

Photo Handling with Linux — Part 1

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<http://volker.top.geek.nz/linux/presentation/Photo-Linux-part1.pdf>

Outline

- 1 Start
- 2 Getting the Photos into the Computer
- 3 Image Formats and Meta-data
- 4 Image Editing, Organising and Publishing
- 5 A word on Prints

Start: Photos in the Camera

- For printing, connect camera to / insert memory card into
 - Dedicated photo-printer
 - Print shop terminal

Photos into the Computer – Protocols

USB connection (still cameras) ¹

Connectors: type-A, type-B, B-mini

Assumption: functional Linux; plug-n-go is standard

- USB mass storage device
 - + Looks like a hard disk (block device)
 - Use your usual method for copying files
- PTP (Picture Transfer Protocol) ^{2,3}
 - ISO 15740 ⁴
 - Vendors can't resist proprietary extensions
 - Special program needed for copying
 - + Allows camera control
 - Software: gphoto2, libgphoto2

¹<http://usb.org/>

²http://en.wikipedia.org/wiki/Picture_Transfer_Protocol

³<http://ptp.sourceforge.net/>

⁴<http://www.iso.org/> (search for 15740)

Photos into the Computer – Memory Cards

- Flash card reader
 - Much faster
 - Cameras typically only have USB 1.1
 - Use camera while copying
 - Doesn't drain camera batteries
- Battery-powered hard disk with card reader
 - Independence in the field / on holiday
 - No need for large capacity flash cards which are never big enough anyway
 - Some with smaller/bigger display
 - Sometimes called image tank

Image Formats

- JPEG (Joint Photographics Experts Group)
 - + Very good compression rates
 - + Variable compression rate/quality trade-off
 - Lossy; no lossless variant or option
 - 8 bit only: 8-bit grey or 24-bit colour
- TIFF (Tagged Image File Format)
 - + Variety of widths (1-bit to 64-bit, 1 to 4 colour)
 - + Additional information can be embedded (eg colour profiles)
 - + Multiple colour spaces
 - Diabolical compression rates (LZW)
10% reduction common, 10% increase(!) not unheard of
 - Tagged format allows for evolution
(and non-universal extensions)

Image Formats 2

- PNG (Portable Network Graphics)

- + Lossless
- + Variety of widths; transparency
- + Acceptable compression ratio
- No compression ratio/quality trade-off option
- Compression times very high (computational cost)

- Raw

- Only produced by cameras
- + Includes additional detailed info from camera
- Proprietary
 - Nikon introduced encryption, making decoding illegal

- GIF – not useful for photos (256 colours max; LZW)

- BMP, PBM, PGM, ...

- Very basic formats without meta-data or compression
- Only used in intermediate processing steps, e.g. Linux printing

EXIF – Exchangeable Image File Format

- Set of tags and values with information about the image⁵
Date/time, shutter speed, aperture, focal length, orientation, flash use, camera model, exposure mode/program, focus mode, metering mode, colour temperature, white balance, correction settings, . . . , geographic location
- Embedded in the image file
- Universally used
- MakerNote = maker trouble
- http://www.linux-magazine.com/issue/61/Image_Processing_with_EXIF.pdf
- Konqueror filebrowser: pop-up when hovering over image
- GUI Software: gexif (part of gtkam)

⁵<http://exif.org/> (inofficial, but best info)

EXIF – Command Line Programs

- `exiftool` ⁶

Very good. Handles MakerNote. Can show EXIF structure

- `jhead` ⁷ (not java)

Display and manipulate EXIF data

Transfer EXIF data back into files when deleted by editors

Can launch other programs

Adjust date/time fields by hh:mm (useful when camera time zone wrong)

Operations can be conditional on tags having certain values

- ImageMagick ⁸

`identify -format '%[exif:]' test.jpeg test.png`

⁶<http://owl.phy.queensu.ca/~phil/exiftool/>

⁷<http://www.sentex.net/~mwandel/jhead/>

⁸<http://imagemagick.org/>

EXIF – Command Line Programs 2

- `exiftran -d test.jpeg`⁹
Lossless image rotation; not for TIFF
- `exifprobe [-L] test.{jpeg,tiff,cr2}`¹⁰
MakerNotes in TIFF IFD format (which includes Canon .cr2)
EXIF structure
- `exif test.jpeg`¹¹
Part of libexif; not for TIFF
- `exifutils`¹² – try it if open source doesn't do your job
Commercial, US\$30, free restricted version
Might be better at decoding proprietary EXIF parts

⁹? (none found)

