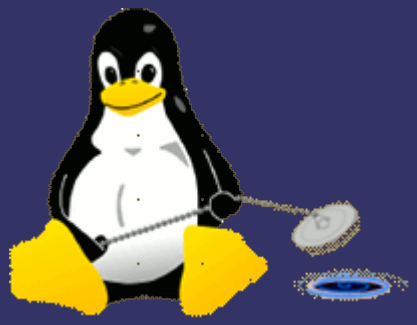

Command Line Tools for Photographers

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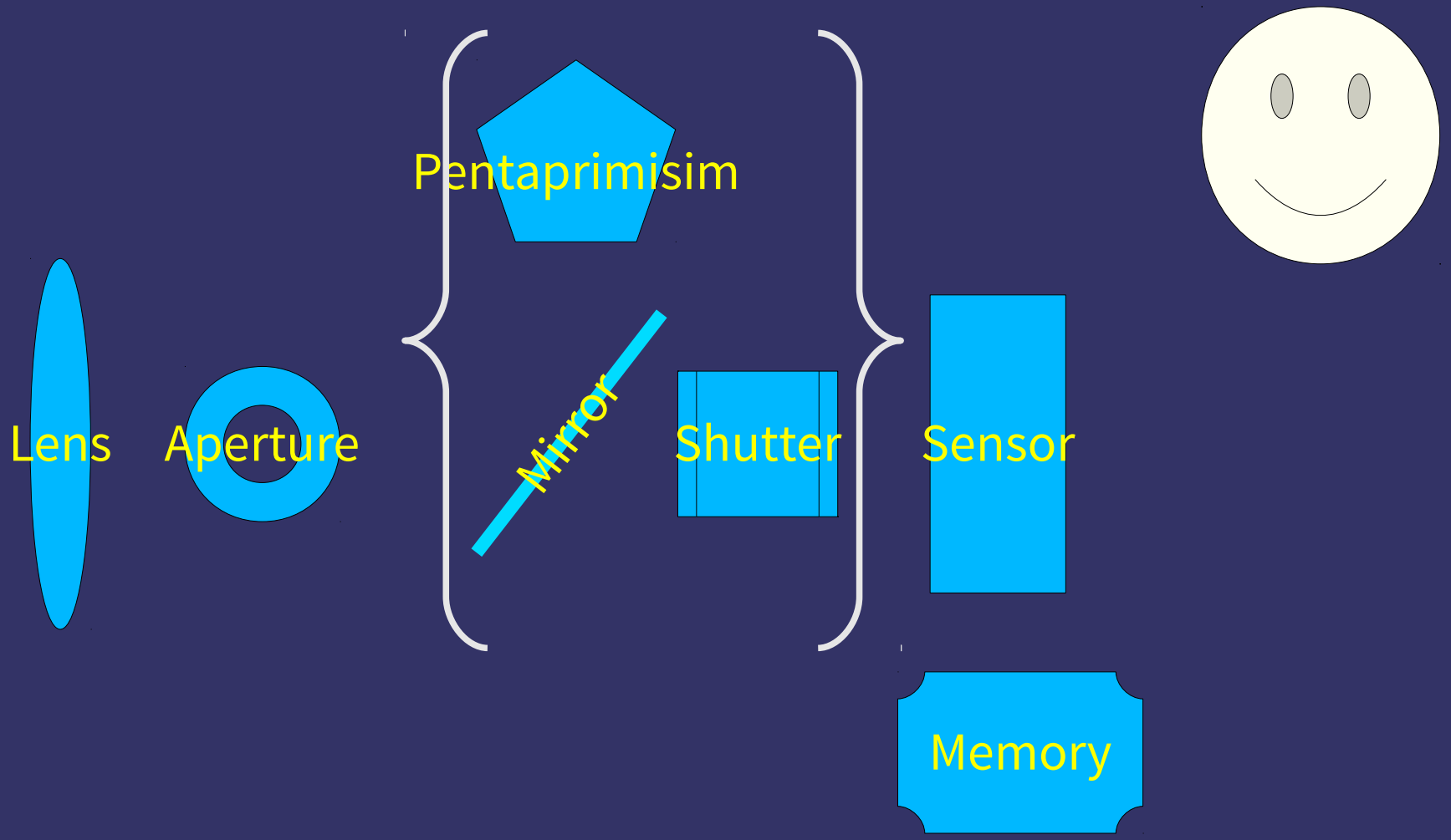
Parts Of A Digital Camera

- Lens
- Aperture
- Mirror & pentaprism if SLR
- Mechanical shutter is SLR
- Colour “Bayer Filter” unless Foveon sensor
- Light sensor (CCD or CMOS)
- Photo-processing software*
- Storage, e.g. SD card

Parts Of A Digital Camera



CHDK

- Canon cameras use mostly the same processing chips and firmware (DIGIC)
- Features are mostly disabled in firmware
- CHDK is open-source software that runs along side the Canon software turning features back on
- You can save RAW images from a £50 compact camera!

