CAMOSUN COLLEGE
Department of Electronics

ELEX 235 Lab 8

Raspberry Pi One Wire

Part1:

Write a c program to read the contents of the w1 virtual files and display the number of one wire devices connected, their serial numbers, and the corresponding temperatures of any DS1820 family of devices. The program should update every minute.

Be prepared to demo the lab by the start of lab week9. Put a screenshot of your onewire temp data and the code in the D2L week8 dropbox.

The raspbian image has support for One Wire interfaces. The device driver makes the one wire bus available on **GPIO4** by default.

From the DS18S20 datasheet:

Figure 4. Supplying the Parasite-Powered DS18S20 During Temperature Conversions

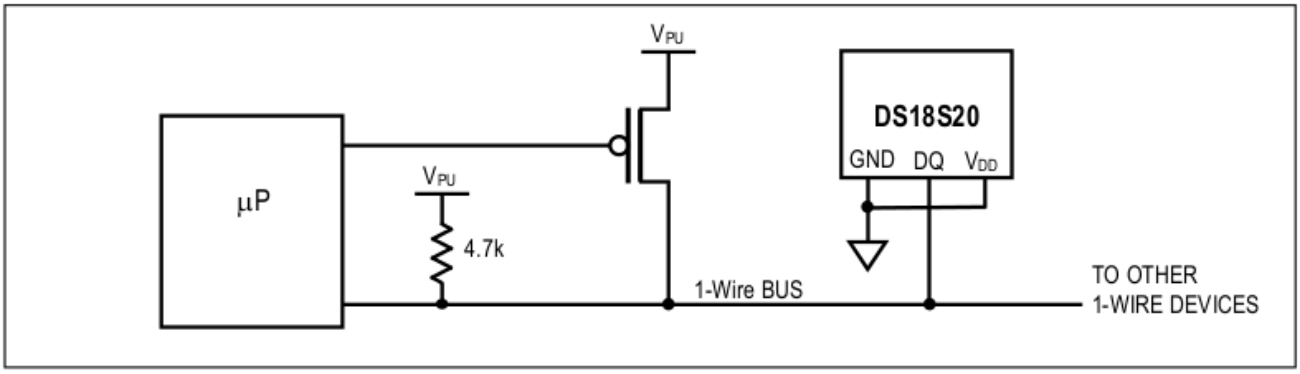
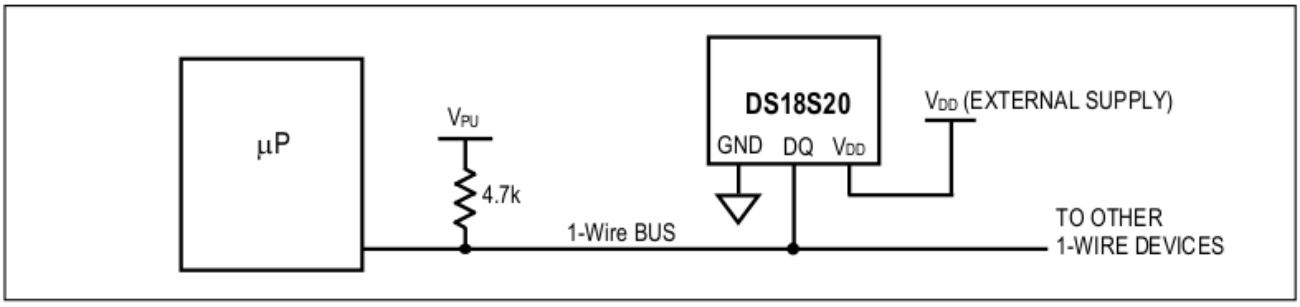


Figure 5. Powering the DS18S20 with an External Supply



Connect a DS18S20 to the raspberry pi.

