***************Draft***************
09/16/20
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https://github.com/develone/filter-c.git which was forked from
https://github.com/adis300/filter-c

```
git clone https://github.com/develone/filter-c.git
```

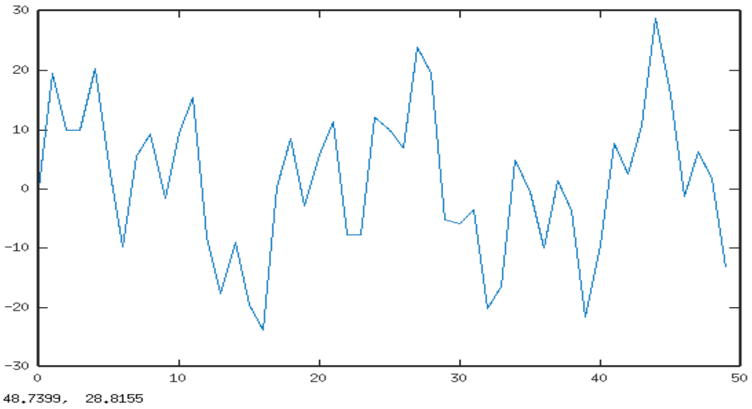
This example will create a BW Low Pass Filter.

```
cp example.c.low example.c
make clean; make
```

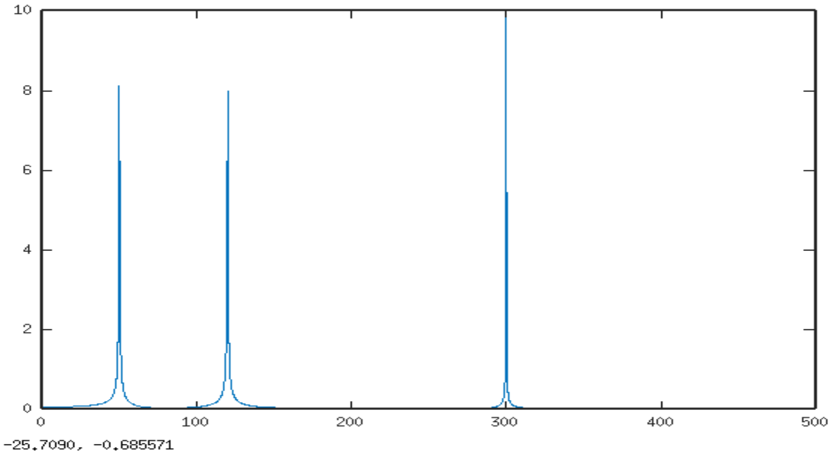
Write 2 binary files “mysig.bin” & “myfilt.bin”.

```
*ptrsignal = (double)10*(sin(2*pi*50*t[i]) + sin(2*pi*120*t[i]) + sin(2*pi*300*t[i])); //no DC
```

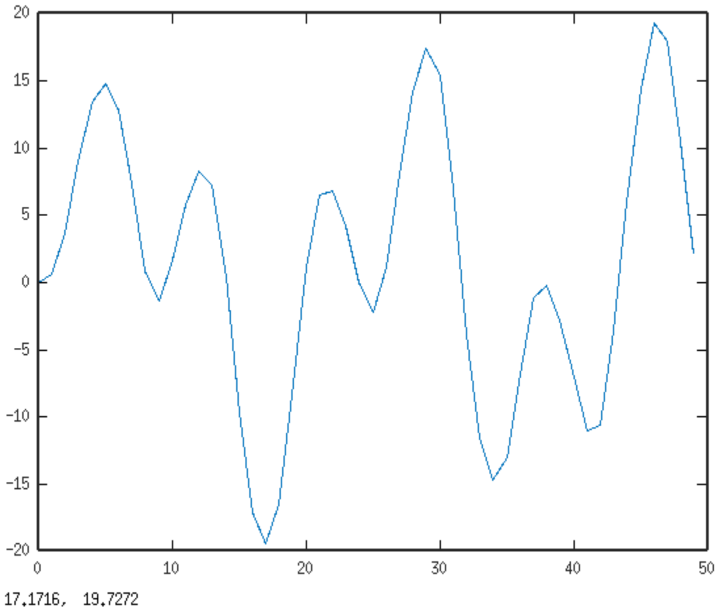
Written to the file “mysig.bin”.



