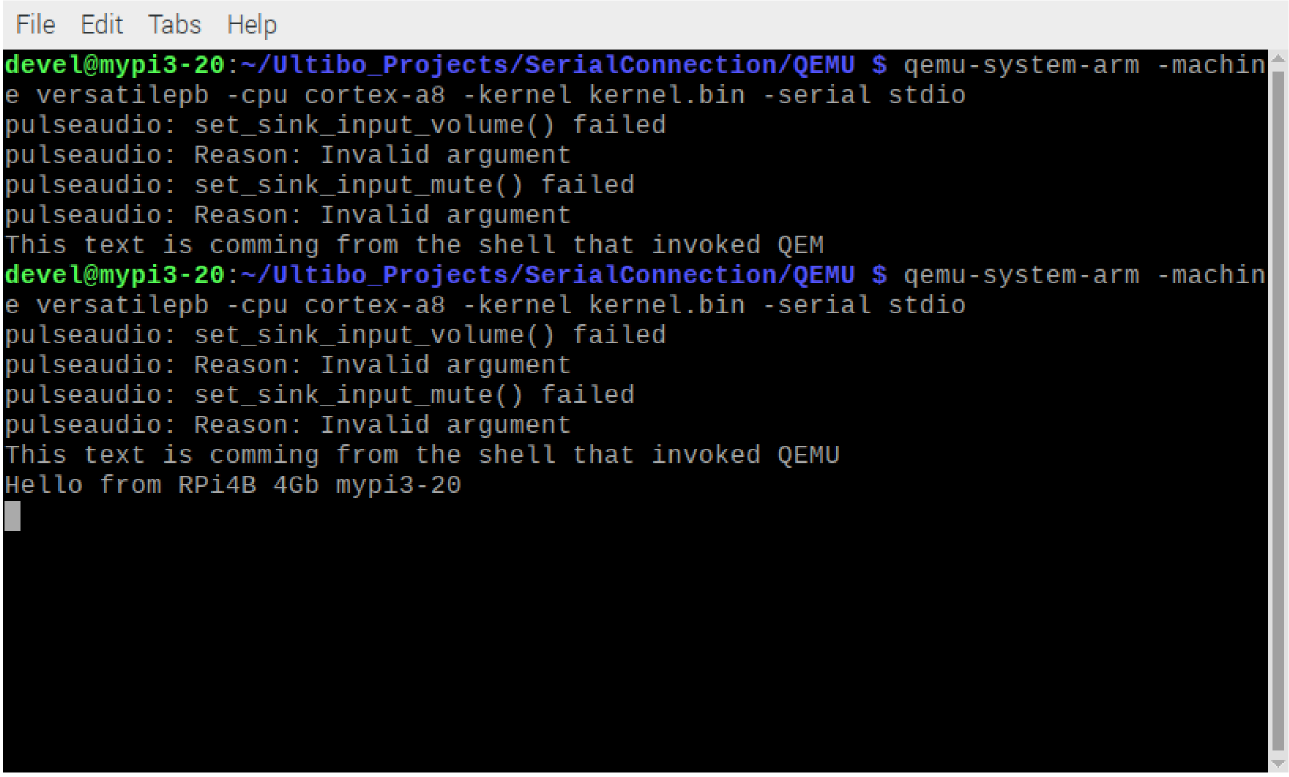
```
devel@mypi3-20:~/Ultibo_Projects/SerialConnection/QEMU $ qemu-system-arm -machin
e versatilepb -cpu cortex-a8 -kernel kernel.bin -serial stdio
pulseaudio: set_sink_input_volume() failed
pulseaudio: Reason: Invalid argument
pulseaudio: set_sink_input_mute() failed
pulseaudio: Reason: Invalid argument
This text is comming from the shell that invoked QEM
devel@mypi3-20:~/Ultibo_Projects/SerialConnection/QEMU $ qemu-system-arm -machin
e versatilepb -cpu cortex-a8 -kernel kernel.bin -serial stdio
pulseaudio: set_sink_input_volume() failed
pulseaudio: Reason: Invalid argument
pulseaudio: set_sink_input_mute() failed
pulseaudio: Reason: Invalid argument
This text is comming from the shell that invoked QEMU
```