We can see if the driver is enabled by looking at the virtual directory /sys . In particular we want to look at what bus interfaces are active so:

ls /sys/bus

```
pi@piRTC: ~
pi@piRTC ~ $ ls /sys/bus/
amba         clocksource  event_source  i2c             mmc       scsi  spi  workqueue
clockevents  cpu          hid           iscsi_flashnode  platform  sdio  usb
pi@piRTC ~ $
```

The one wire bus will show up as w1. By default in the raspbian image, the one wire bus is supported by kernel modules. As the one wire bus entry is not there, we need to look for the kernel modules.

lsmod

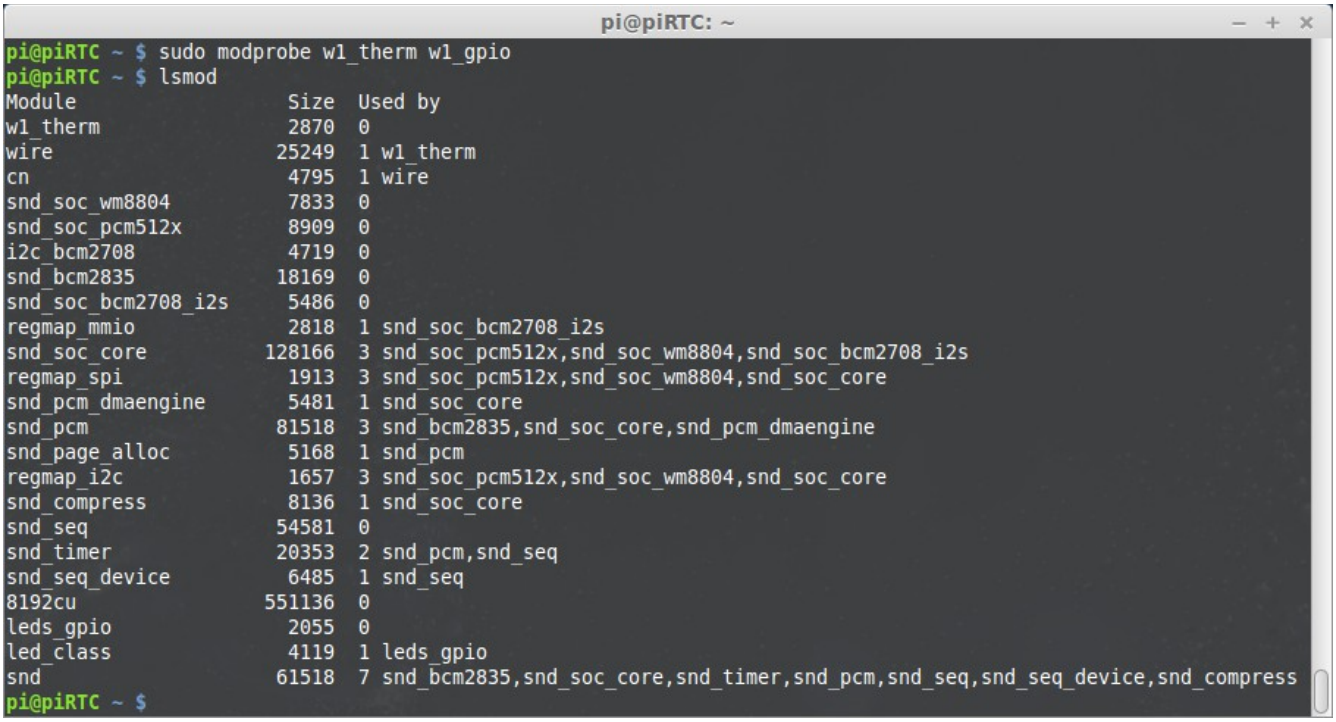
```
pi@piRTC: ~
pi@piRTC ~ $ lsmod
Module                  Size  Used by
snd_soc_wm8804          7833  0
snd_soc_pcm512x         8909  0
i2c_bcm2708             4719  0
snd_bcm2835            18169  0
snd_soc_bcm2708_i2s     5486  0
regmap_mmio             2818  1 snd_soc_bcm2708_i2s
snd_soc_core          128166  3 snd_soc_pcm512x,snd_soc_wm8804,snd_soc_bcm2708_i2s
regmap_spi              1913  3 snd_soc_pcm512x,snd_soc_wm8804,snd_soc_core
snd_pcm_dmaengine       5481  1 snd_soc_core
snd_pcm                81518  3 snd_bcm2835,snd_soc_core,snd_pcm_dmaengine
snd_page_alloc          5168  1 snd_pcm
regmap_i2c              1657  3 snd_soc_pcm512x,snd_soc_wm8804,snd_soc_core
snd_compress            8136  1 snd_soc_core
snd_seq                54581  0
snd_timer              20353  2 snd_pcm,snd_seq
snd_seq_device          6485  1 snd_seq
8192cu                551136  0
leds_gpio               2055  0
led_class               4119  1 leds_gpio
snd                    61518  7 snd_bcm2835,snd_soc_core,snd_timer,snd_pcm,snd_seq,snd_seq_device,snd_compress
pi@piRTC ~ $
```