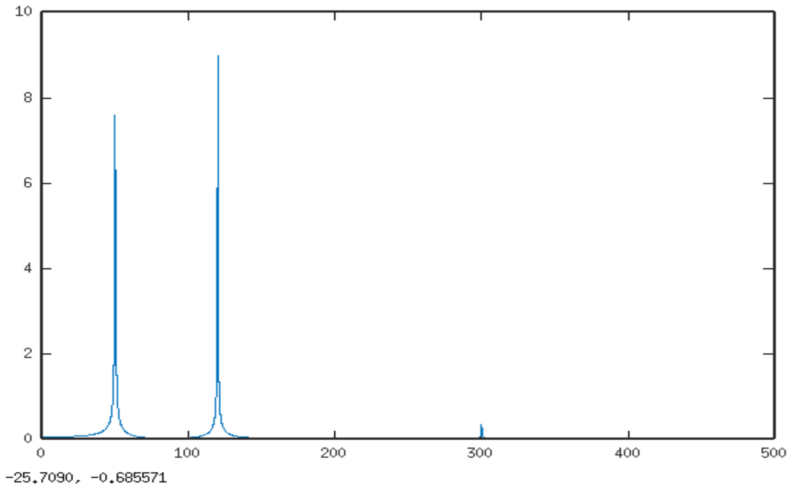
FFT computed in octave from mysig.



The filttered data is written to the file “myfilt.bin”.



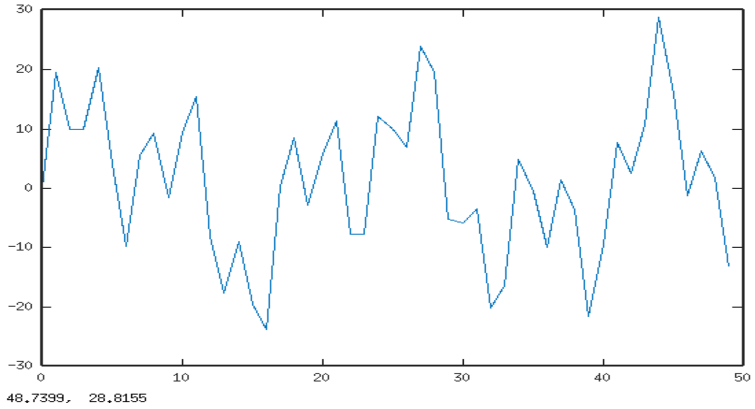
FFT computed from signal myfilt create with example.c



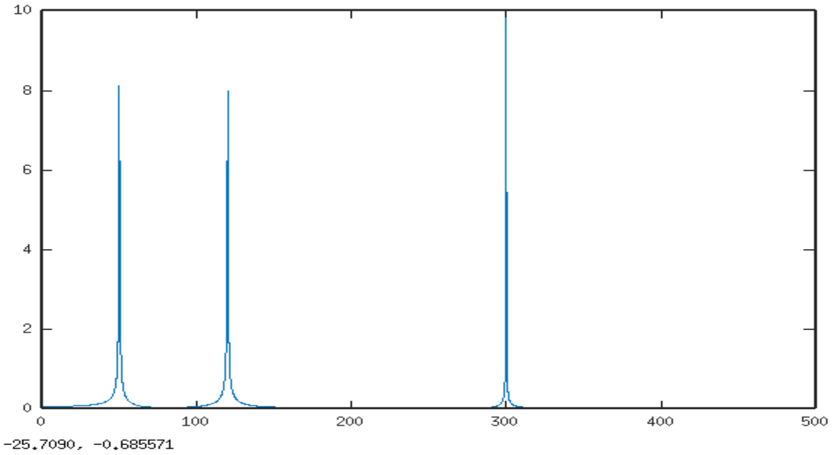
```
cp example.c.high example.c
make clean; make
```

```
*ptrsignal = (double)10*(sin(2*pi*50*t[i]) + sin(2*pi*120*t[i]) + sin(2*pi*300*t[i])); //no DC
```