QEMU



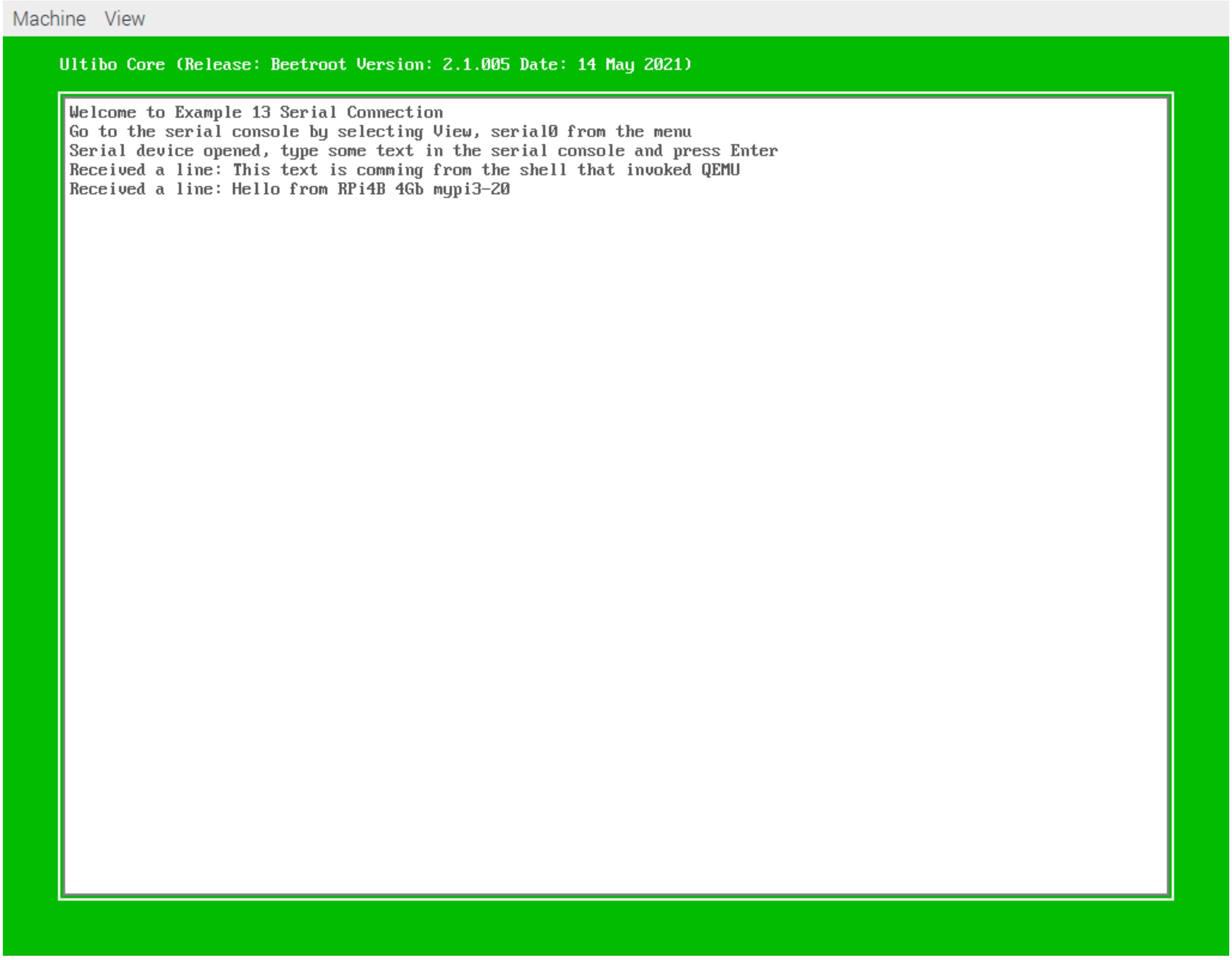
```
Ultibo Core (Release: Beetroot Version: 2.1.005 Date: 14 May 2021)

Welcome to Example 13 Serial Connection
Go to the serial console by selecting View, serial0 from the menu
Serial device opened, type some text in the serial console and press Enter
Received a line: This text is comming from the shell that invoked QEMU
```