These are not installed by default, so we need to install the following modules

w1_therm
w1_gpio

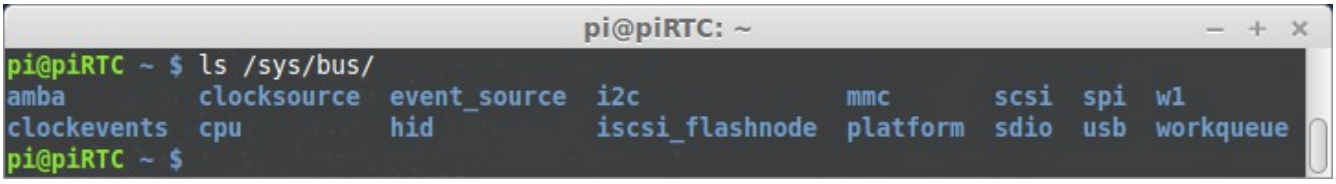
sudo modprobe w1_therm
sudo modprobe w1_gpio

lsmod



Now the one wire bus should be found in /sys/bus

ls /sys/bus



ls /sys/bus/w1

Add the following line to /boot/config.txt

dtoverlay=w1-gpio

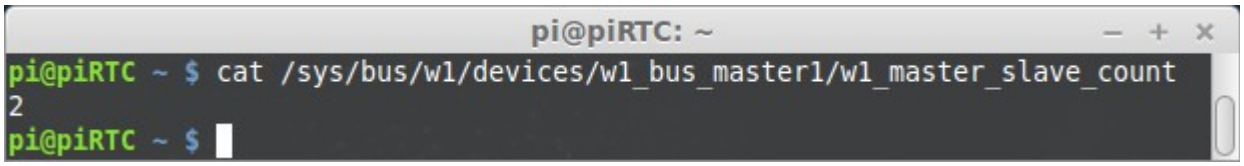
ls /sys/bus/w1/devices

We have 2 one wire devices attached to this bus. Each device will appear under s directory entry named with it's serial number. Here we have 10-0008003bbd2a and 10-000802d9ed15 . The 10- indicates these are DS1820 or DS18S20 one wire temperature devices. It would be 28- for DS18B20 devices.

Under the /sys/bus/w1/devices/w1_bus_master1 directory, there are a number of file entries to provide information.

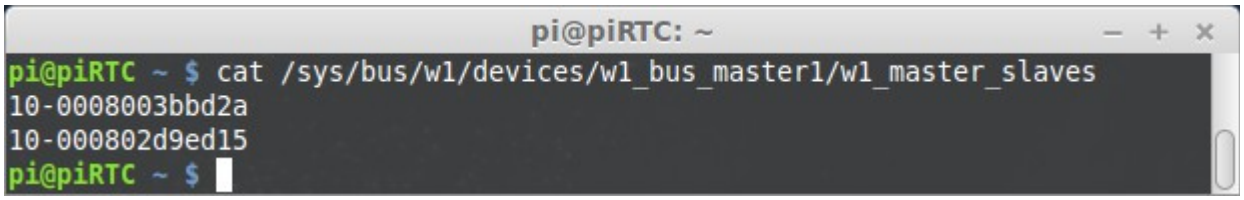
Looking at the contents of /sys/bus/w1/devices/w1_bus_master1/w1_master_slave_count

cat /sys/bus/w1/devices/w1_bus_master1/w1_master_slave_count



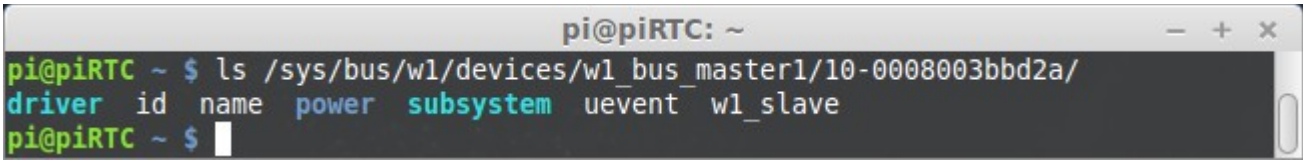
We see a response of 2 devices.