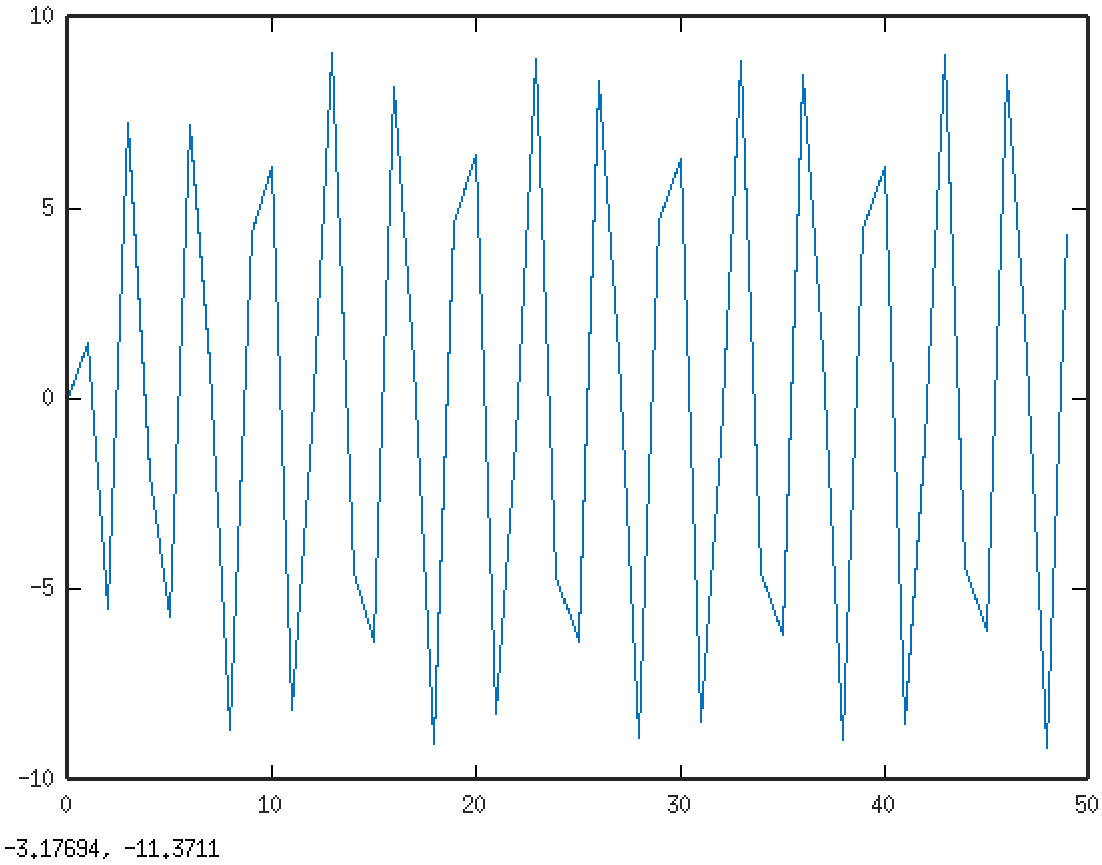
Written to the file “mysig.bin”.