SHELL



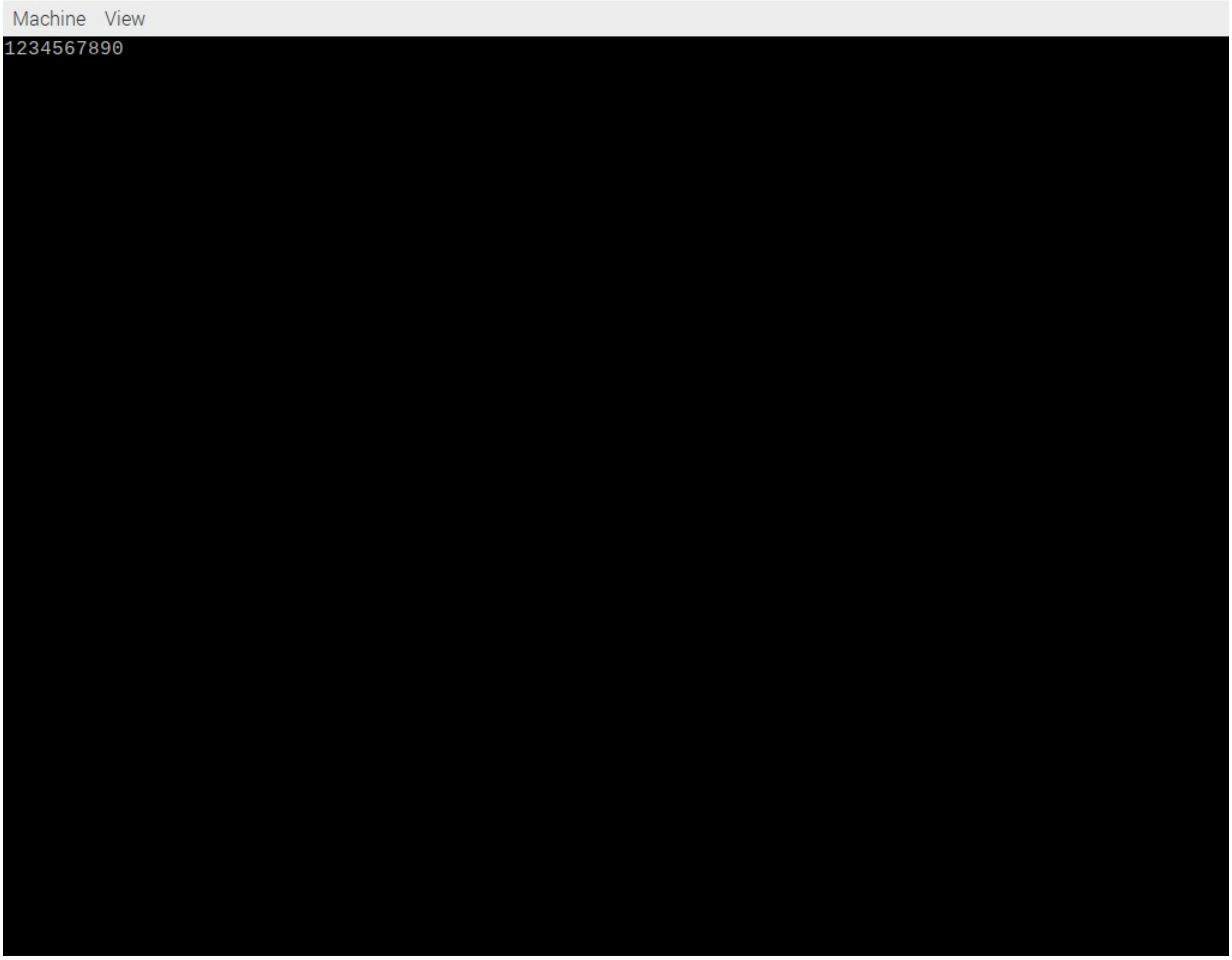
```
devel@mypi3-20:~/Ultibo_Projects/SerialConnection/QEMU $ qemu-system-arm -machin
e versatilepb -cpu cortex-a8 -kernel kernel.bin -serial stdio
pulseaudio: set_sink_input_volume() failed
pulseaudio: Reason: Invalid argument
pulseaudio: set_sink_input_mute() failed
pulseaudio: Reason: Invalid argument
This text is comming from the shell that invoked QEM
devel@mypi3-20:~/Ultibo_Projects/SerialConnection/QEMU $ qemu-system-arm -machin
e versatilepb -cpu cortex-a8 -kernel kernel.bin -serial stdio
pulseaudio: set_sink_input_volume() failed
pulseaudio: Reason: Invalid argument
pulseaudio: set_sink_input_mute() failed
pulseaudio: Reason: Invalid argument
This text is comming from the shell that invoked QEMU
Hello from RPi4B 4Gb mypi3-20
```

QEMU



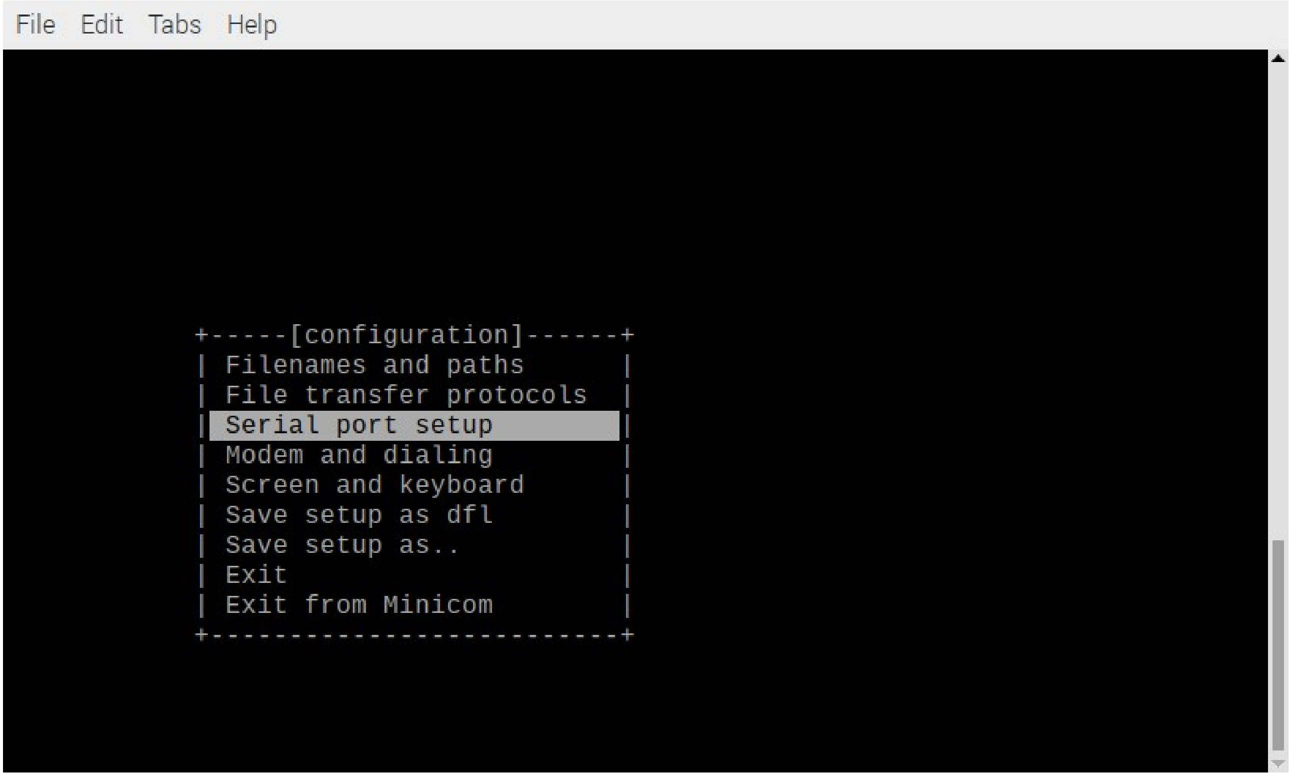
```
Ultibo Core (Release: Beetroot Version: 2.1.005 Date: 14 May 2021)
```

```
Welcome to Example 13 Serial Connection
Go to the serial console by selecting View, serial0 from the menu
Serial device opened, type some text in the serial console and press Enter
Received a line: This text is comming from the shell that invoked QEMU
Received a line: Hello from RPi4B 4Gb mypi3-20
```