cat /sys/bus/w1/devices/w1_bus_master1/w1_master_slaves



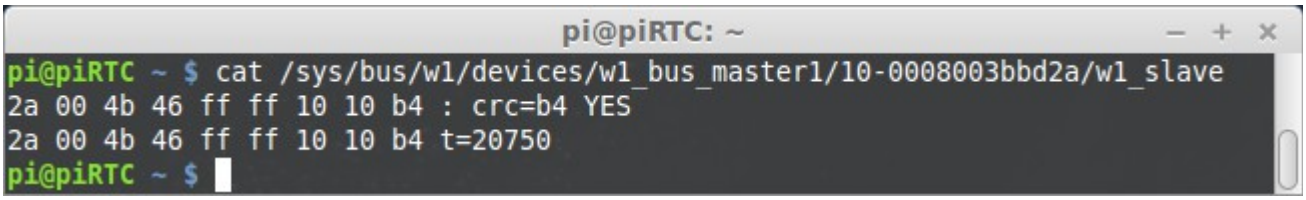
We display the contents of a file containing the serial numbers of the one wire devices found.

ls /sys/bus/w1/devices/w1_bus_master1/10-0008003bbd2a

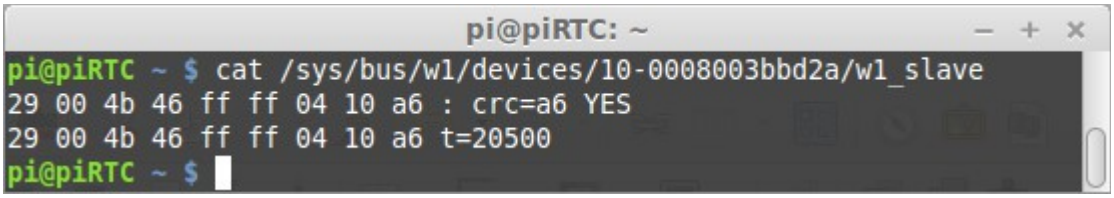


shows the files and directories and shortcut links available for this device.