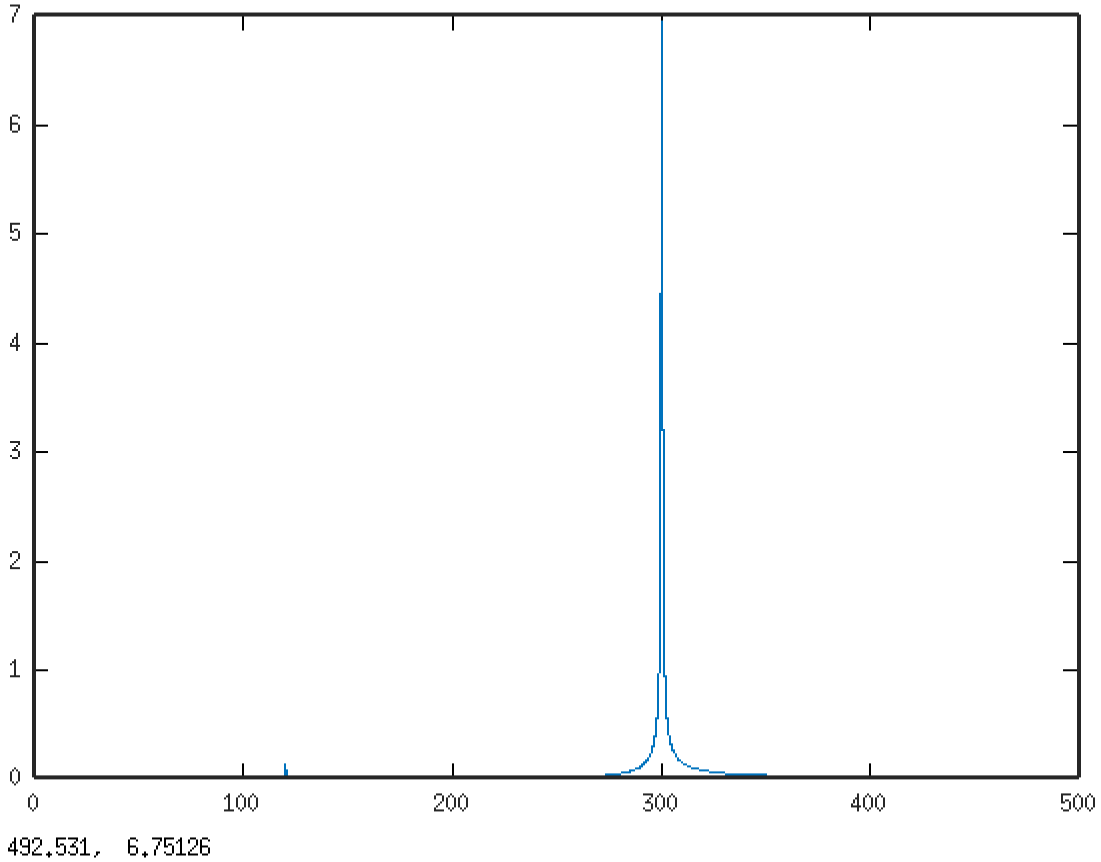
FFT computed in octave from “myfilt.bin”.



The filttered data is written to the file “myfilt.bin”.



FFT computed in octave from myfilt.bin.



