

# PTXdists Application Note

## Using udev

Udev creates and removes device nodes in `/dev`, based on events the kernel sends out on device discovery or removal.

This application note should help to configure udev to achieve embedded targets requirements.

Note: This application note is valid for the current ptxdist-1.0.x stable release.



# Configuring udev

## 1 Preparation

In order to make udev work in our system, we must enable the following features in other parts of the system than the udev package itself:

### 1.1 Kernel

1. at least the Linux kernel 2.6.15 is required.
2. this kernel must have *sysfs*, *unix domain sockets* and networking enabled.
3. at runtime the *sysfs* and *procfs* must be mounted to predefined paths prior to starting udev.

To ensure the first precondition we run the menuconfig:

```
~/prj# ptxdist menuconfig
```

Navigate to **Core (Kernel, libc, locales) – linux kernel** and check the **linux kernel Version** entry if a recent kernel is defined to use in this BSP.

To ensure the second precondition we run the kernel config in the next step:

```
~/prj# ptxdist kernelconfig
```

Navigate to menu **File systems – Pseudo filesystems** and ensure that the entries **/proc file system support** and **sysfs file system support** are enabled.

Navigate back to the kernel's main menu and now into **Networking**, ensure **Networking support** is enabled and now walk into the **Networking options** menu entry. Ensure here that the **Unix domain sockets** menu entry is selected.

To ensure the third precondition we must check the target's */etc/fstab*, if it contains the correct mount points and options – and if they are really used.

### 1.2 PTXdist

PTXdist supports a generic solution for the target's */etc/fstab* and how to use it, and it also supports a user specific (to be more precise: A BSP specific solution) to provide the target with these files and commands. PTXdist's generic solution is known to work. So we discuss here the user specific variant only, as many deeply embedded systems must meet very specific requirements.

Let us start with a project specific */etc/fstab* file. We can start with the generic one that comes with PTXdist. If not already done, create the folder *projectroot/etc* in the BSP first.

```
~/prj# mkdir --parents projectroot/etc
```

Copy the generic *fstab* from the PTXdist installation folder to *projectroot/etc*:

```
~/prj# cp <where/ever/you/install/ptxdist>/generic/etc/fstab projectroot/etc
```

There is a second generic script file that is responsible to auto mount devices listed in the *etc/fstab* at system startup. It comes with PTXdist and it's located in *generic/etc/init.d/rcs*.

Once again we create a project local folder for this user specific file:

```
~/prj# mkdir --parents projectroot/etc/init.d
```

And copy the script to our local project:

```
~/prj# cp <where/ever/you/install/ptxdist>/generic/etc/init.d/rcS
      projectroot/etc/init.d
```

Modifying these files are the next steps. As we don't know your specific requirements we can't give any recommendations here on what to change.



At least one thing with the `/etc/fstab` is tricky: If we want to mount a special device into our root filesystem, this will fail at this early phase of system startup. There are no device nodes yet! Only pseudo filesystems can be mounted at this time.

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In the last step we configure PTXdist to use these project local files instead of the default ones.

```
~/prj# ptxdist menuconfig
```

We navigate to **Root Filesystem – start scripts (/etc/init.d)** activate the **rcS** menu entry, walk into this entry and select **Kind of rcS script (User defined)** instead of the default **(Use generic)**.

Now we navigate back to menu **Root Filesystem**, walk into **config files**, select **/etc/fstab**, walk into this menu and select here **Kind of /etc/fstab (User defined)** instead of the **(Use generic)**.

With these changes PTXdist will now use our local files for the next build.

## 2 Udev

Udev can do many things. Many things beside its basic feature of device node creation. Everything is controlled by internal rules udev comes with. All these built-in rules can be overwritten by external rules.

### 2.1 User defined Config Files

PTXdist comes with a (small) default udev configuration file. If we need a different one, we can provide it in the project locally.