cat /sys/bus/w1/devices/w1_bus_master1/10-0008003bbd2a/w1_slave

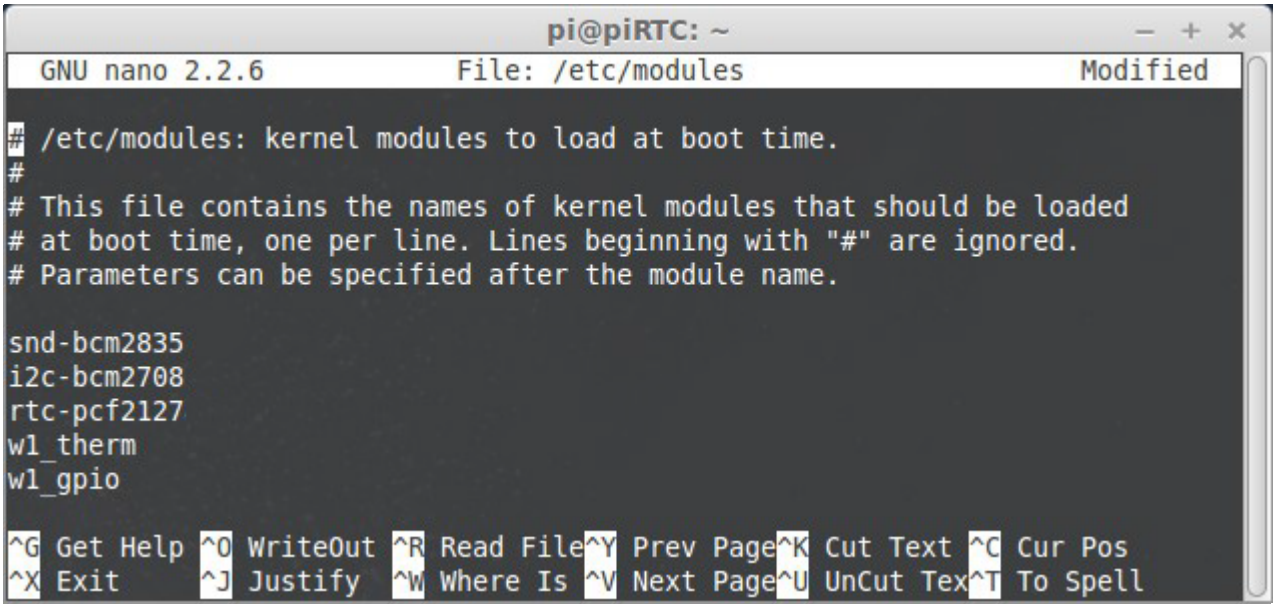


cat /sys/bus/w1/devices/10-0008003bbd2a/w1_slave

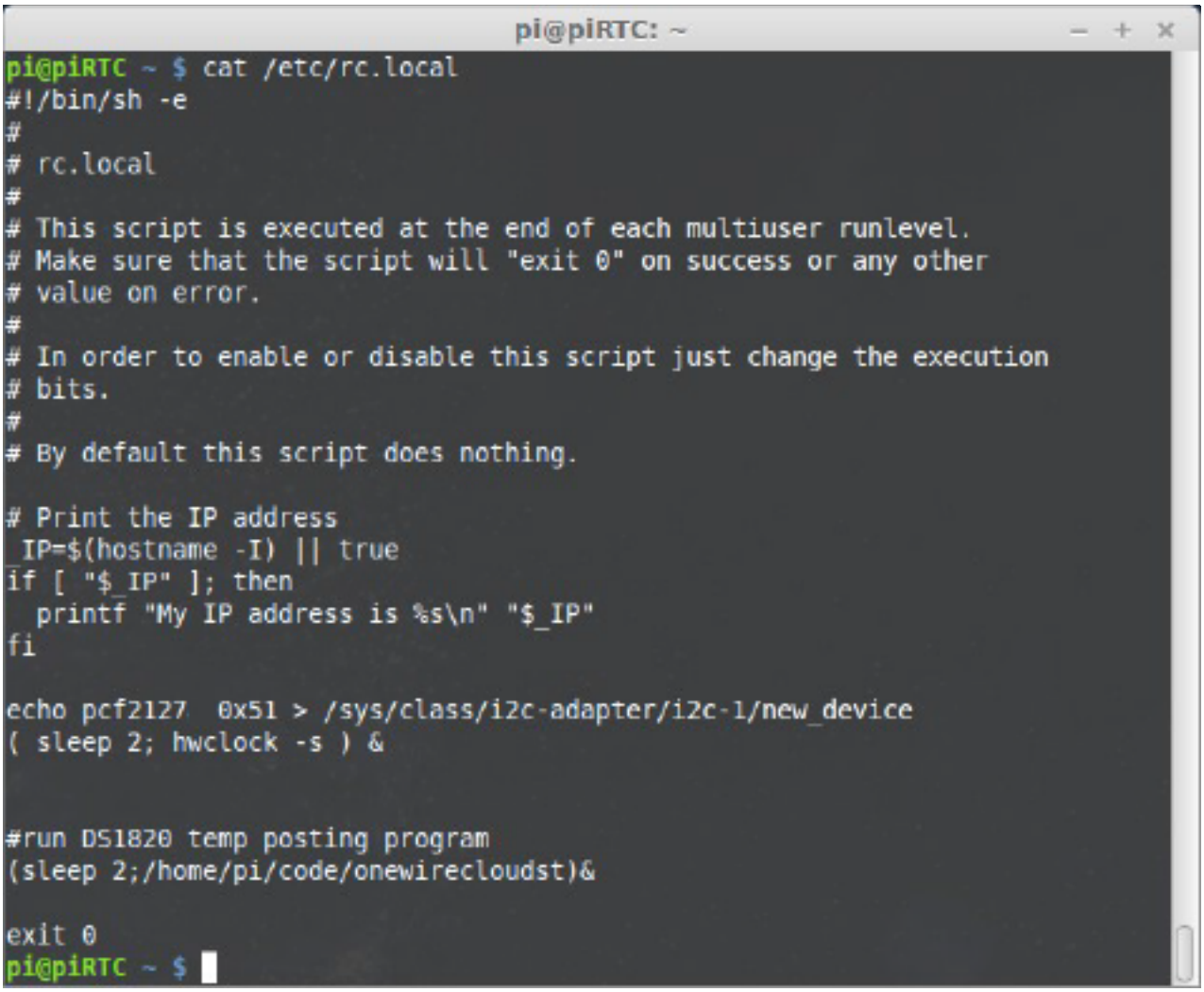


The devices show up under the w1_bus_master1 directory or the devices directory. Listing either locations w1_slave file contents will display the DS1820 eeprom contents.

To make the one wire drivers load at startup we need to add the modules to the bottom of the /etc/modules file



To make your program run at startup, edit the /etc/rc.local file.



We have added a comment line:

#run DS1820 temp posting program

The line below runs as a background task. It sleeps 2 seconds and runs the onewirecloudst app.

(sleep 2;/home/pi/code/onewirecloudst) &

Make sure the lines are entered above the exit 0 call.

To run a program at specific times, we can utilize the cron daemon.

crontab -e will allow you to edit our cron jobs.

From http://www.thegeekstuff.com/2009/06/15-practical-crontab-examples/

Linux Crontab Format

```
MIN HOUR DOM MON DOW CMD
```

Table: Crontab Fields and Allowed Ranges (Linux Crontab Syntax)

Field	Description	Allowed Value
MIN	Minute field	0 to 59
HOUR	Hour field	0 to 23
DOM	Day of Month	1-31
MON	Month field	1-12
DOW	Day Of Week	0-6
CMD	Command	Any command to be executed.

1. Scheduling a Job For a Specific Time

The basic usage of cron is to execute a job in a specific time as shown below. This will execute the Full backup shell script (full-backup) on **10th June 08:30 AM**.

Please note that the time field uses 24 hours format. So, for 8 AM use 8, and for 8 PM use 20.

```
30 08 10 06 * /home/ramesh/full-backup
```

- **30** – 30th Minute