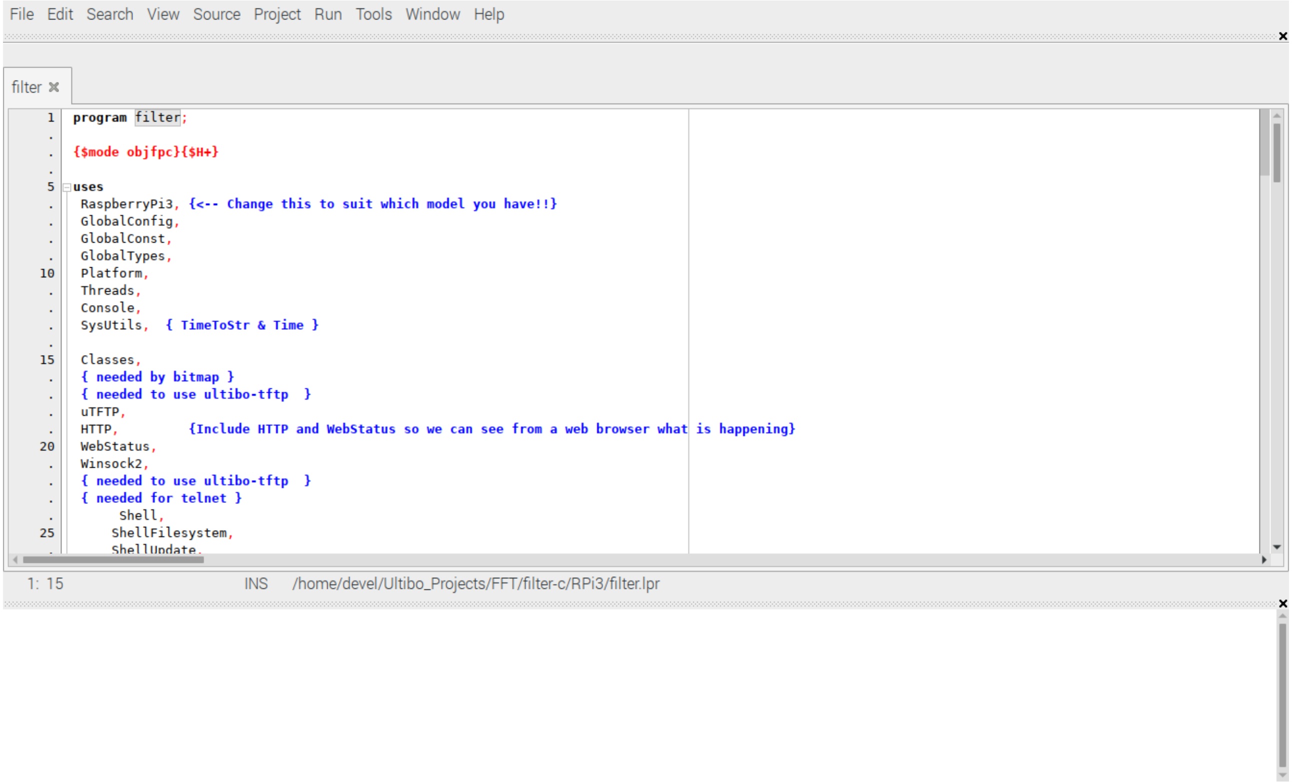
The difference between running the example.c program on the Raspberry Pi OS and Bare Metal using Ultibo is the

```
diff example.c.high ~/Ultibo_Projects/FFT/filter-c/example.c
67c67
< int main() {
---
> int test() {
```

In the case of Bare Metal. The code is compiled and library is created.

```
#!/bin/bash
rm -f *.o
arm-none-eabi-gcc -O2 -mabi=aapcs -marm -march=armv7-a -mfpu=vfpv3-d16 \
-mfloat-abi=hard -D__DYNAMIC_REENT__  -c filter.c
arm-none-eabi-gcc -O2 -mabi=aapcs -marm -march=armv7-a -mfpu=vfpv3-d16 \
-mfloat-abi=hard -D__DYNAMIC_REENT__  -c example.c
arm-none-eabi-ar rcs libfilter.a *.o
arm-none-eabi-objdump -d libfilter.a > filter-obj.txt
cp libfilter.a RPi3
```