¹⁰<http://www.virtual-cafe.com/~dhh/tools.d/exifprobe.d/exifprobe.html>

¹¹<http://sourceforge.net/projects/libexif>

¹²<http://www.hugsan.com/EXIFutils/html/downloads.html>

IPTC – International Press Telecommunications Council

- Standard for news agency data exchange; parts apply to image meta-data, embedded.
- <http://en.wikipedia.org/wiki/IPTC>
- Information, specification: <http://www.iptc.org/IIM>
- List of NAA/IPTC header codes:
<http://www.ap.org/apserver/userguide/codes.htm>
- Applications:
<http://libiptcdata.sourceforge.net/>
<http://owl.phy.queensu.ca/~phil/exiftool/>
<http://www.exiv2.org/>
<http://www.xnview.com/> (commercial, free for private use)

Editing and Viewing

- ImageMagick ¹³
 - Large number of image operations
 - Command line, not interactive
 - No operation in regions
 - Excellent for automation
 - Set of programs: convert, display, montage, ...
- netpbm ¹⁴
 - Graphics conversion
 - Command line, excellent for automation
- picaa ¹⁵ (from google)
 - Commercial, free for ...? (read license), uses wine
 - All-in-1
 - Red-eye removal
 - Try digikam

¹³<http://imagemagick.org/>

¹⁴<http://netpbm.sourceforge.net/>

¹⁵<http://picaa.google.com/>

GIMP – GNU Image Manipulation Program

- GIMP ¹⁶
The choice of open source image editing
no alternative general purpose image editor available for Linux
- Documentation: manual, tutorials (online); books
- Good basic functionality, but no red-eye removal
- Curve and levels tools very good
- User interface sometimes not so good; professional workflow not really addressed
- New functions can be added with plugins, or by combining existing functions using the integrated scripting language

¹⁶<http://gimp.org/>

Storing and Archiving

- iOta¹⁷ Image Organization Tool and Archiver
Organise, index, archive, publish on the web
KDE/Qt-based
- JCap¹⁸
Add captions and descriptions for sorting/searching
Self-contained Java application; no external database
- Barry's photoutils¹⁹
(Presented June 2006)

¹⁷<http://www.varp.net/photos/iOta.html>

¹⁸<http://flagrantdisregard.com/jcap/>

¹⁹<http://homepages.paradise.net.nz/barry-m/photoutils/>

Publishing

- Target audience? (friends, world, ...)
- Once online, it's everywhere and effectively out of control!
- Copyright issues – Copyright is with the photographer, but may be restricted by the subject.
- Ways
 - Email JPEGs
 - Create HTML-based photo album
Copy that to web server or burn on CD
 - Photo DVD
Similar to a video DVD
Not the same as burning image files onto a DVD!
 - ...

Publishing – Software

- picfolio ²⁰

Script; turns directory trees into HTML albums.

- dvd-baker ²¹

Make a photo DVD from albums in a directory structure, optionally with audio and video.

Requires dvd-slideshow, dvdauthor (both on sourceforge)

- gallery ²²

- Web server software, needs web server and data base to run
 - Requires PHP safe_mode to be off – server-wide security risk
 - Public user management and uploading, blog functions
 - Can create/extend albums while on the road; processing on server
- Small number of potential users, unless provided by ISP?

²⁰web site disappeared

²¹<http://dvd-baker.sourceforge.net>

²²<http://gallery.menalto.com/> (requirements + features)

digikam – all-in-1

- digikam is part of KDE
 - Import images from camera with gphoto2, or from directory
 - Add comments and tags
 - Tags can be used for sorting, organising, archiving
 - Basic integrated image editing
 - Can call any image editor on the system
 - gwenview gives access to any KDE image plugin (incl making calendar)
 - Create HTML photo albums, but:
 - Lousy HTML generation (HTML hardcoded, no CSS file, album not extendible)
 - Create HTML albums on disk, burn to CD, export to remote gallery
- GNOME: gtkam

Getting Prints

- Print shops; \$0.50–1.20 per small print
- Internet upload shops
 - Upload cumbersome (one image at a time)
 - Postage costs
 - Quality? (no re-do)
 - Privacy?
 - + Door-service
- Digital printing is no risk – incompetent handling can't damage the film. . .
- Print yourself
 - + Total colour control
 - Difficult to get the colours right
 - Expensive for small prints (>\$0.60 for consumables alone)
 - + Cheap for larger prints
 - Time consuming

More Information

- Find applications: browse “digital camera” on sourceforge²³
Unfortunately, sourceforge swamped by non-Linux software.
- Google

²³http://sf.net/softwaremap/trove_list.php?form_cat=103

Part 2

- Content
 - Scanning
 - Printing
 - Image processing theory
 - Advanced editing
 - Raw format
 - Colour spaces
 - Colour control
- Requests