RAW Format

- Almost all cameras process the image from the sensor and output a JPEG to the storage
- Most SLRs and high end compacts can also save the raw image sensor data before processing
- Mostly proprietary formats except Adobe designed DNG standard which is free and open (TIFF based)
- You *technically* need vendor supplied software to read the RAW files

Exchangeable Image File Format "EXIF" Data

- *De facto* industry standard for adding meta data to an image format
  - Focal length, shutter speed, time and date, GPS co-ordinates etc etc
- Supported in TIFF, JPEG, many RAW formats, not supported by PNG, GIF or JPEG 2000
- Supported by most cameras & software
- Extensible Metadata Platform (XMP) possibly better but not used by many cameras

Getting Images off the Camera 1

- Use gPhoto
  - It knows how to read most cameras over a USB cable
  - Speaks Picture Transfer Protocol (PTP) and Media Transfer Protocol (MTP)
  - Can control some camera over the USB cable
  - Various GUI programs use the gPhoto library if they need to talk to a camera, e.g. DigiKam or gtkam

Getting Images off the Camera 2

- Use a card reader
  - Most cameras use flash media devices, usually SD
  - All SD cards except the latest SDXC which use exFAT can be mounted and read by all modern Linux systems
  - Copy or move the file using your file manger
  - Many laptops have a card reader built in
  - Potentially faster than reading the camera directly

Reading Images

- JPEG format should be readable with just about any imaging software you have
- RAW images will need special handling:
  - Use camera vendors proprietary software on Windows or Mac OSX only
  - Use 3rd party commercial software
  - Use F/LOSS software

Don't buy an expensive camera until you check it's supported

RAW Processing on Linux

- dcraw
  - Command line tool, useful on it's own, but also used by other software
- UFRaw
  - Standalone GUI or plug-in for GIMP
- RawTherapee
- Darktable
- DigiKam

dcraw

- Extract JPEG thumbnail from RAW image
- Extra RAW data and save as TIFF or PPM
- Read EXIF Data
- Command line usage
- Called from other programs
- Small and fast
- Supports many cameras

Extract JPEG From RAW

```
$ dcraw -e IMG_1.CR2
$ ls
$ IMG_1.CR2
$ IMG_1.thumb.jpg
```

ImageMagick

- Dcraw may extract the image into TIFF, PPM or JPEG format – it depends what it's there
- ImageMagick's `mogrify` command can convert losslessly (if possible) between formats on the CLI

```
$ mogrify -format jpg IMG_1.thumb.ppm
$ ls
$ IMG_1.thumb.ppm
$ IMG_1.thumb.jpg
```

Image::ExifTool

- EXIF processing tool written in Perl
- Cross platform
  - Read EXIF data
  - Write EXIF data
  - Copy EXIF data from one image to a second
  - Supports more than just EXIF, e.g. XMP
  - Use in your own Perl programs
  - Use from CLI as a simple tool

Copy EXIF data from RAW to JPEG

```
$ exiftool -q -tagsFromFile IMG_1.CR2 IMG_1.jpg
$
$ date=$( exiftool -DateTimeOriginal IMG1.jpg |\
  awk -F ' : ' '{ print $2 }' | sed 's/[: ]//g' |\
  awk '{print substr($1,1,12) "." substr($1,13)}' 2>
  /dev/null )
$ if [ ${date} ]; then
$   touch -t ${date} IMG1.jpg
$ fi
```

Ability

- Get images off camera without GUI
- Extract JPEG from RAW if you don't have one
- Copy EXIF from RAW to JPEG
- Extract the image creation time and date and set the file date/time stamp accordingly
- Add/change metadata, e.g. Copyright information

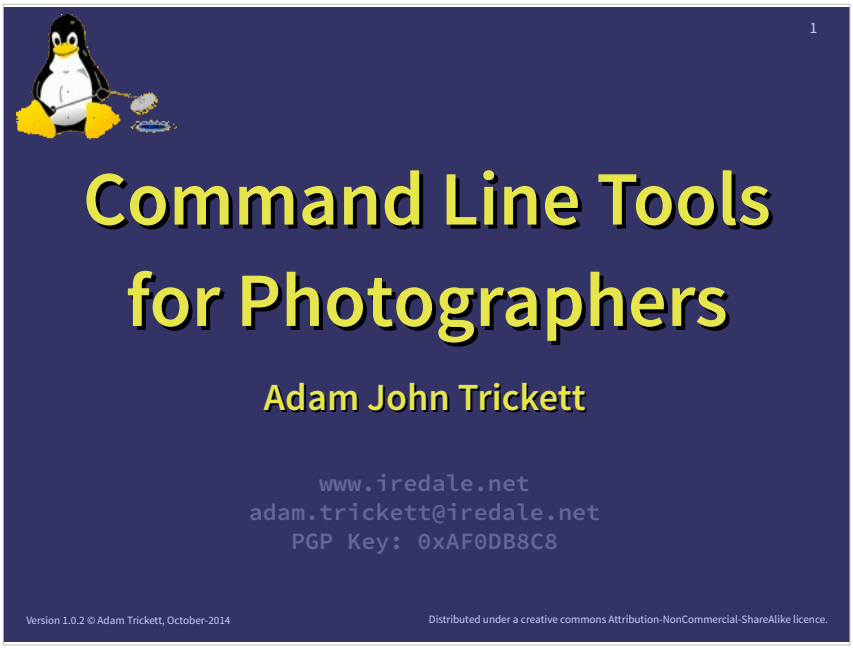
Demo

Links

- http://gphoto.sourceforge.net/
- http://www.cybercom.net/~dcoffin/dcraw/
- http://ufraw.sourceforge.net/
- http://www.imagemagick.org/
- https://metacpan.org/module/Image::ExifTool
- http://chdk.wikia.com/wiki/CHDK