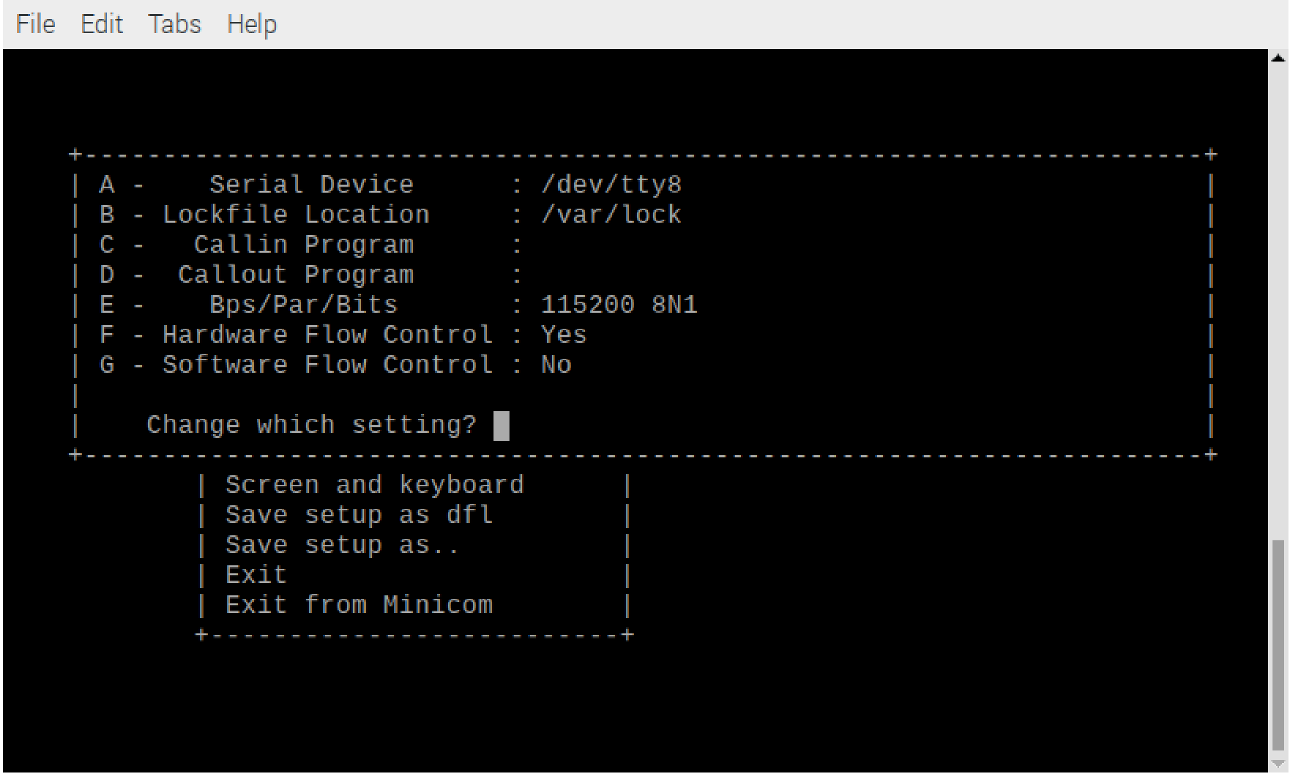


```
1234567890
```

sudo minicom -s

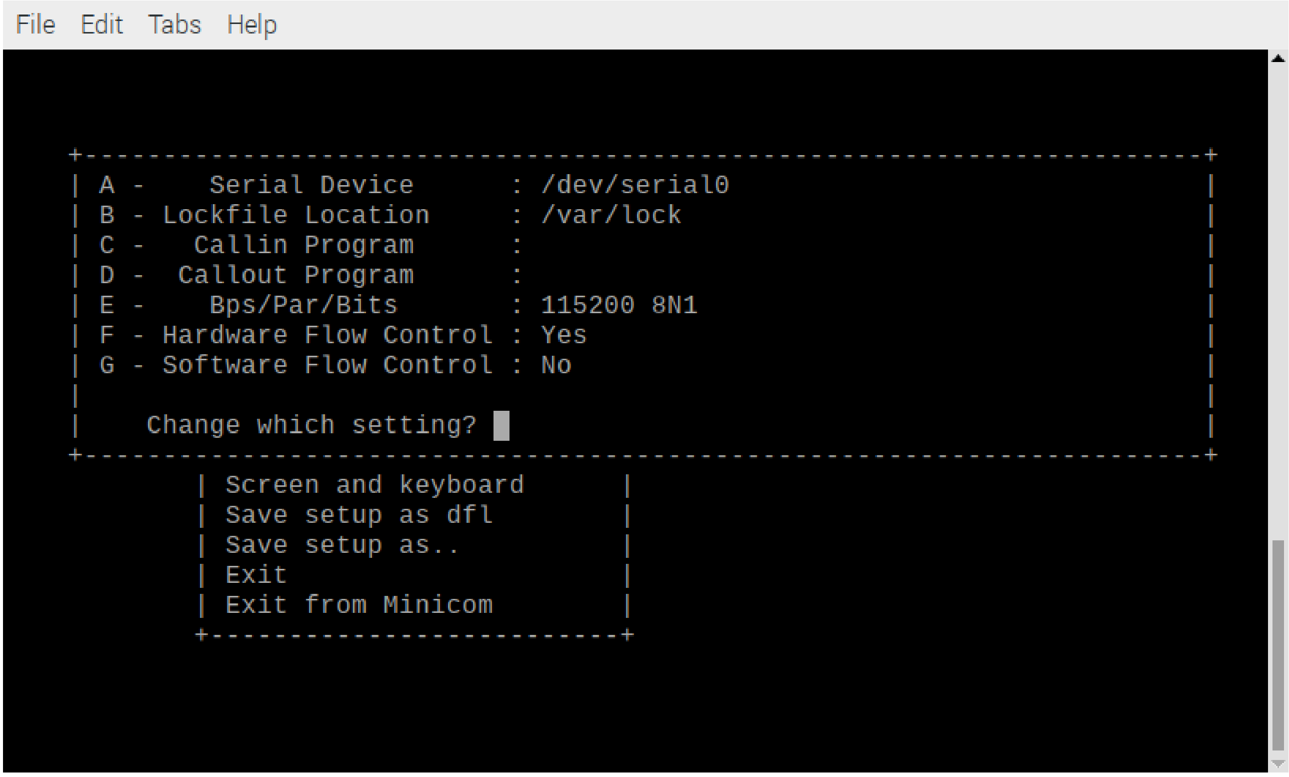


```
+-----[configuration]------+
| Filenames and paths      |
| File transfer protocols  |
| Serial port setup        |
| Modem and dialing        |
| Screen and keyboard      |
| Save setup as dfl        |
| Save setup as..          |
| Exit                     |
| Exit from Minicom        |
+--------------------------+
```



