

V4L2 File handlers

struct `v4l2_fh` provides a way to easily keep file handle specific data that is used by the V4L2 framework.

Attention!

New drivers must use struct `v4l2_fh` since it is also used to implement priority handling ([ref`VIDIOC_G_PRIORITY`](#)).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\linux-master\Documentation\driver-api\media\v4l2-fh.rst, line 10); [backlink](#)

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The users of `:ctype:`v4l2_fh`` (in the V4L2 framework, not the driver) know whether a driver uses `:ctype:`v4l2_fh`` as its `file->private_data` pointer by testing the `V4L2_FL_USES_V4L2_FH` bit in `:ctype:`video_device`->flags`. This bit is set whenever `:cfunc:`v4l2_fh_init`` is called.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\linux-master\Documentation\driver-api\media\v4l2-fh.rst, line 14); [backlink](#)

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System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\linux-master\Documentation\driver-api\media\v4l2-fh.rst, line 14); [backlink](#)

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System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\linux-master\Documentation\driver-api\media\v4l2-fh.rst, line 14); [backlink](#)

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System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\linux-master\Documentation\driver-api\media\v4l2-fh.rst, line 14); [backlink](#)

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struct `v4l2_fh` is allocated as a part of the driver's own file handle structure and `file->private_data` is set to it in the driver's `open()` function by the driver.

In many cases the struct `v4l2_fh` will be embedded in a larger structure. In that case you should call:

1. `:cfunc:`v4l2_fh_init`` and `:cfunc:`v4l2_fh_add`` in `open()`

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\linux-master\Documentation\driver-api\media\v4l2-fh.rst, line 26); [backlink](#)

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System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\linux-master\Documentation\driver-api\media\v4l2-fh.rst, line 26); [backlink](#)

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2. `:cfunc:`v4l2_fh_del`` and `:cfunc:`v4l2_fh_exit`` in `release()`

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\[linux-master][Documentation][driver-api][media]v4l2-fh.rst, line 27); [backlink](#)

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System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\[linux-master][Documentation][driver-api][media]v4l2-fh.rst, line 27); [backlink](#)

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Drivers can extract their own file handle structure by using the `container_of` macro.

Example:

```
struct my_fh {
    int blah;
    struct v4l2_fh fh;
};

...

int my_open(struct file *file)
{
    struct my_fh *my_fh;
    struct video_device *vfd;
    int ret;

    ...

    my_fh = kzalloc(sizeof(*my_fh), GFP_KERNEL);

    ...

    v4l2_fh_init(&my_fh->fh, vfd);

    ...

    file->private_data = &my_fh->fh;
    v4l2_fh_add(&my_fh->fh);
    return 0;
}

int my_release(struct file *file)
{
    struct v4l2_fh *fh = file->private_data;
    struct my_fh *my_fh = container_of(fh, struct my_fh, fh);

    ...
    v4l2_fh_del(&my_fh->fh);
    v4l2_fh_exit(&my_fh->fh);
    kfree(my_fh);
    return 0;
}
```

Below is a short description of the `:ctype:'v4l2_fh'` functions used:

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\[linux-master][Documentation][driver-api][media]v4l2-fh.rst, line 76); [backlink](#)

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`:c:func:'v4l2_fh_init <v4l2_fh_init>' (:c:type:'fh <v4l2_fh>', :c:type:'vdev <video_device>')`

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\[linux-master][Documentation][driver-api][media]v4l2-fh.rst, line 78); [backlink](#)

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System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-

master\Documentation\driver-api\media\[linux-master] [Documentation] [driver-api] [media]v4l2-fh.rst, line 78); [backlink](#)

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System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\[linux-master] [Documentation] [driver-api] [media]v4l2-fh.rst, line 78); [backlink](#)

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- Initialise the file handle. This **MUST** be performed in the driver's `:c:type:`v4l2_file_operations`->open()` handler.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\[linux-master] [Documentation] [driver-api] [media]v4l2-fh.rst, line 82); [backlink](#)

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`:c:func:`v4l2_fh_add`(<v4l2_fh_add>` (:c:type:`fh`<v4l2_fh>`)`

