

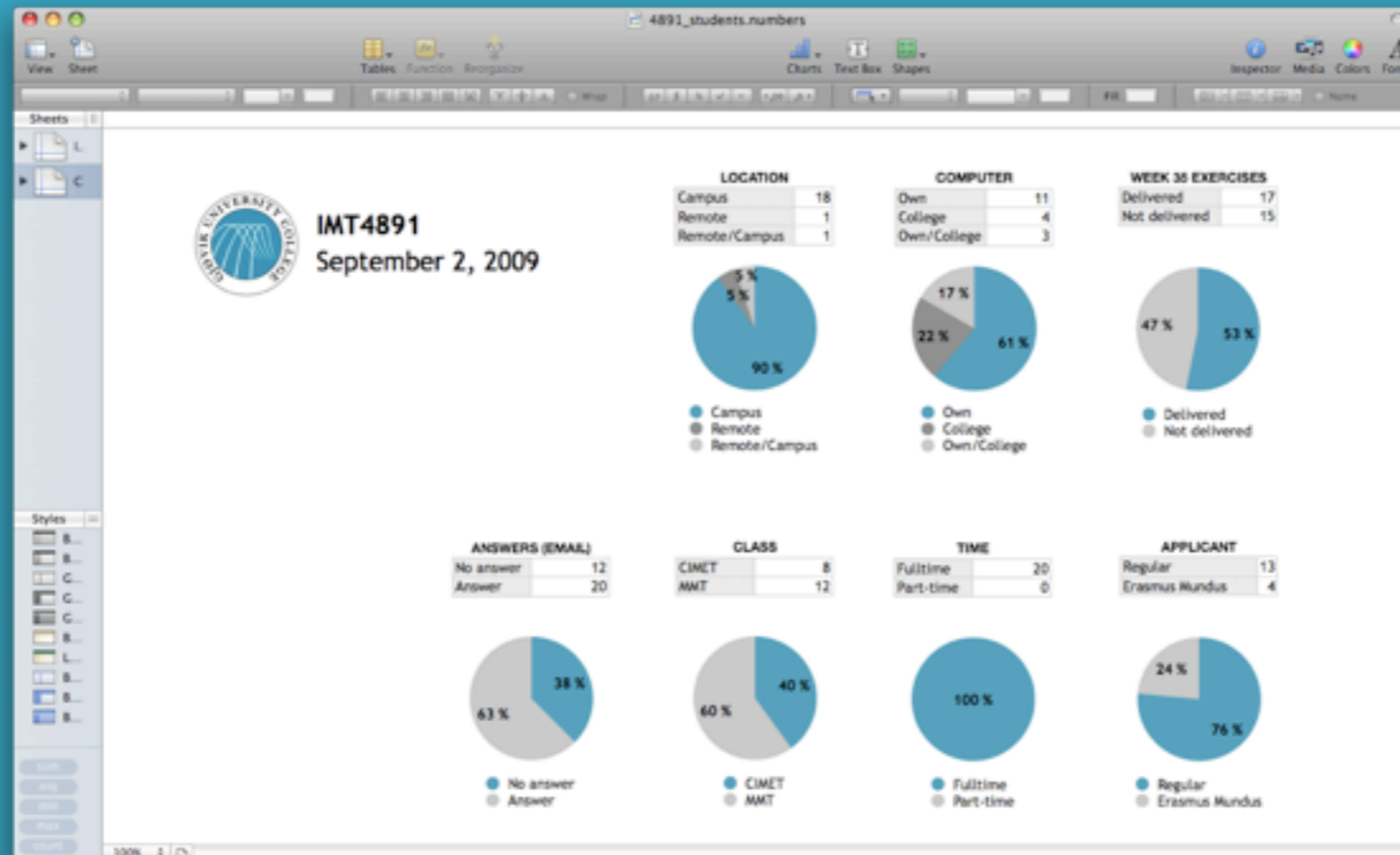


IMT 4891 - Digital Workflow Fundamentals
September 2, 2009

#2: Transcoding, compression and storing data

Kjell Are Refsvik

Welcome!



Students yet to:

Send me an email.....	12
Deliver answers to exercises	15

Lab A211 at 12:30 today

_____@hig.no

Assistance?