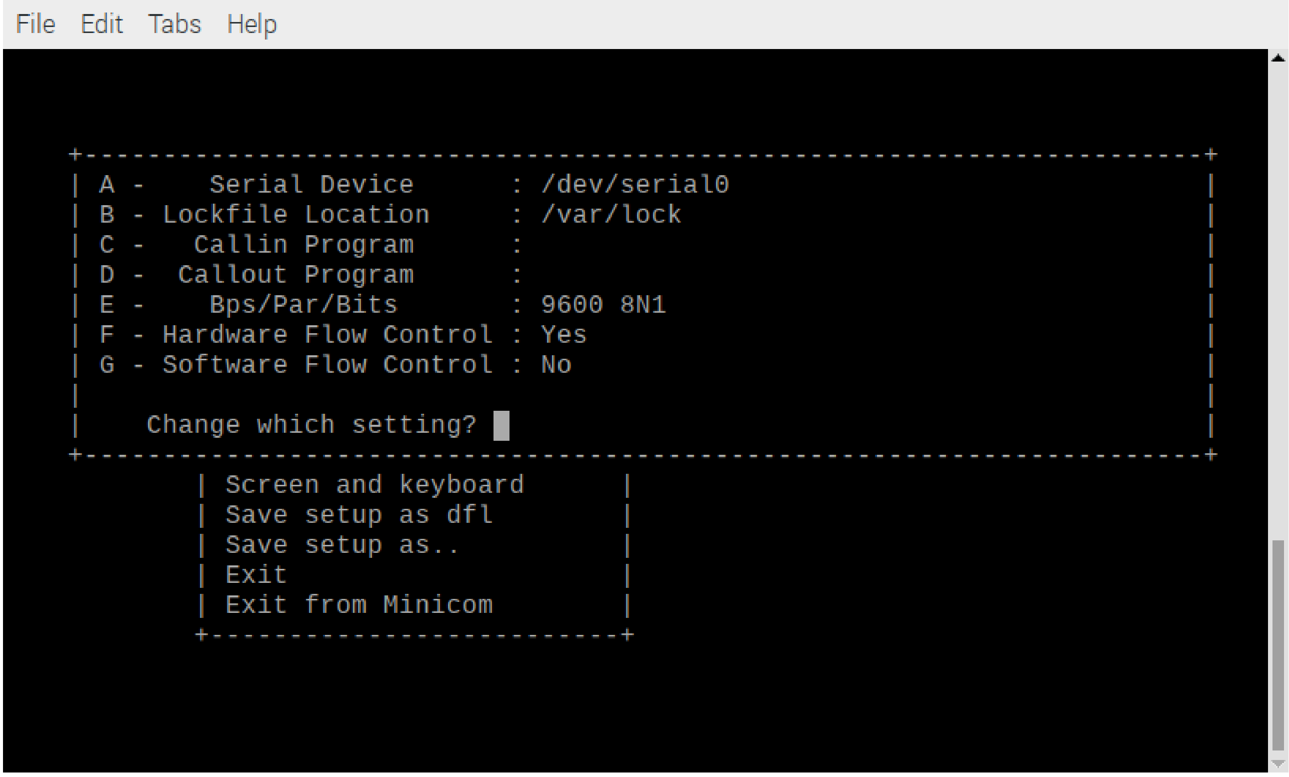
```
+-----------------------------------------------------------------------+
| A -    Serial Device      : /dev/tty8                                 |
| B - Lockfile Location     : /var/lock                                 |
| C -   Callin Program      :                                           |
| D -  Callout Program      :                                           |
| E -    Bps/Par/Bits       : 115200 8N1                                |
| F - Hardware Flow Control : Yes                                       |
| G - Software Flow Control : No                                        |
|                                                                       |
|    Change which setting?                                              |
+-----------------------------------------------------------------------+
        | Screen and keyboard      |
        | Save setup as dfl        |
        | Save setup as..          |
        | Exit                     |
        | Exit from Minicom        |
        +--------------------------+
```

Change “/*dev*/tty8” to “/dev/serial0”.