Thank You

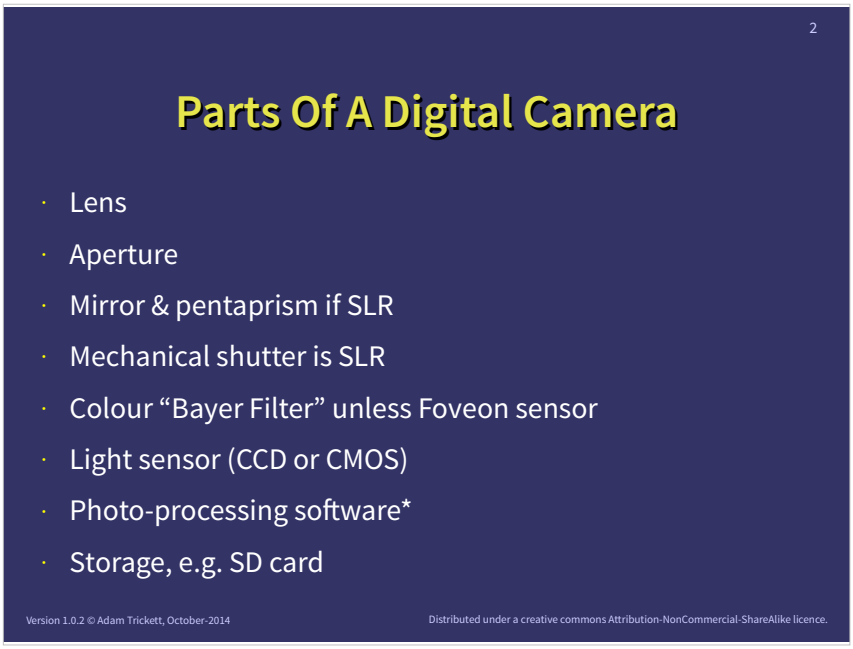
Any Questions?



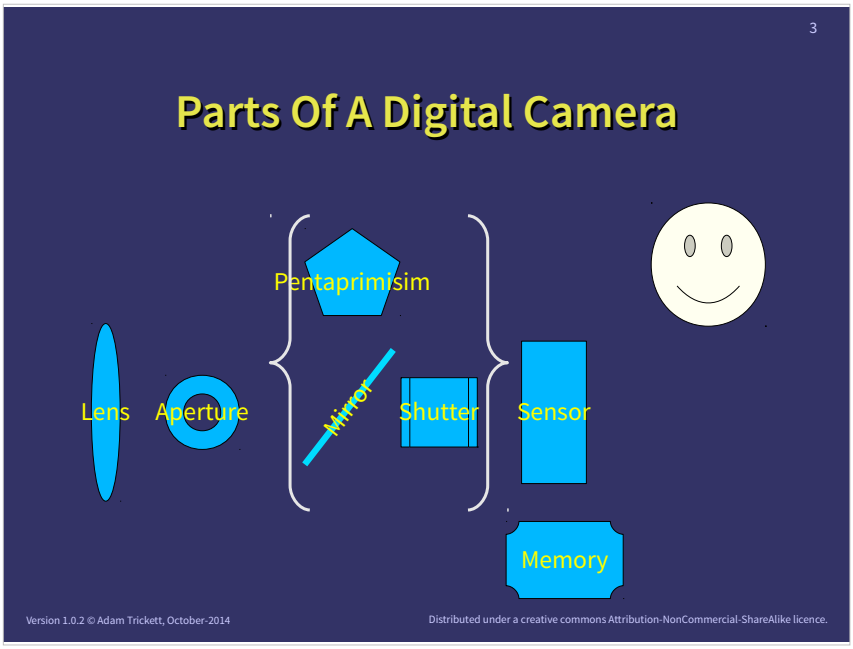
Hello!

I normally say that you can download this talk from my web site, but I just checked on my way here and noticed that it isn't there – so I will be uploading it there soon!

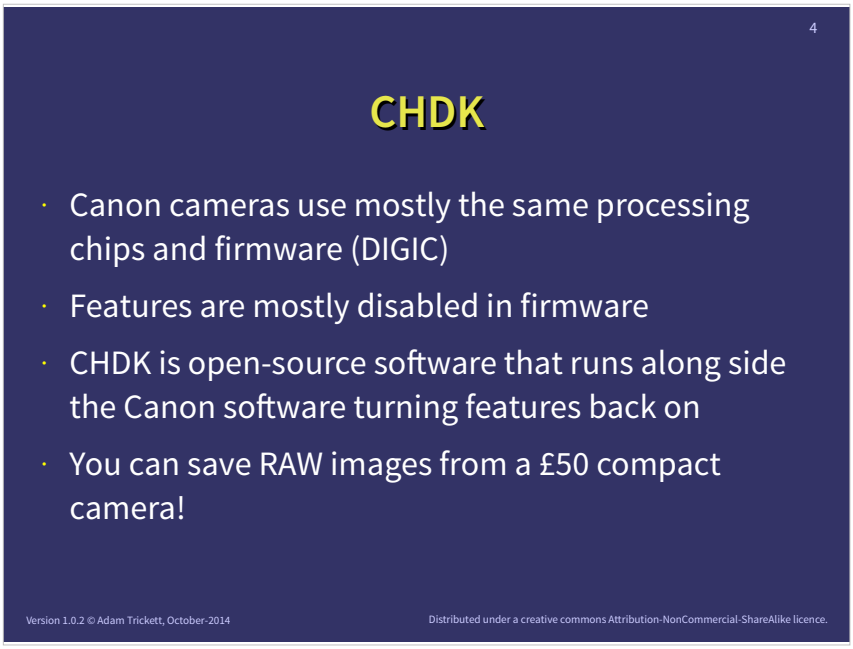
I should also say, I've given this talk before and things have changed a little since then, but much of what I'm staying still holds true.