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\[linux-master] [Documentation] [driver-api] [media]v4l2-fh.rst, line 86); [backlink](#)

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System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\[linux-master] [Documentation] [driver-api] [media]v4l2-fh.rst, line 86); [backlink](#)

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- Add a `:c:type:`v4l2_fh`` to `:c:type:`video_device`` file handle list. Must be called once the file handle is completely initialized.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\[linux-master] [Documentation] [driver-api] [media]v4l2-fh.rst, line 89); [backlink](#)

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System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\[linux-master] [Documentation] [driver-api] [media]v4l2-fh.rst, line 89); [backlink](#)

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`:c:func:`v4l2_fh_del`(<v4l2_fh_del>` (:c:type:`fh`<v4l2_fh>`)`

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\[linux-master] [Documentation] [driver-api] [media]v4l2-fh.rst, line 92); [backlink](#)

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System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\[linux-master] [Documentation] [driver-api] [media]v4l2-fh.rst, line 92); [backlink](#)

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- Unassociate the file handle from `:c:type:`video_device``. The file handle exit function may now be called.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\[linux-master]

[Documentation] [driver-api] [media]v4l2-fh.rst, line 95); [backlink](#)

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`:c:func:'v4l2_fh_exit <v4l2_fh_exit>' (:c:type:'fh <v4l2_fh>')`

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\[linux-master] [Documentation] [driver-api] [media]v4l2-fh.rst, line 98); [backlink](#)

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System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\[linux-master] [Documentation] [driver-api] [media]v4l2-fh.rst, line 98); [backlink](#)

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- Uninitialise the file handle. After uninitialisation the `:c:type:'v4l2_fh'` memory can be freed.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\[linux-master] [Documentation] [driver-api] [media]v4l2-fh.rst, line 101); [backlink](#)

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If struct `v4l2_fh` is not embedded, then you can use these helper functions:

`:c:func:'v4l2_fh_open <v4l2_fh_open>' (struct file *filp)`

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\[linux-master] [Documentation] [driver-api] [media]v4l2-fh.rst, line 107); [backlink](#)

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- This allocates a struct `v4l2_fh`, initializes it and adds it to the struct `video_device` associated with the file struct.

`:c:func:'v4l2_fh_release <v4l2_fh_release>' (struct file *filp)`

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\[linux-master] [Documentation] [driver-api] [media]v4l2-fh.rst, line 113); [backlink](#)

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- This deletes it from the struct `video_device` associated with the file struct, uninitialised the `:c:type:'v4l2_fh'` and frees it.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\[linux-master] [Documentation] [driver-api] [media]v4l2-fh.rst, line 116); [backlink](#)

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These two functions can be plugged into the `v4l2_file_operation`'s `open()` and `release()` ops.

Several drivers need to do something when the first file handle is opened and when the last file handle closes. Two helper functions were added to check whether the `:c:type:'v4l2_fh'` struct is the only open filehandle of the associated device node:

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\[linux-master] [Documentation] [driver-api] [media]v4l2-fh.rst, line 122); [backlink](#)

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`:c:func:'v4l2_fh_is_singular <v4l2_fh_is_singular>' (:c:type:'fh <v4l2_fh>')`

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\[linux-master] [Documentation] [driver-api] [media]v4l2-fh.rst, line 127); [backlink](#)

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System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\[linux-master] [Documentation] [driver-api] [media]v4l2-fh.rst, line 127); [backlink](#)

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- Returns 1 if the file handle is the only open file handle, else 0.

`:c:func:`v4l2_fh_is_singular_file`(<v4l2_fh_is_singular_file>` (struct file *filp)`

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\[linux-master] [Documentation] [driver-api] [media]v4l2-fh.rst, line 132); [backlink](#)

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- Same, but it calls `v4l2_fh_is_singular` with `filp->private_data`.

V4L2 fh functions and data structures

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\driver-api\media\[linux-master] [Documentation] [driver-api] [media]v4l2-fh.rst, line 141)

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```
.. kernel-doc:: include/media/v4l2-fh.h
```