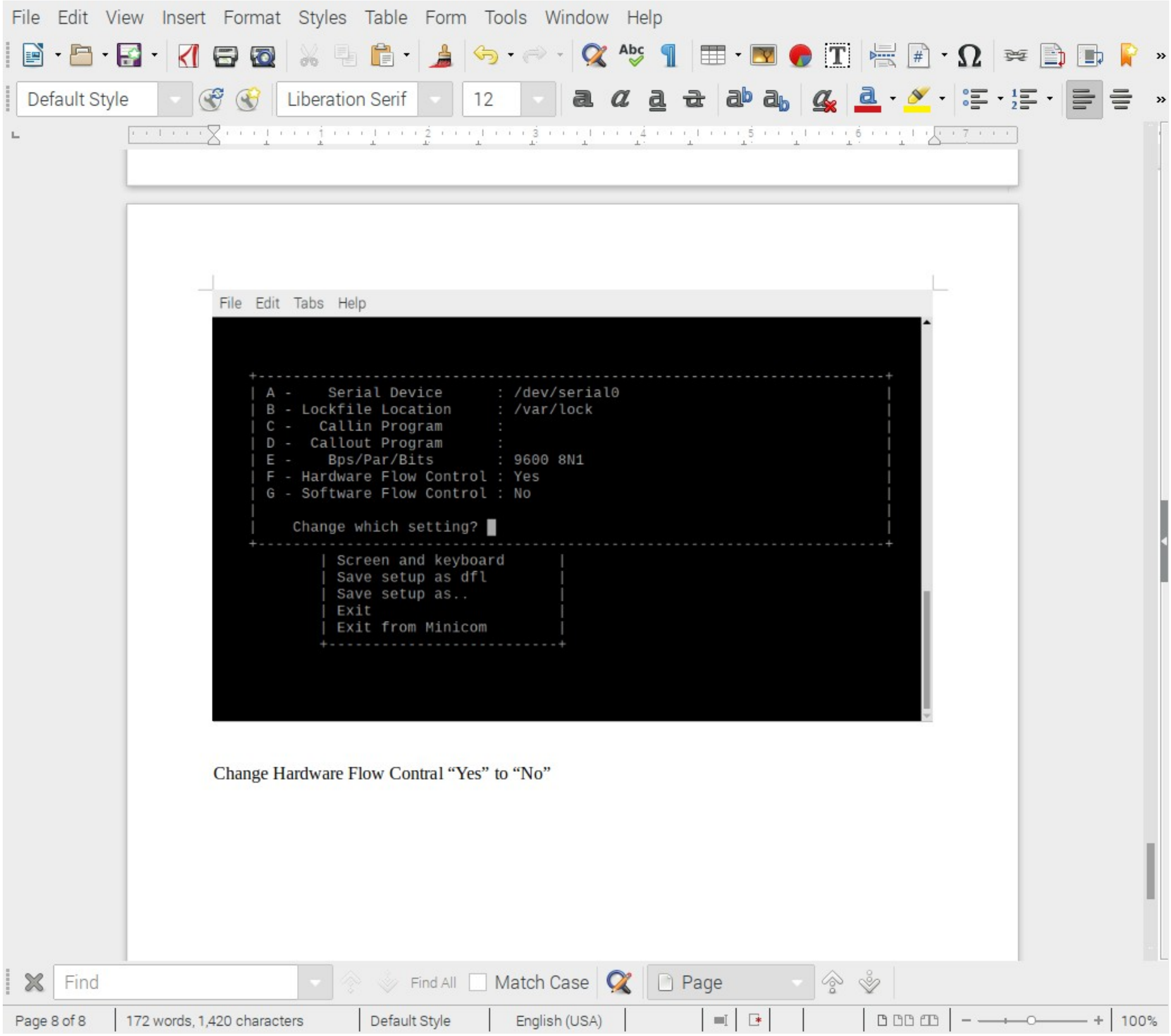
```
    +-----------------------------------------------------------------------+
    | A -    Serial Device      : /dev/serial0                              |
    | B - Lockfile Location     : /var/lock                                 |
    | C -   Callin Program      :                                           |
    | D -  Callout Program      :                                           |
    | E -    Bps/Par/Bits       : 115200 8N1                                |
    | F - Hardware Flow Control : Yes                                       |
    | G - Software Flow Control : No                                        |
    |                                                                       |
    |    Change which setting?                                              |
    +-----------------------------------------------------------------------+
            | Screen and keyboard      |
            | Save setup as dfl        |
            | Save setup as..          |
            | Exit                     |
            | Exit from Minicom        |
            +--------------------------+
```

