

FreeBSD on the Raspberry Pi ? Pt 1: Quick and Dirty Intro (also for Linux-Users)

Tonight I went along to fire up FreeBSD on a Raspberry Pi.

Although I'm in for Linux on a day-to-day basis, my heart truly belongs to the BSDish world.

So why not run FreeBSD on the Pi? Especially since I have an idea in mind to build a very specialized and compact access point for one of my ongoing projects.

A good starting point for this is at <https://wiki.freebsd.org/FreeBSD/arm>.

Getting FreeBSD

After some quick reading I found that FreeBSD on the Pi has matured a lot since I looked at it last time, so the install is considered to be more straightforward as it used to be. And yet even better, snapshots are on par with latest 10.2 release :-)

FreeBSD on arm is not considered a tier 1 platform, btw. So this means, that it's supported on a best-effort basis as opposed to tier 1 platforms like x86.

So to get the current snapshots, head over to <ftp://ftp.freebsd.org/pub/FreeBSD/snapshots/arm/armv6/ISO-IMAGES/10.2/>.

Get the image and extract it.

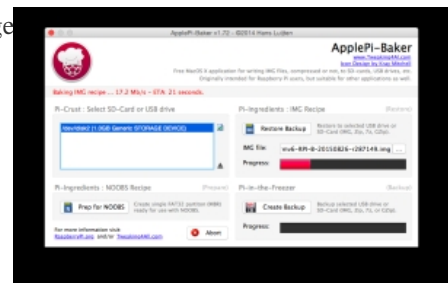
```
wget
```

```
ftp://ftp.freebsd.org/pub/FreeBSD/snapshots/arm/armv6/ISO-IMAGES/10.2/FreeBSD-10.2-STABLE-arm-armv6-RPI-B-20150826-r287149.img.xz
```

```
unxz FreeBSD-10.2-STABLE-arm-armv6-RPI-B-20150826-r287149.img.xz
```

Then write the image to your SD card. Depending on what you need, a 4 GiB card will do. I used a 1 GiB card for mine, which is plenty enough.

Since I prepared the SD card on my mac, I used [ApplePi Baker](#) to transfer the image



Once this has finished, slide your SD card into your Raspi, hook it up and watch it boot.



```
(usb0: 1 port with 1 removable, self powered)
random: adding device.
Host mount waiting for: usb0#
usb0:2: Vendor 0x0403 product 0x0001, class 0x08, rev 2.00/2.00, addr 2 on usb0#
usb0: 1000 enabled
Host mount waiting for: usb0#
usb0:1: 3 ports with 2 removable, self powered
usb0:3: Vendor 0x0403 product 0x0001, class 0x08, rev 2.00/2.00, addr 3 on usb0#
usb0: chip 0x0403, rev. 0002
usb0:0: still busy on usb0#
usb0:0: class: 0x02 0x00 0x00 media interface: PHY 1 on usb0#
Host mount waiting for: usb0#
usb0:0: name: 0x000007, 0x000007-FIX, 0x000007-FIX, auto
usb: class (Ethernet) on usb0#
usb: Ethernet address: 98:27:eb:f7:44:24
usb0:4: (eth0) at usb0#
usb0:0: DELL DELL USB Keyboard, class 0x03, rev 1.10/1.05, addr 0 on usb0#
Host at usb0#
Trying to mount root from ufs:/dev/ufs/rootfs true...
warning: on-line-of-800 clock registered, option line will not be set accurately
USB_FIR2: msc0#02 was automatically resized.
Use 'gpart commit msc0#02' to save changes or 'gpart undo msc0#02' to revert them.
usb0: chip 0x0403, rev. 0002
usb: link state changed to 0000
FreeBSD/om (rpi-b) (ttyd)
login: |
```

Log on to FreeBSD

The first boot may take a little longer than usual as the FreeBSD slice is automatically resized to fill up the remaining space of the SD card.

If you're used to FreeBSD's init, you may notice that you won't see any messages on screen besides some initial kernel stats. Don't panic. That's because the boot console is configured to use the serial port, so in order to see this, you will need to hook up a serial TTL cable to the Pi's designated serial pins on the GPIO header.

To login as **root**, in you must use **root** for both username and password. It's best to quickly change it to something more secure:

`passwd root`

The FreeBSD dev's have already enabled SSH for us by default, additionally the NIC is configured to use DHCP.

So you can actually log in via SSH, but not using the **root** account.

As opposed to Linux distros for the Pi, where a default account called **pi** exist, FreeBSD comes with a yet another default account by the name of **freebsd**. Use this as both username and password to login as an unprivileged user.

You should change this password as well:

`passwd freebsd`

Let me point out, FreeBSD doesn't come with a lot of tools. Especially when you come from a Linux-world, familiar tools like **sudo** do not exist on the base install. Those will need to be installed separately.

So in order for you to be able to do that, you need to use the **su** command in the first place while logged in as user **freebsd**.

Elevate to a privileged session like this, and provide the **root** password.