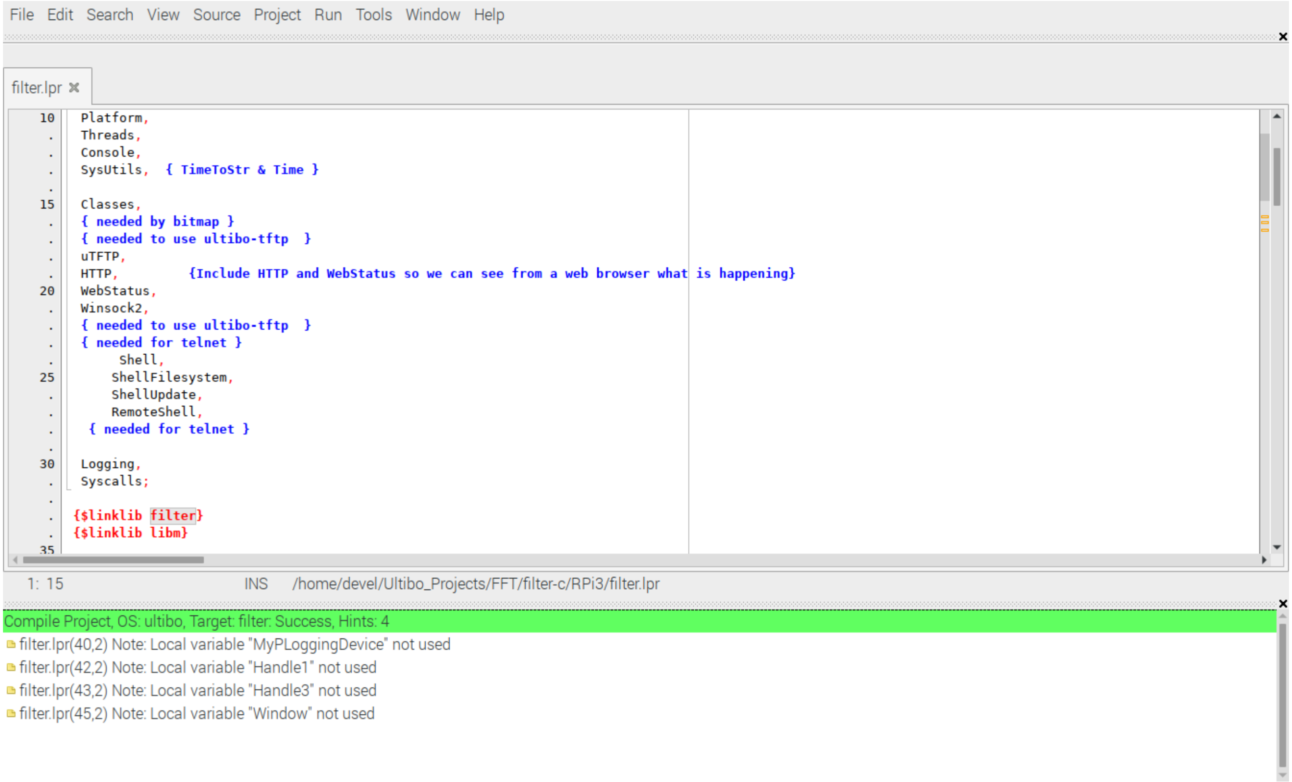
Lazarus IDE (Ultibo Edition) is used to compile and link to create “kernel7.img”.



File Edit Search View Source Project Run Tools Window Help
filter
1: 15
INS
/home/devel/Ultibo_Projects/FFT/filter-c/RPi3/filter.lpr

```
program filter;

{$mode objfpc}{$H+}

uses
 RaspberryPi3, {<-- Change this to suit which model you have!!}
 GlobalConfig,
 GlobalConst,
 GlobalTypes,
 Platform,
 Threads,
 Console,
 SysUtils,  { TimeToStr & Time }

 Classes,
 { needed by bitmap }
 { needed to use ultibo-tftp  }
 uTFTP,
 HTTP,         {Include HTTP and WebStatus so we can see from a web browser what is happening}
 WebStatus,
 Winsock2,
 { needed to use ultibo-tftp  }
 { needed for telnet }
      Shell,
     ShellFilesystem,
     ShellUpdate,
```

To compile & link “Run/Compile”



File Edit Search View Source Project Run Tools Window Help
filter.lpr
1: 15
INS
/home/devel/Ultibo_Projects/FFT/filter-c/RPi3/filter.lpr