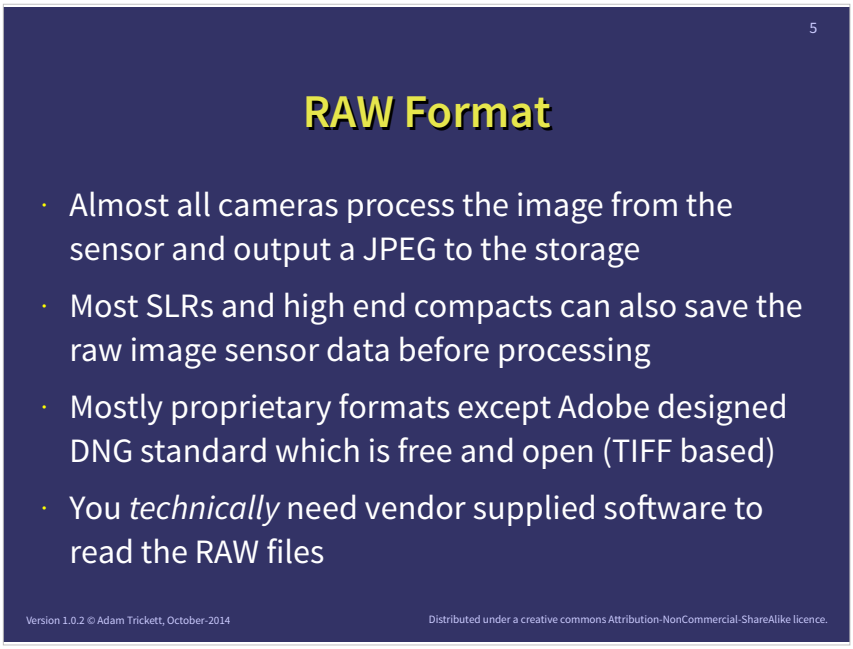
I should first highlight the bits of a modern digital camera. Not all models have all the bits but they all have some optical element, some sensor and some kind of storage.



This is a diagram of what I said, some people like diagrams some don't. Here you can see the bits that make a SLR different from non-SLRs.

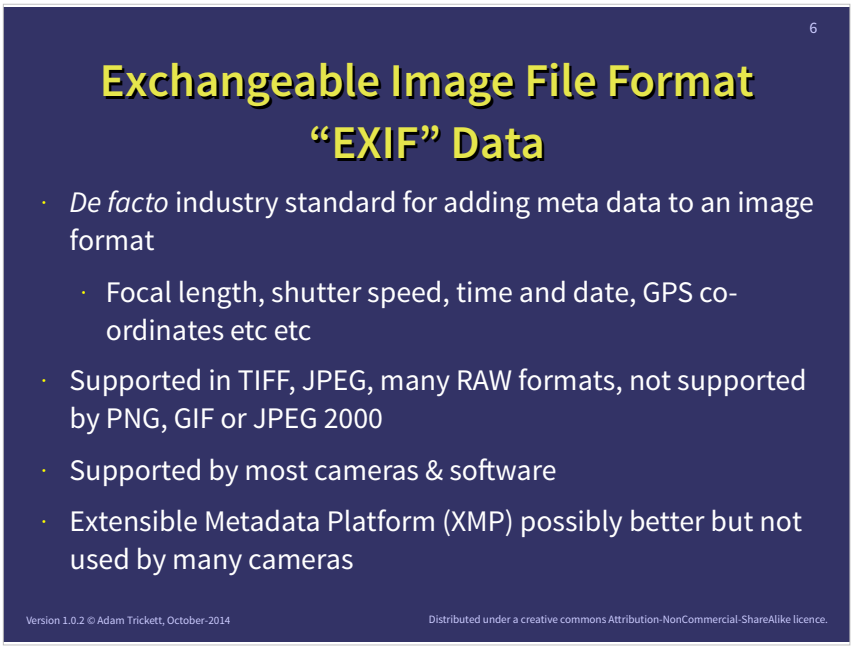


The Canon Hackers Development Kit is for Canon, but the same principle applies to other camera marques and models. I've got mostly Canon kits so it's something I've looked at and used.