To do so, we need a local folder first:

```
~/prj# mkdir --parents projectroot/etc/udev
```

And the file. It might be a good idea to start with the generic one.

```
~/prj# cp <where/ever/you/install/ptxdist>/generic/etc/udev/udev.conf
      projectroot/etc/udev
```

To make PTXdist use it instead of the default one, we run:

```
~/prj# ptxdist menuconfig
```

Navigate to **Shell & Console Tools – udev**, enable **Install udev.conf** and select **Kind of udev.conf (User defined)**.

## 2.2 User defined Rule Files

PTXdist comes with a few basic udev rules. We can provide any project specific udev rules by creating a local folder:

```
~/prj# mkdir --parents projectroot/etc/udev/rules.d
```

And providing all the rule files we need into this folder.

To configure PTXdist to use them instead of or in addition to the default ones we do:

```
~/prj# ptxdist menuconfig
```

We navigate to **Shell & Console Tools – udev**. We now can select or deselect the **Install default udev rules** and **Install user defined rules** menu entries in a way we want or need.

## 3 Udev Debugging

Why does udev do something wrong or in another way than we want it to do? Udev can spit out a large amount of debuginfo – on request. With this feature we can check if the rules we give to udev are working as expected.

Note: This is intended for development. It's hard to say if one should ship his/her production system with this feature enabled.

### 3.1 How to enable Udev Debugging

We run:

```
~/prj# ptxdist menuconfig
```

and navigate to **Shell & Console Tools – udev**. In this menu we enable **Enable debugging messages** and (might be a good idea) also **Enable syslog**. The latter one can be useful, as udev spits out a large amount of debugging messages, all to the console.

Note: The syslog feature is useless at system startup. This is because udev must run before the log daemon can start. So the first few (thousand) messages are routed to the console until the syslogger starts.

Note: If we've already built the udev package, we must rebuild it when we've changed this menu entries in order make it work:

```
~/prj# ptxdist clean udev
~/prj# ptxdist targetinstall udev
```

With these features enabled nothing special will happen at the target until we also modify the `/etc/udev/udev.conf`. If we provide our own local version of this file we can modify `projectroot/etc/udev/udev.conf` and rebuild the udev package, or (much simpler) modify the file at the target side.

The only thing that must be modified in this file to get the debugging messages is the line:

```
udev_log="err"

into

udev_log="debug"
```

To activate this new parameter, udev must be restarted (or better the whole target system).

## Additional questions?

Below is a list of locations where you can get help in case of trouble. For questions how to do something special with PTXdist or general questions about Linux in the embedded world, try these.

## Mailing Lists

### About PTXdist in particular

This is an English language public mailing list for questions about PTXdist. See

[http://www.pengutronix.de/maillinglists/index\\_en.html](http://www.pengutronix.de/maillinglists/index_en.html)

how to subscribe to this list. If you want to search through the mailing list archive, visit

<http://www.mail-archive.com/>

and search for the list *ptxdist*.

### About embedded Linux in general

This is a German language public mailing list for general questions about Linux in embedded environments. See

[http://www.pengutronix.de/maillinglists/index\\_de.html](http://www.pengutronix.de/maillinglists/index_de.html)

how to subscribe to this list. Note: You also can send mails in English.

## News Groups

### About Linux in embedded environments

This is an English newsgroup for general questions about Linux in embedded environments.

**comp.os.linux.embedded**

### About general Unix/Linux questions

This is a German newsgroup for general questions about Unix/Linux programming.

**de.comp.os.unix.programming**

## Chat/IRC

### About PTXdist in particular

**irc.freenode.net:6667**

Create a connection to the **irc.freenode.net:6667** server and enter the chatroom **#ptxdist**. This is an English room to answer questions about PTXdist. Best time to meet somebody there is at European daytime.

## Miscellaneous

### Online Linux Kernel Cross Reference

A powerful online cross reference.

<http://lxr.linux.no/blurb.html>

### U-Boot manual (partially)

Manual how to survive in an embedded environment and how to use the U-Boot on target's side

<http://www.denx.de/wiki/DULG>

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