Change “115200 8N1” to “9600 8N1”.



```
    +-----------------------------------------------------------------------+
    | A -    Serial Device      : /dev/serial0                              |
    | B - Lockfile Location     : /var/lock                                 |
    | C -   Callin Program      :                                           |
    | D -  Callout Program      :                                           |
    | E -    Bps/Par/Bits       : 9600 8N1                                  |
    | F - Hardware Flow Control : Yes                                       |
    | G - Software Flow Control : No                                        |
    |                                                                       |
    |    Change which setting?                                              |
    +-----------------------------------------------------------------------+
            | Screen and keyboard      |
            | Save setup as dfl        |
            | Save setup as..          |
            | Exit                     |
            | Exit from Minicom        |
            +--------------------------+
```

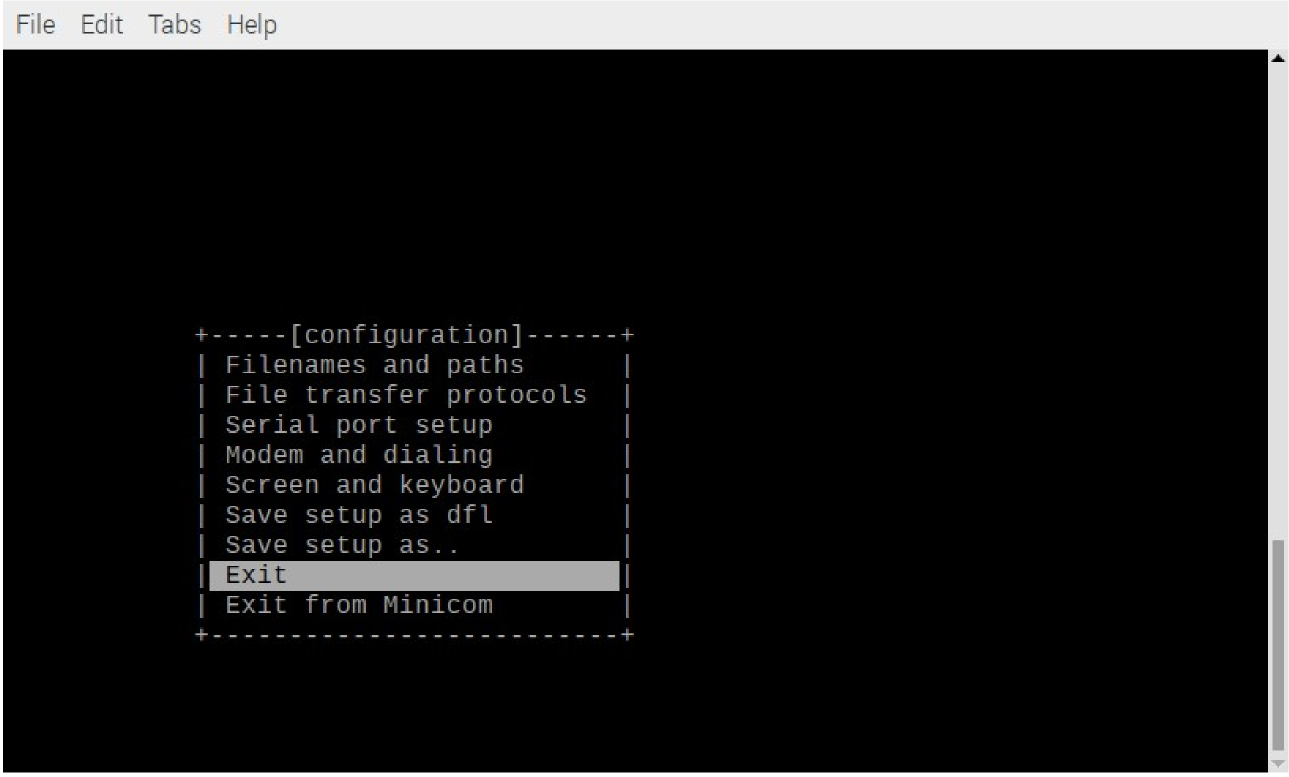
Change Hardware Flow Contral “Yes” to “No”



```
+-----------------------------------------------------------------------+
| A -    Serial Device      : /dev/serial0                              |
| B - Lockfile Location     : /var/lock                                 |
| C -   Callin Program      :                                           |
| D -  Callout Program      :                                           |
| E -    Bps/Par/Bits       : 9600 8N1                                  |
| F - Hardware Flow Control : Yes                                       |
| G - Software Flow Control : No                                        |
|                                                                       |
|    Change which setting?                                              |
+-----------------------------------------------------------------------+
        | Screen and keyboard      |
        | Save setup as dfl        |
        | Save setup as..          |
        | Exit                     |
        | Exit from Minicom        |
        +--------------------------+
```