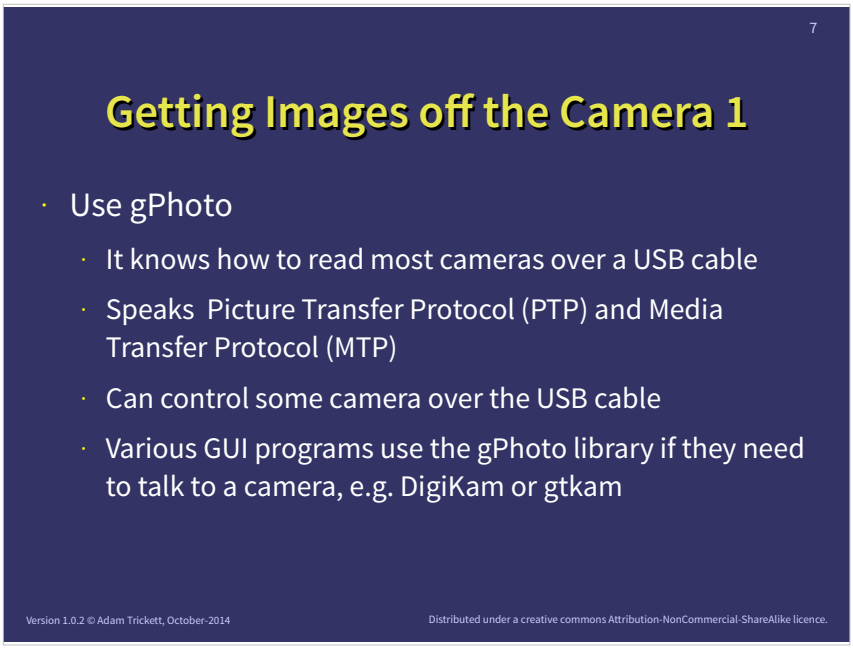


RAW format means sort of raw with respect to one camera model, it doesn't technically mean the same file format even for cameras of the same family from the same manufacturer. The key components are:

- **Image data from each colour filtered sensor**
- **Metadata about what the camera was doing**
- **Usually an embedded JPEG which is used for review purposes**



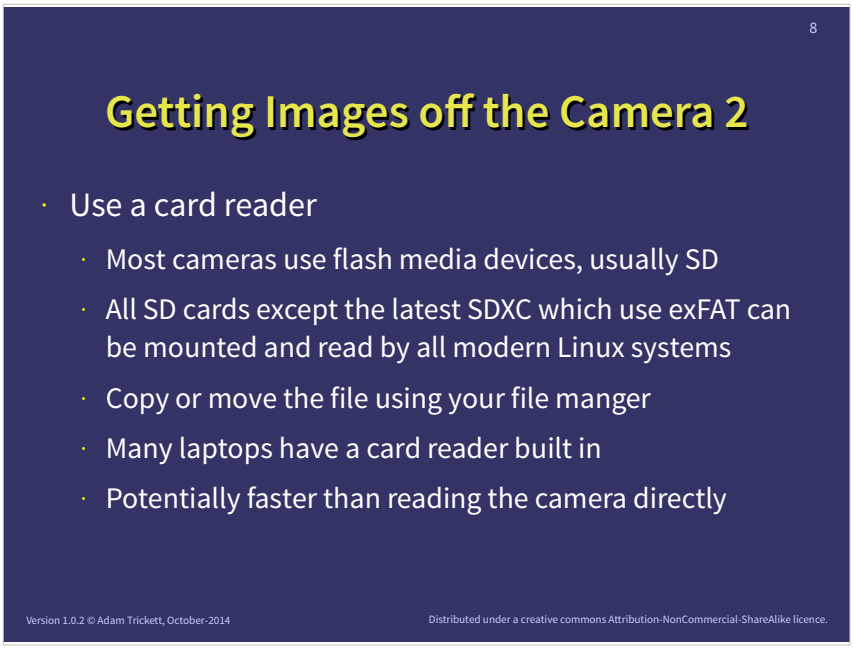
The metadata is important and it's often stored in EXIF format, but there are other formats available. Metadata is really important and most people ignore it!



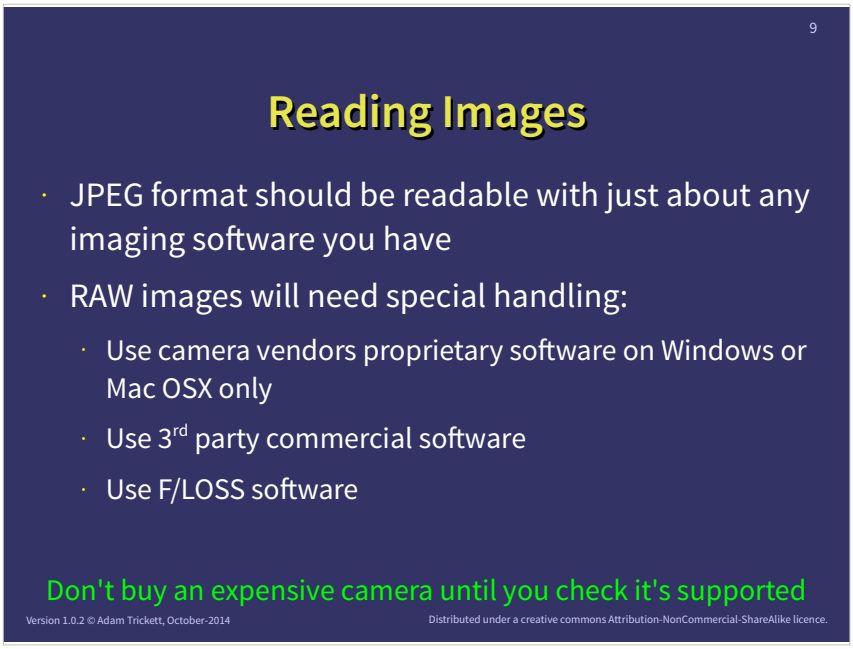
The first problem is to get the files off the camera. Generally speaking the camera firms went for the USB connection and proprietary software solution. Like smart phone skins they are usually buggy and horrible and best avoided. I don't believe that there are any for Linux, and many don't provide OSX either.