Hilde Bakke

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61135223

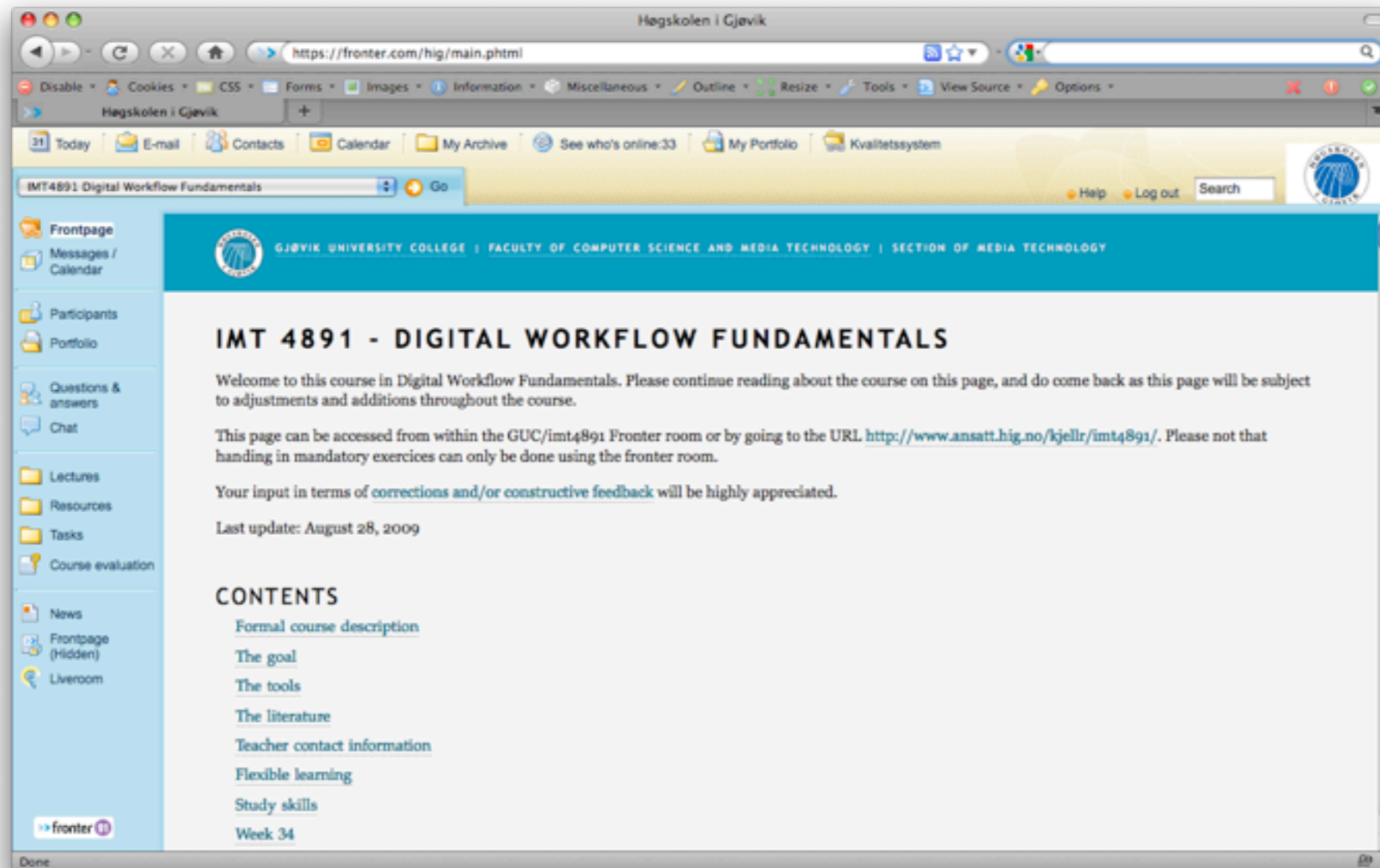


Student representative

The class (CIMET+MMT) is asked to elect a student representative (preferably a campus student).

Email hilde.bakke2@hig.no the name of your elective today.

Frontier room adjustments



34	Introductions	
35	Collect and describe data	
36	Transform, compress, encode data	Computer history
37	Move and store data	
38	Workflow automation	
39	Academic writing using LaTeX and Bibtex	
40	Intellectual Property Rights	Intellectual Property Rights and Creative Commons
41	-	
42	Exam	