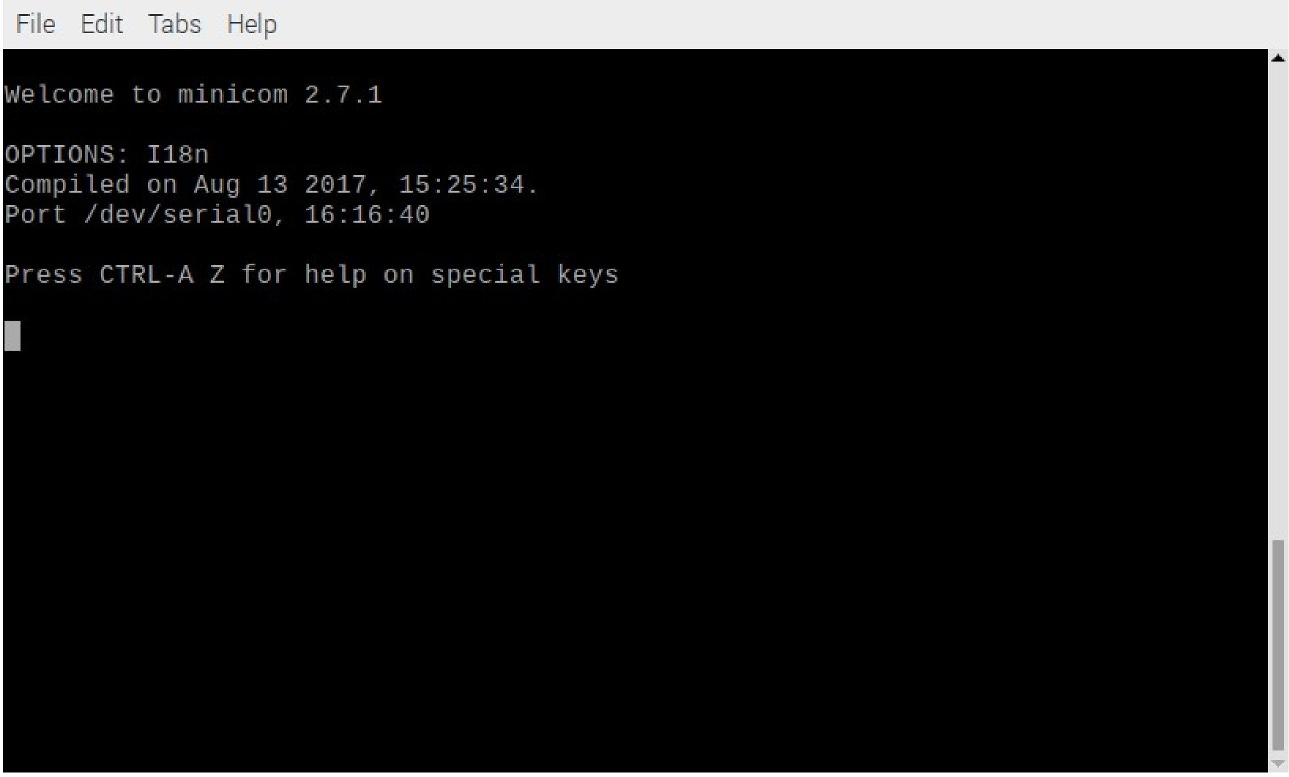
Change Hardware Flow Contral “Yes” to “No”

Enter



```
+-----[configuration]------+
| Filenames and paths      |
| File transfer protocols  |
| Serial port setup        |
| Modem and dialing        |
| Screen and keyboard      |
| Save setup as dfl        |
| Save setup as..          |
| Exit                     |
| Exit from Minicom        |
+--------------------------+
```

Select Exit



```
Welcome to minicom 2.7.1

OPTIONS: I18n
Compiled on Aug 13 2017, 15:25:34.
Port /dev/serial0, 16:16:40

Press CTRL-A Z for help on special keys
```