ZoneMinder: RPI3 Install Walkthrough

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Contents

1 Overview

The **Raspberry Pi 3** is a common general purpose ARM computer that can be used to record cameras in ZM.[1] While the resources are limited, the common availability of these RPIs, low-cost, and their **low power use**, makes them a attractive for ZM. Is it worth going to the effort of setting up ZM for these? Let's find out.

2 RPI3 with 1.32.2 and Debian Stretch (9)

This is currently only available in experimental repos as 2018 / Early 2019. It is not recommended for most people to use this - only more advanced

[1] SBCs can also be used as cameras, or as ZM Clients. These latter two options may be more advisable https://wiki.zoneminder.com/Single_Board_Computers

admins, who are willing to have a server (usually update) fail on them should use this. I added a 1.32+ RPI to my existing server, and do not update it.[2]

There is some discussion that you can't add the debian repos to the RPI... [3] I had no trouble doing this, and it appears to be possible on the RPI. If they both support armhf, it shouldn't be a problem, but ARM is complicated [4] and its support is not as good as it could be.

2.1 Steps

Download the latest RPI Stretch Lite release, install to SD card. Login to Pi, change password, enable ssh (if desired).

```
apt-get update

apt-get dist-upgrade

apt-get install dirmngr

    add debian sid repos to /etc/apt/sources.list

deb http://deb.debian.org/debian sid main


    add debian keyring to remove warnings
apt-get install debian-archive-keyring

apt-get update

    install 1.32+ from experimentals
apt-get install -t experimental zoneminder
```

follow the rest of the steps in Bbhunges guide, except for the timezone for php which was in 7.3 not 7.0.[5]

[2] At least until ZM 1.32+ is in the stable debian repos.

[3] https://raspberrypi.stackexchange.com/questions/28064/install-or-build-experimental-debian-package-for-rpi-networkmanager-1-0 I think why they originally wrote this, it was for an earlier RPI

[4] (armel, armhf, arm64... Let's not even mention cellphones which are a disaster for hobbyists to install Linux on. A real step backwards from i386 compatibility),

[5] https://wiki.zoneminder.com/Debian

[6]

2.2 RPI3 1.32.2 Performance

I'm going to test one Axis camera at various resolutions and frame rates, and report on the system load. Essentially, I will max out a given FPS for a resolution. This might be a benchmark upon which to size other RPIs against. In this table we are using FFMPEG.

Here are some example Modes, Resolutions, FPS[7], and CPU Loads

Testing of Raspbian Stretch Lite with Debian Sid Repos (December 2018) and Zoneminder 1.32.2 from Experimental.

Mode	Source	PathType	Resolution	FPS	Load	RAM
Record	FFMPEG	MJPEG	800x600	8	6.1	295M/927M
Record	FFMPEG	MJPEG	800x600	14(20 limit on camera)	7.5+	311M/927M

This is all single camera recording. The results may differ with multiple cameras. I will now try Modect.

Mode	Source	PathType	Resolution	FPS	Load	RAM
Modect	FFMPEG	MJPEG	800x600	14(20 limit on camera)	3.5	192M/927M

Something strange has occured here. First off, I'm using only two cores. There is one zma and one zmc process. Before, with record, there were multiple zma processes, and only one zmc process. The good news is, performance is better with Modect. The bad news is: this is not working as expected. Let's turn it back to record. And as expected, record functions much worse. Seems like a bug.[8]

Here are some screenshots (from the pics directory) that demonstrate this:

[6] https://wiki.debian.org/RaspberryPi3 has a preview image that can be used, and should support the Debian repos out of the box. The Raspbian image (as we saw) needed to have the debian repos added, but worked afterwards, without complaint.

[7] FPS is set at the camera. The actual FPS recorded tends to be a bit lower, when FPS is greater than 5 for 1280x720

[8] And it was a bug as I learned later, after posting on the forums.