Many cameras run flat if you plug them into USB so it's best not done on these.

gPhoto is a generic Linux solution for tethered connections and file transfers.



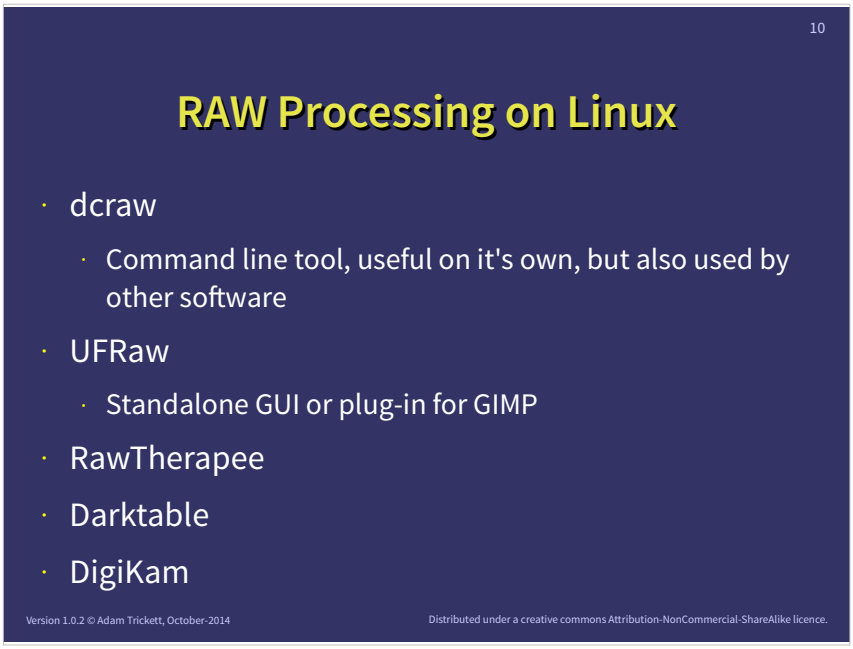
Most cameras have removable storage, it's easiest to remove the storage and read it directly on your computer. Most Linux distros will read most flash card formats over a USB connection. In most cases Microsoft bullied firms to use FAT as the file format, and except exFAT on the SDXC cards, most cards can be read from the card as they are.



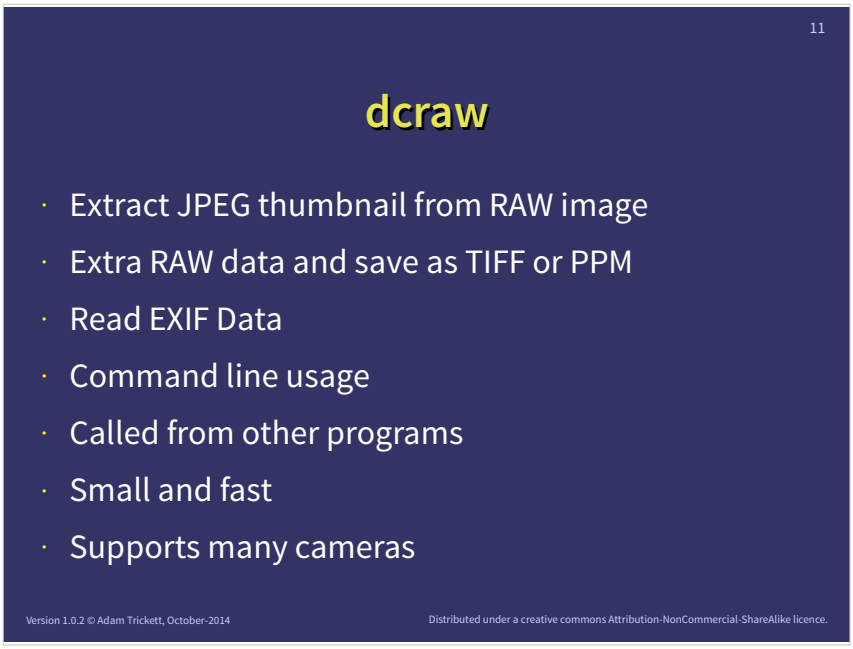
If your pictures are in JPEG format I think every Linux distro should be able to read the image, and there are a million tools for that.

If you want RAW then it's a bit more of a mess as most cameras use secret-sauce RAW formats and Linux is not supported. Unless you have an exotic camera you should find that they can be read but you should always check.