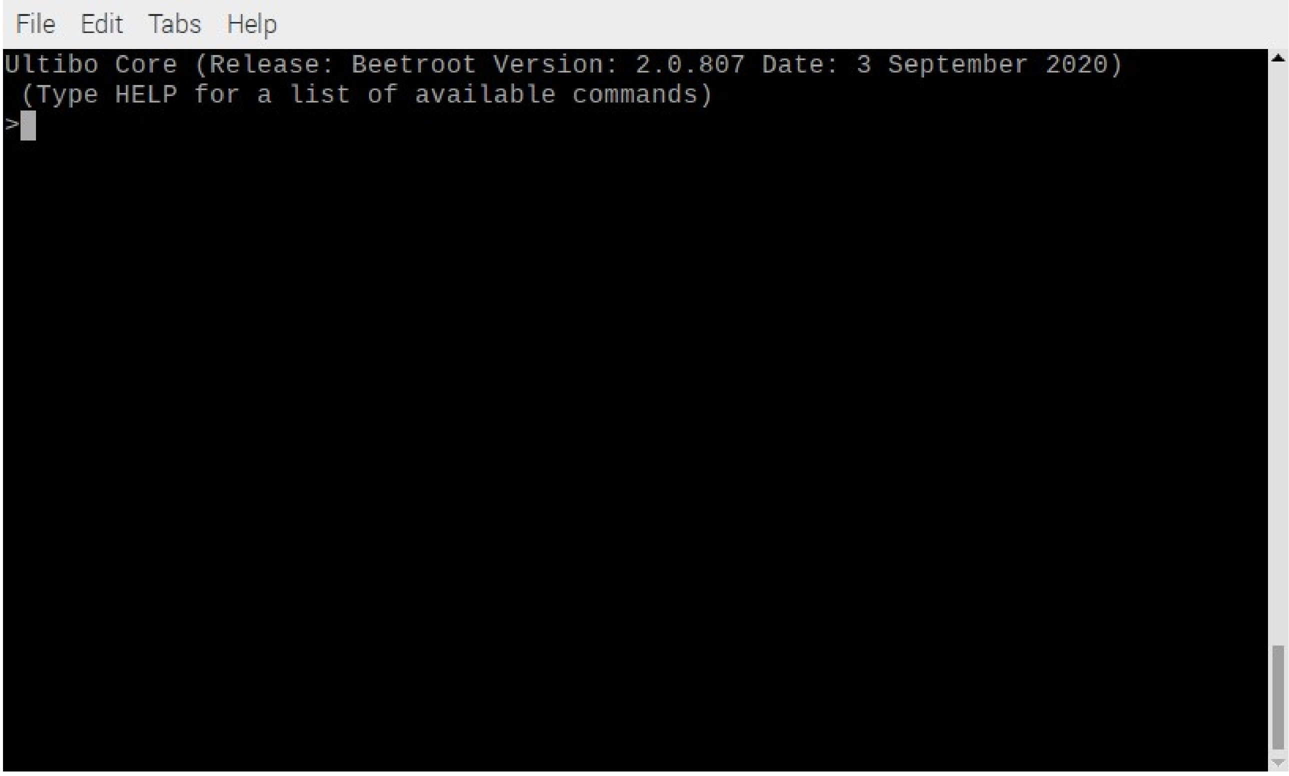
```
 Platform,
 Threads,
 Console,
 SysUtils,  { TimeToStr & Time }

 Classes,
 { needed by bitmap }
 { needed to use ultibo-tftp  }
 uTFTP,
 HTTP,         {Include HTTP and WebStatus so we can see from a web browser what is happening}
 WebStatus,
 Winsock2,
 { needed to use ultibo-tftp  }
 { needed for telnet }
      Shell,
     ShellFilesystem,
     ShellUpdate,
     RemoteShell,
  { needed for telnet }

 Logging,
 Syscalls;

{$linklib filter}
{$linklib libm}
```

```
Compile Project, OS: ultibo, Target: filter: Success, Hints: 4
filter.lpr(40,2) Note: Local variable "MyPLoggingDevice" not used
filter.lpr(42,2) Note: Local variable "Handle1" not used
filter.lpr(43,2) Note: Local variable "Handle3" not used
filter.lpr(45,2) Note: Local variable "Window" not used
```

Then the kernel7.img can be transferred with the command
tftp xx.xx.xx.xx < cmdstftp
tftp> tftp> Sent 2905544 bytes in 8.1 seconds