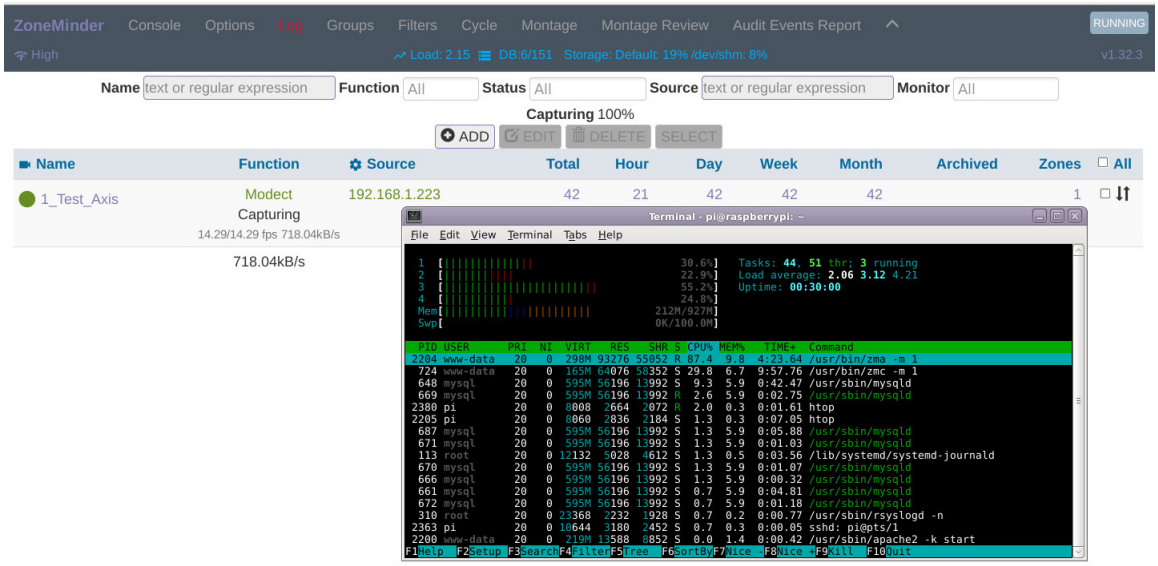

Figure 1: Modect uses little CPU

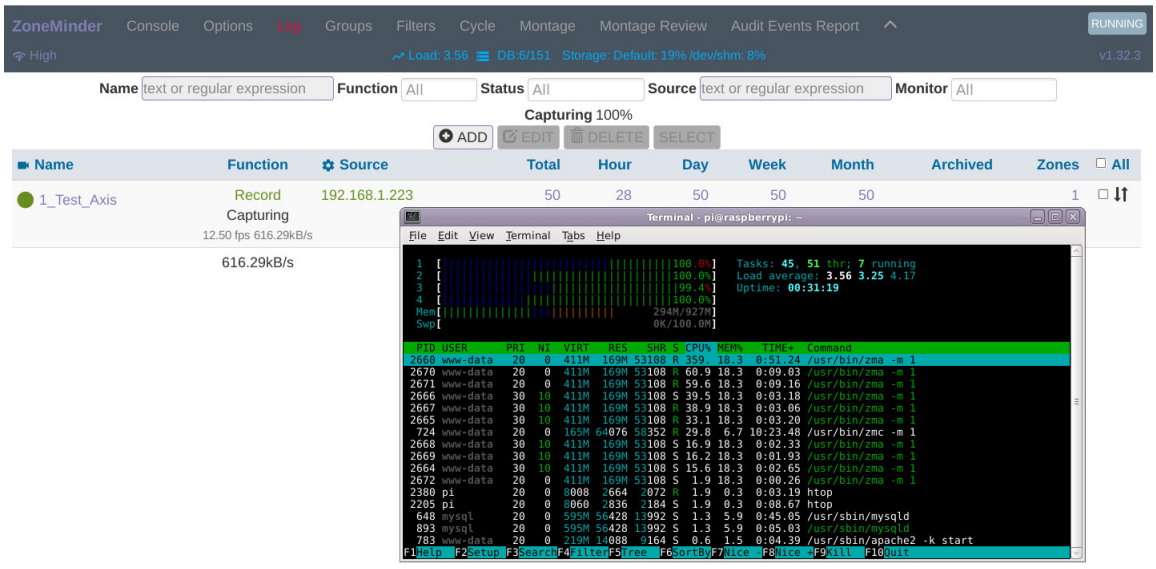

Figure 2: Record seems to have too many zma active

2.2.1 Modect vs Record Issues with ZMA

Looking at the logs, there is a warning in Record mode, to slow down analysis, slow down FPS, or increase buffer size. I tried changing buffer size from 20 to 60, and setting Analysis FPS at 4... Neither of these fixes resolved the multiple ZMA issue. The Analysis FPS is not expected to resolve this, as Modect has no such issue with Analyzing 11FPS of 800x600.

2.2.2 The bug - Video Writer

After posting on the forums, I discovered that the issue was that by default on 1.32.2, the video writer was set to enabled. However, the video writer doesn't work on ARM, so it's non-active. So this was a bug. It was necessary to manually set the video writer to disabled to get rid of these errors. Note that there was no error with Modect, only with Mocord, Record.

3 RPI3 with 1.30.4 and Debian Stretch (9)

After the bench marking with 1.32.2, I've decided to hold off, and simply use 1.30.4 for the rest of this document. Testing 1.32+ will have to come at a later time. So let's see what the 1.30.4 can do.
WARNING!!!!!: The following steps will first be for 1.30. Then I will show how to add the debian ARM repos for 1.30.4. Note that Raspbian's repos only have 1.30. NOT 1.30.4. If you want the most stable 1.30.4, it is recommended to add Debian's repos.