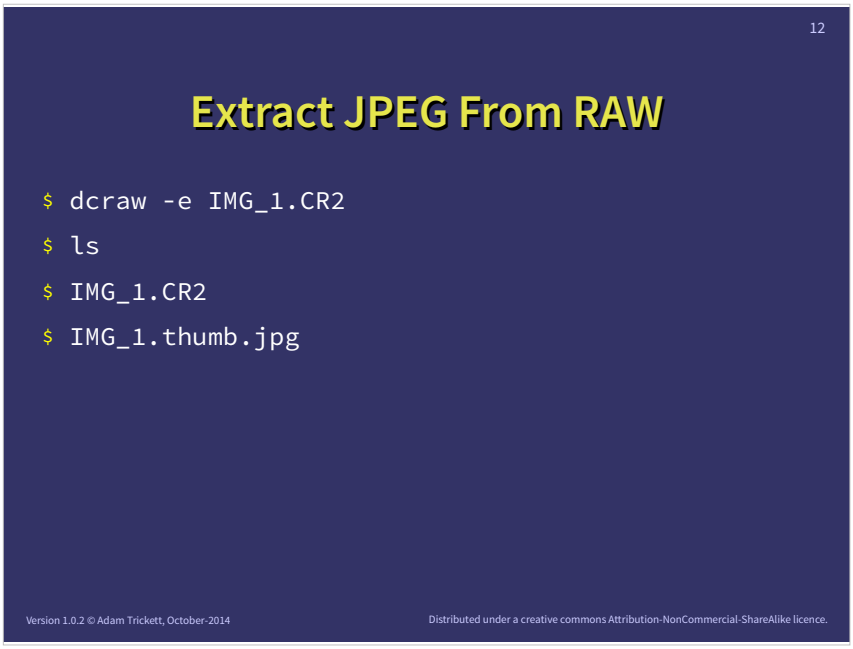
My Canon S110 can't be read by Debian stable but can be on Debian testing. My Canon EOS 60D is fine on both...



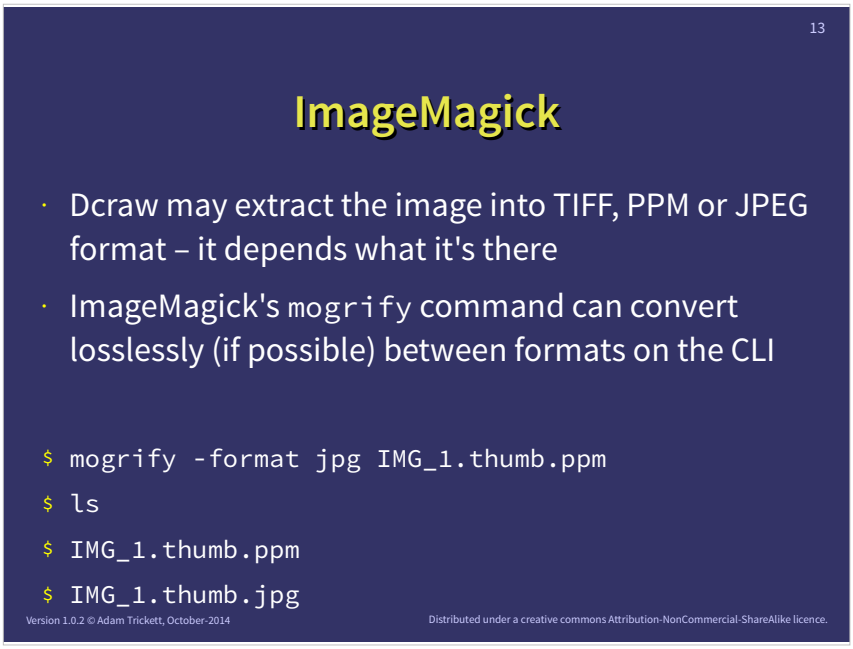
DC RAW if the reference solution and is often built into other tools and is available as a stand alone CLI tool. Unidentified Flying RAW is related tool that's also a plugin and GUI tool. There are other tools and core code improves over time. Debian stable KDE can't read RAW but DigiKam can, testing can read RAW and so can most of it's components.



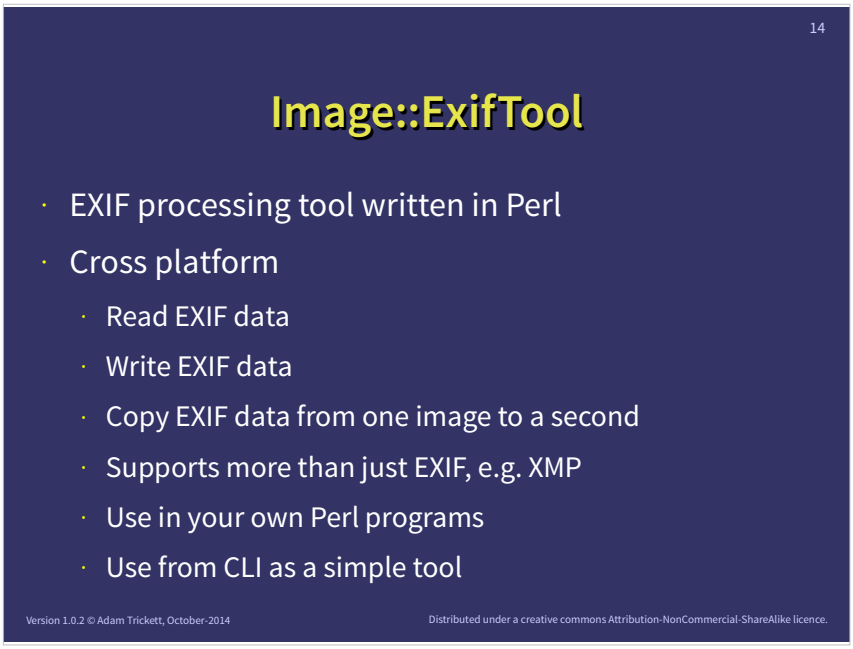
This is the main CLI tool.