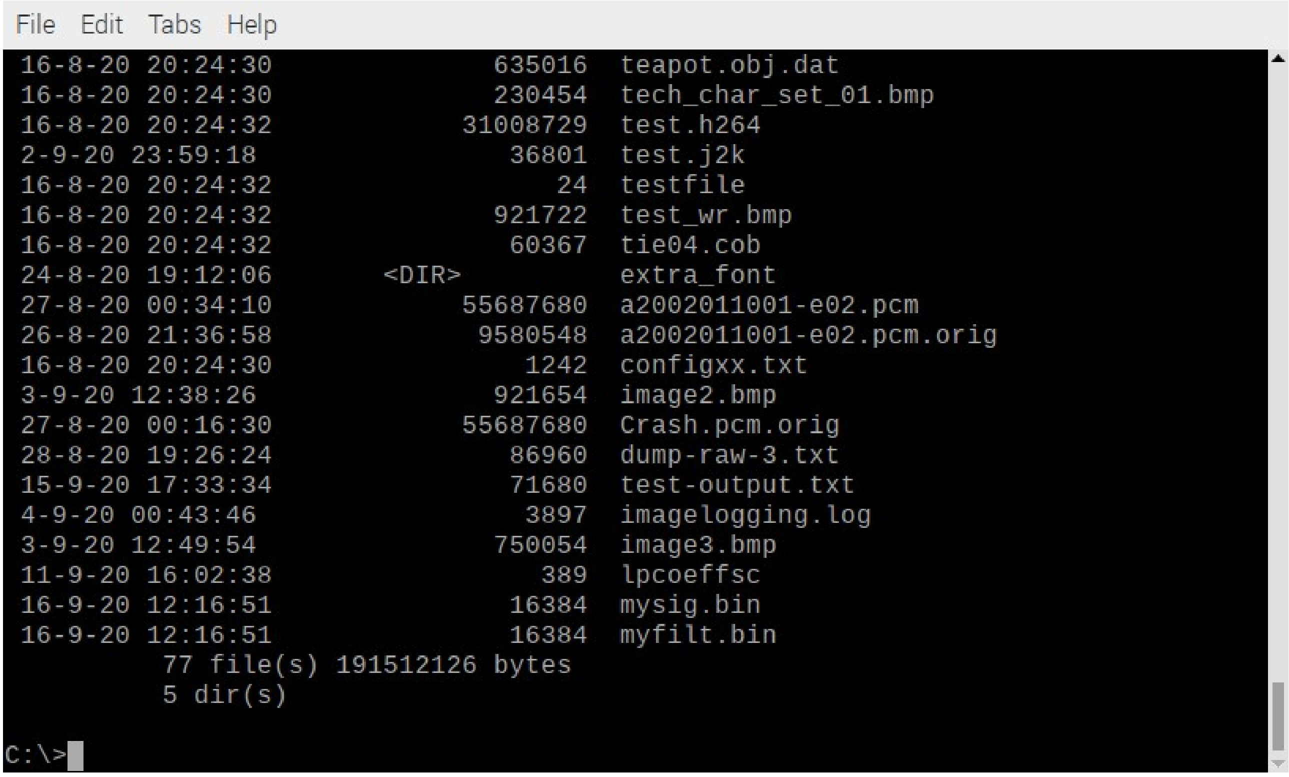
At this point the Ultibo system reboots with the new kernel7.img

A connection to a remote shell can be made “telnet xx.xx.xx.xx”



```
Ultibo Core (Release: Beetroot Version: 2.0.807 Date: 3 September 2020)
 (Type HELP for a list of available commands)
>
```

The dir command provides the files on the Ultibo system.



```
16-8-20 20:24:30               635016  teapot.obj.dat
16-8-20 20:24:30               230454  tech_char_set_01.bmp
16-8-20 20:24:32             31008729  test.h264
2-9-20 23:59:18                 36801  test.j2k
16-8-20 20:24:32                   24  testfile
16-8-20 20:24:32               921722  test_wr.bmp
16-8-20 20:24:32                60367  tie04.cob
24-8-20 19:12:06        <DIR>          extra_font
27-8-20 00:34:10             55687680  a2002011001-e02.pcm
26-8-20 21:36:58              9580548  a2002011001-e02.pcm.orig
16-8-20 20:24:30                 1242  configxx.txt
3-9-20 12:38:26                921654  image2.bmp
27-8-20 00:16:30             55687680  Crash.pcm.orig
28-8-20 19:26:24                86960  dump-raw-3.txt
15-9-20 17:33:34                71680  test-output.txt
4-9-20 00:43:46                  3897  imagelogging.log
3-9-20 12:49:54                750054  image3.bmp
11-9-20 16:02:38                  389  lpcoeffsc
16-9-20 12:16:51                16384  mysig.bin
16-9-20 12:16:51                16384  myfilt.bin
         77 file(s) 191512126 bytes
         5 dir(s)

C:\>
```