- **08** – 08 AM
- **10** – 10th Day
- **06** – 6th Month (June)
- ***** – Every day of the week

2. Schedule a Job For More Than One Instance (e.g. Twice a Day)

The following script take a incremental backup twice a day every day.

This example executes the specified incremental backup shell script (incremental-backup) at 11:00 and 16:00 on every day. The comma separated value in a field specifies that the command needs to be executed in all the mentioned time.

```
00 11,16 * * * /home/ramesh/bin/incremental-backup
```

- **00** – 0th Minute (Top of the hour)
- **11,16** – 11 AM and 4 PM
- ***** – Every day
- ***** – Every month
- ***** – Every day of the week

3. Schedule a Job for Specific Range of Time (e.g. Only on Weekdays)

If you wanted a job to be scheduled for every hour with in a specific range of time then use the following.

Cron Job everyday during working hours
This example checks the status of the database everyday (including weekends) during the working hours 9 a.m – 6 p.m

```
00 09-18 * * * /home/ramesh/bin/check-db-status
```

- **00** – 0th Minute (Top of the hour)
- **09-18** – 9 am, 10 am,11 am, 12 am, 1 pm, 2 pm, 3 pm, 4 pm, 5 pm, 6 pm
- ***** – Every day
- ***** – Every month
- ***** – Every day of the week

Cron Job every weekday during working hours
This example checks the status of the database every weekday (i.e excluding Sat and Sun) during the working hours 9 a.m – 6 p.m.

```
00 09-18 * * 1-5 /home/ramesh/bin/check-db-status
```

- **00** – 0th Minute (Top of the hour)
- **09-18** – 9 am, 10 am,11 am, 12 am, 1 pm, 2 pm, 3 pm, 4 pm, 5 pm, 6 pm
- ***** – Every day
- ***** – Every month
- **1-5** -Mon, Tue, Wed, Thu and Fri (Every Weekday)