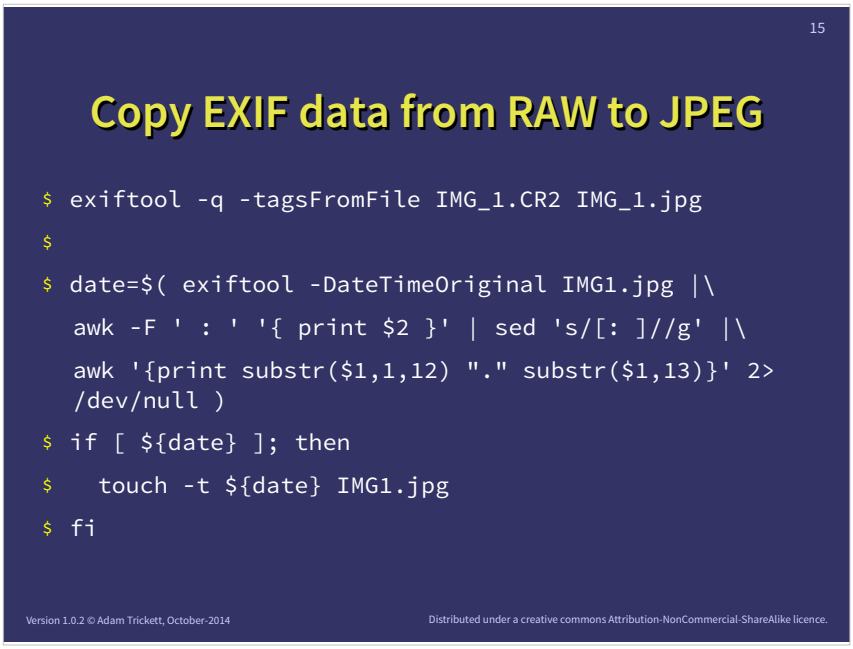
It's not rocket science, RAW goes in an the JPEG comes out



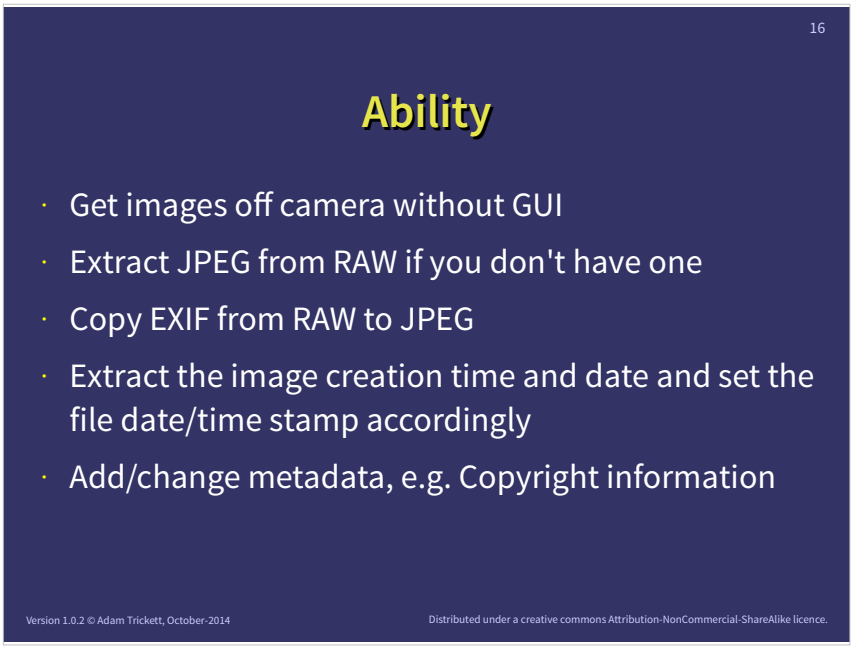
There are many file formats for images, standard and non-standard. It is possible to convert from one to the other, some conversions are lossless some are lossy. ImageMagick is a commonly used CLI tool-kit, used by Perl etc and directly from the CLI.



EXIF and XMP contain the data about your data. This tool allows you to read and write it. You can use it from the CLI or in your own Perl programs



If you extract a JPEG from a RAW, it probably won't have any metadata and the filesystem date will be JPEG creating time not photograph time. You can copy the EXIF data from one to the other and then touch the JPEG to give it the same time as the EXIF time stamp



Copy the file to your PC using normal CLI or file manager actions.

Extract a thumbnail if you need one and set EXIF data on it from RAW original

Update metadate in bulk

Ensure filesystem date and time is correct relative to EXIF – makes searching easier

Demo

Links

- http://gphoto.sourceforge.net/
- http://www.cybercom.net/~dcoffin/dcraw/
- http://ufraw.sourceforge.net/
- http://www.imagemagick.org/
- https://metacpan.org/module/Image::ExifTool
- http://chdk.wikia.com/wiki/CHDK

Please feel free to ask anything...!