`su -`

Configuration stuff

The main system configuration is found at `/etc/rc.conf`, which means, hostnames, interface configs, services, basically everything is defined in there. Forget about runlevels, FreeBSD doesn't need it. We're talking about simple init here.

You may want to change your keyboard map?

Add a new statement like this to `rc.conf`:

```
keymap="ch.acc"
```

You'll find some keymaps at `/usr/share/vt/keymaps`. To activate simply run:

```
service syscons restart
```

You may want to check out `/etc/defaults/rc.conf` on configurable keys which are available. Each newly installed software may add it's own keys.

You may also consider to enable automatic file system repairs. Of course, FreeBSD always runs `fsck` and minor corruption will be repaired automatically. This is called **preen mode**. But if there is more severe corruption, the check bails out with an error, leaving it to the admin to decide what to do. So you will need to confirm everything on your own.

This may be good in some cases, but breaks unattended mode. Especially in this scenario I would like FreeBSD to recover as much as possible. Yes, this comes at the price, files will be salvaged, misallocated blocks will be cleared, etc. But hey, it's supposed to be running unattended. Beware the risk of data loss though!

You may also want to put `/tmp` onto a ram disk in order to reduce I/O writes for temporary scratch files a little.

All this goes to `/etc/rc.conf` as well:

```
fsck_y_enable="YES" # force auto-repair if 'fsck -p' fails
tmpmfs="YES" # put /tmp on a ram disk
tmpsize="20m" # 20 MiB is default anyway, use whatever suits your need.
```

If you put `/tmp` on a ram disk (MFS means actually memory file system), you may want to redirect `/var/tmp` to `/tmp` as well. This is not strictly needed, but if you don't want to take extra care for cleaning up temp directories via cron or alike, this will help you. Also it may reduce intense writes to the SD card if you're doing lot's of scratch files stuff.

```
root@rpi-b:~ # rm -rf /var/tmp
root@rpi-b:~ # ln -s /tmp /var/tmp
```

About software

Ok, so how to get software onto the Pi? Currently there's no packages around, at least none that are officially built. So you will either use the FreeBSD ports and compile the ports by yourself, your roam the web for someone else to provide packages.

There exists an experimental repository at <http://pkg.uzsolt.hu/> for FreeBSD 10.

So to include it, open up `/etc/pkg/FreeBSD.conf` in `vi`.

First disable the existing **FreeBSD** section by setting **enabled: no**. Save the file and exit.

Then add a new file at `/etc/pkg/uzsolt.conf` with this content:

```
uzsolt-rpi: {  
url: "http://pkg.uzsolt.hu/rpi",  
mirror_type: NONE,  
signature_type: none,  
enabled: yes  
}
```

Now run the pkg bootstrap like this:

```
root@rpi-b:~ # pkg  
The package management tool is not yet installed on your system.  
Do you want to fetch and install it now? [y/N]: y
```

Then run **pkg update** to update the repository.
Currently there's only some 300 packages available, to see what's around, do it like so:

```
pkg search -g '*'
```

Then to install, do **pkg install <pkgname>**.

Ok, if you need something else, go for the ports (see also <https://www.freebsd.org/doc/handbook/ports-using.html>).

Quick and directy:

```
portsnap fetch extract
```

But we warned, you'll need enough disk space for this. And also, compiling needs even more space, and yet processing power. It'll take a long time, which is why I want to have a look at building FreeBSD packages for the Pi via cross-compiling using *poudriere* in my upcoming blog post.

And please keep in mind to not (as in never, really) mix ports and packages. Use either one or the other. Mixing it will break the system sooner or later due to conflicts. So once you start with one, stick with it.

About device names

Alright, if you're looking for the FAT partition that contains the boot loader, config.txt et all, head out to **/boot/msdos**.

When you look at the output of **mount** you'll find it familiar that FreeBSD uses labels as well instead of device names. But don't let it fool you, when it comes to device names, FreeBSD is completely different story.

Some quick primers:

NICs are not called **eth**. but use the name of the device driver, i.e. **em** for Intel-based NICs, **bcm** for Broadcam, and **ue**. for your Raspi onboard NIC in this particular case.

Device names for disks on Linux refer typical to **hd**. and **sd** for P-ATA and SCSI/SAS/SATA devices. Not so on FreeBSD. There it's **ad**. for P-ATA/S-ATA drivers, **sd**. for SCSI/SAS/et all, sometimes you'll even find things like **wd**. and other obscure names, like

mmcsd0 in our case referring to the SD card.

More on FreeBSD

You'll find more on FreeBSD on <https://www.freebsd.org/doc/handbook/>.

Rest assured that FreeBSD may look archaic and not so comfortable as the typical Linux distro. But it has its benefits, because it doesn't bloat your hard drive. Leaving you with a default install of roughly 100 MiB, FreeBSD gives you a pure and plain but yet solid and powerful operating system.

I'm going to build an access point out of my Pi. So stay tuned for my yet another upcoming howto.

Be sure to also read on [part 2 of the series](#), how to cross-compile packages for the Raspi.