3.1 Install Process for 1.30

Using Raspbian 9 Lite image, copy that to SD card. Logon to the pi, and

enable ssh, set a new password for pi.

passwd

sudo /etc/init.d/ssh start

Now you can remotely log onto it via ssh.

```
Update packages list:
```

```
apt update
apt upgrade
apt dist-upgrade

    Install Zoneminder
apt install zoneminder vlc-plugin-base php7.0-gd
    Install Mysql, set passwords
mysql_secure_installation


    Create Zoneminder database in MySQL (Note: this also creates the default Zonemind
mysql -uroot -p < /usr/share/zoneminder/db/zm_create.sql
mysql -uroot -p -e "grant all on zm.* to 'zmuser'@localhost identified by 'zmpass';"
mysqladmin -uroot -p reload

    Set permissions of /etc/zm/zm.conf to root:www-data 740
chmod 740 /etc/zm/zm.conf
chown root:www-data /etc/zm/zm.conf
    Enable Zoneminder service to start at boot
systemctl enable zoneminder.service
    Add www-data to the sudo group (to enable use of local video devices)
adduser www-data video
    Start Zoneminder
systemctl start zoneminder.service
(can also type /etc/init.d/zoneminder start)
    Check to see that Zoneminder is running
systemctl status zoneminder.service
    Enable CGI and Zoneminder configuration in Apache.
a2enmod cgi
a2enmod rewrite
a2enconf zoneminder
    Add timezone to PHP
sed -i "s/;date.timezone =/date.timezone = $(sed 's/\//\\\//' /etc/timezone)/g" /etc/
    Change permissions in /usr/share/zoneminder/
chown -R www-data:www-data /usr/share/zoneminder/

Restart Apache
service apache2 restart
```

Note that these steps are copied from Bbunge's excellent walkthroughs

on https://wiki.zoneminder.com/Debian. I have copied the steps for 1.32, mostly. I tested this first on 1.30 on the Raspbian Repos for ZM, and it worked no problem.

3.2 Installing or Upgrading to 1.30.4

After following the above steps, you can follow these steps below to install ZM from the debian stretch-backports repos. Those adventurous, could probably merge this below step into the above.

```
    All of these steps are as root.

    Add the debian repos to /etc/apt/sources.list:
deb http://ftp.debian.org/debian stretch-backports main contrib
    Note that I am adding only the backports repo. I will leave the remaining Raspbia
apt-get update
apt-get install debian-archive-keyring
    Accept the prompt and install it without authentication
apt-get update
    update should now complete without warning. Now we will install Zoneminder from B
apt-get install -t stretch-backports zoneminder

    And because we upgraded manually, we must upgrade the DB...
service zoneminder stop
    Note that ZM should be stopped.
zmupdate.pl
/etc/init.d/zoneminder start
```

And that is it for installing Zoneminder 1.30.4.

3.3 Benchmarking ZM 1.30.4

Now, let's do some testing of what this machine can do.

```
Settings:
32 bit colour depth
FFMPEG (Remote could be used, but it may be phased out in the future, so let's
use FFMPEG)
Modect/Mocord uses the default Zone.
10 FPS seems to be the limit for what ZM can do with this camera. I have not limited
the FPS. It is streaming at 30FPS or so.
```

Mode	Source	PathType	Resolution	FPS	Load	RAM	Note
Monitor	FFMPEG	MJPEG	800x600	10	0.4	266M	Stable
Modect	FFMPEG	MJPEG	800x600	10	1	282M	Stable
Record	FFMPEG	MJPEG	800x600	10	3	278M	Unstable - Crashes
Mocord	FFMPEG	MJPEG	800x600	10	3	280M	Unstable - Crashes
Nodect	FFMPEG	MJPEG	800x600	10	0.4	280M	Stable

This is with an SD card. In order to get better performance, you would want to use an SSD connected via USB as the main filesystem.[9] As you can see, the best performance is with Nodect, which remains king. Modect is also good. It looks like the immediate bottleneck, on a default Pi install is the actual writing of the video files.[10]

Let's try again with a lower FPS. I know record is the bottleneck, so let's focus on Record and Mocord.

Mode	Source	PathType	Resolution	FPS	Load	RAM	Note
Record	FFMPEG	MJPEG	800x600	4	2	280M	Stable
Mocord	FFMPEG	MJPEG	800x600	4	2	280M	ZMA crashes

4 Conclusion

The RPI can be used as a Zoneminder server, but not above a limited level. If you have external alarms or record only, it makes the Pi a bit more practical, though it should be only for a low number of low resolution cameras. Bear in mind, this testing was 1 800x600 camera. The RPI should probably only be used for streams of 320x240, or similar low resolutions. In any case, the RPI is not recommended for Zoneminder, but it can be used, if you understand its limitations, and are willing to work within them.

[9] This was recommended to me in a forum post originally which is here: https://forums.zoneminder.com/viewtopic.php?f=38&t=27873

[10] Based on earlier testing with 1.32.2, I expect Remote to be comparable to FFMPEG perfomance wise.