



# KIO FUSE

A summary of what is and what will be

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## The Status Quo

Consider a user that wishes to view documents, photos and videos located on a password-protected networked filesystem via the smb protocol. This user will use Dolphin to list the files present on the share.

To motivate the need for KIO FUSE, we'll consider the following three scenarios:

- Open a photo using Gwenview, which uses KIO.
- Open a video using VLC, which independently supports the smb protocol but not KIO.
- Open a document using LibreOffice Writer, which supports neither the smb protocol or KIO.

## What is KIO?

KIO provides network transparent access to files and data. Allows applications to understand all sorts of protocols. For example, mtp, smb, sftp and many more!

The API is simple to use, as can be seen below:

```
auto *job = KIO::get(url);
connect(job, &KIO::TransferJob::data, [=] {
    // Do something with the data.
});
connect(job, &KIO::TransferJob::result, [=] {
    // Relay result to user.
});
```

# Viewing Photos with Gwenview

Gwenview is an image viewer that supports opening images with KIO.

The scenario would play out as follows:

1. Using Dolphin, select an image to open with Gwenview
2. KIO determines if Gwenview understands KIO URLs.
3. Gwenview does understand and is passed the URL!

## Viewing Videos with VLC

VLC is a popular media player that doesn't support KIO, but understands the smb protocol.

The scenario would play out as follows:

1. Using Dolphin, select a video to open with VLC.
2. KIO determines if VLC understands KIO URLs.
3. VLC doesn't understand KIO but understands the smb protocol, so is passed the URL.
4. However, the password is stored either in kpasswdserver or in KWallet, which VLC does not have access to!
5. Hence the user has to provide the password to VLC as well! Cumbersome!

## Viewing Documents with LibreOffice Writer

LibreOffice Writer is a popular document viewer that doesn't support KIO or the smb protocol.

The scenario would play out as follows:

1. Using Dolphin, select a document to open with LO Writer.
2. KIO determines if LO Writer understands KIO URLs.
3. LO Writer doesn't understand KIO, nor the smb protocol.
4. Hence kioexec will be used to download the file on the local filesystem.
5. Once downloaded LO Writer will be passed the location of this file.
6. kioexec will monitor changes to the file and will upload them.

# What's the problem?

Why is kioexec not a satisfactory solution?

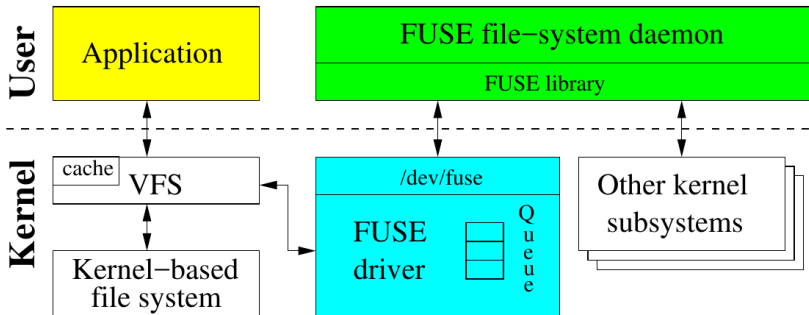
1. Have to wait for download to finish, not good for large files!
2. Asks for confirmation before re-uploading! (BUG: 398216)
3. Other more subtle bugs can occur with re-uploading! (BUG: 397742)

Switching from KWallet to Secret Service API solves VLC problem, but only if user is happy for credentials to be stored persistently.

Otherwise application would need to access secrets in kpasswdserver!

# What is FUSE?

FUSE is a user-space filesystem framework that allows implementing filesystems in user-space.





## What is KIO FUSE?

KIO FUSE is a user-space filesystem daemon that provides a FUSE interface to KIO, allowing KIO resources to be accessible to all applications. One can view KIO FUSE as simply a mapping between FUSE requests and KIO requests.

To communicate with the daemon, one can use DBus:

```
dbus-send --session --print-reply --type=method_call \  
--dest=org.kde.KIOFuse \  
    /org/kde/KIOFuse \  
    org.kde.KIOFuse.VFS.mountUrl \  
    string:ftp://user@server/directory
```

KIO is also changed to determine if KIO FUSE should be used, thus allowing seamless usage of KIO FUSE.

## The Solution in Action

Consider the same three scenarios as described earlier but now with the inclusion that KIO FUSE exists on the system.

In particular this means that the KIO FUSE daemon (kio-fuse) is installed correctly. In addition, it is required that the daemon is Dbus activated if it isn't running already.

It is also required that the KIO patch that makes use of KIO FUSE necessary is available. This patch uses the following logic to determine what URL is passed to the end application.

- If the applications understands KIO, pass the URL as-is.
- Else if the application understands the protocol and the URL does not contain a user, pass the URL as-is.
- Else pass the KIO FUSE equivalent URL.

# Viewing Photos with Gwenview Revisited

The scenario would play out as follows:

1. Using Dolphin, select an image to open with Gwenview
2. KIO determines if Gwenview understands KIO URLs.
3. Gwenview does understand and is passed the URL!

Note, this is exactly the same as before!

## Viewing Videos with VLC Revisited

The scenario would play out as follows:

1. Using Dolphin, select a video to open with VLC.
2. KIO determines if VLC understands KIO URLs.
3. VLC doesn't understand KIO but understands the smb protocol.
4. However, the URL contains a user (password-protected) and hence is passed the KIO FUSE URL.

Here, we have successfully avoided the password problem! Note that if the resource is not password-protected, then the KIO URL is passed as-is.

## Viewing Documents with LO Writer Revisited

The scenario would play out as follows:

1. Using Dolphin, select a document to open with LO Writer.
2. KIO determines if LO Writer understands KIO URLs.
3. LO Writer doesn't understand KIO, nor the smb protocol.
4. Hence a KIO FUSE URL will be passed.

This works seamlessly, as the KIO FUSE URL is on the local filesystem!

# Evaluation

So why is this any better?

- KIO FUSE is better for larger files, allows random-access and does not need to download the whole file.
- Helps to circumvent the password problem.
- Avoids other pitfalls of kioexec.
- Allows syncing terminal with folder view!

Are we done? No!

- Locations of mounts changes between sessions (or crashes!).
- Drag-and-Drop doesn't work!
- Currently slower (patch WIP)!

## Future Work

- XFSTESTS Integratin - Better testing of KIO FUSE and KIO protocols! GSoC 2021 - Bhumit Attarde.
- Porting to MacOS, Windows? Maybe others?