1. Find a few of your own digital photos, alternatively download some from the Internet. Look inside the files using the “exiftool” program. What metadata do you find and what groups do they belong to?

```
Terminal — bash — 120x35
bash
Kjell-Are-Refsviks-MacBook:demo_files refs vik$ ls
07_kos.mp3                Gjøvik sett fra Nordlia.jpg      READ_Final.pdf
Gjovik2006_22.jpg         IMG_0137.JPG                     freeculture.pdf
Gjøvik,2003.jpg           ImageVaultHandler.jpg            søknad.doc
Gjøvik-Nyhavna.JPG        Kapittel4_4_5Idrettsanlegg.pdf
Kjell-Are-Refsviks-MacBook:demo_files refs vik$ exiftool -common *.JPG | wc -l
15
Kjell-Are-Refsviks-MacBook:demo_files refs vik$ exiftool -canon *.JPG | wc -l
16
Kjell-Are-Refsviks-MacBook:demo_files refs vik$ exiftool -a *.JPG | wc -l
81
Kjell-Are-Refsviks-MacBook:demo_files refs vik$ exiftool -a *.JPG > IMG_0137_metadata.txt
Kjell-Are-Refsviks-MacBook:demo_files refs vik$
```

```

ExifTool Version Number      : 7.90
File Name                    : IMG_0155.jpg
Directory                   : .
File Size                    : 106 kB
File Modification Date/Time  : 2009:08:31 12:35:51+02:00
File Type                   : JPEG
MIME Type                    : image/jpeg
JFIF Version                : 1.01
Resolution Unit              : inches
X Resolution                 : 72
Y Resolution                 : 72
Profile CMM Type             : Lino
Profile Version              : 2.1.0
Profile Class                : Display Device Profile
Color Space Data             : RGB
Profile Connection Space     : XYZ
Profile Date Time            : 1998:02:09 06:49:00
Profile File Signature       : acsp
Primary Platform             : Microsoft Corporation
CMM Flags                    : Not Embedded, Independent
Device Manufacturer         : IEC
Device Model                 : sRGB
Device Attributes            : Reflective, Glossy, Positive, Color
Rendering Intent             : Perceptual
Connection Space Illuminant  : 0.9642 1 0.82491
Profile Creator              : HP
Profile ID                   : 0
Profile Copyright            : Copyright (c) 1998 Hewlett-Packard Company
Profile Description          : sRGB IEC61966-2.1
Media White Point            : 0.95045 1 1.08905
Media Black Point            : 0 0 0
Red Matrix Column            : 0.43607 0.22249 0.01392
Green Matrix Column          : 0.38515 0.71687 0.09708
Blue Matrix Column           : 0.14307 0.06061 0.7141
Device Mfg Desc              : IEC http://www.iec.ch
Device Model Desc            : IEC 61966-2.1 Default RGB colour space - sRGB
Viewing Cond Desc            : Reference Viewing Condition in IEC61966-2.1
Viewing Cond Illuminant      : 19.6445 20.3718 16.8089
Viewing Cond Surround        : 3.92889 4.07439 3.36179
Viewing Cond Illuminant Type : D50
Luminance                    : 76.03647 80 87.12462
Measurement Observer         : CIE 1931
Measurement Backing          : 0 0 0
Measurement Geometry         : Unknown (0)
Measurement Flare            : 0.999%
Measurement Illuminant       : D65
Technology                   : Cathode Ray Tube Display
Red Tone Reproduction Curve   : (Binary data 2060 bytes, use -b option to extract)
Green Tone Reproduction Curve : (Binary data 2060 bytes, use -b option to extract)
Blue Tone Reproduction Curve  : (Binary data 2060 bytes, use -b option to extract)
Exif Byte Order              : Big-endian (Motorola, MM)

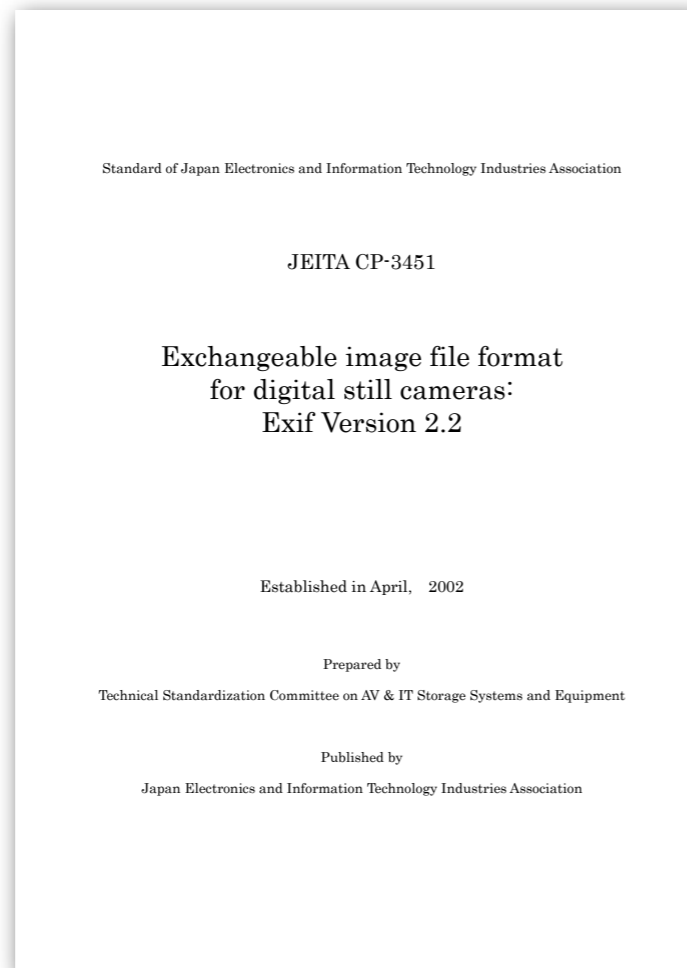
```

```

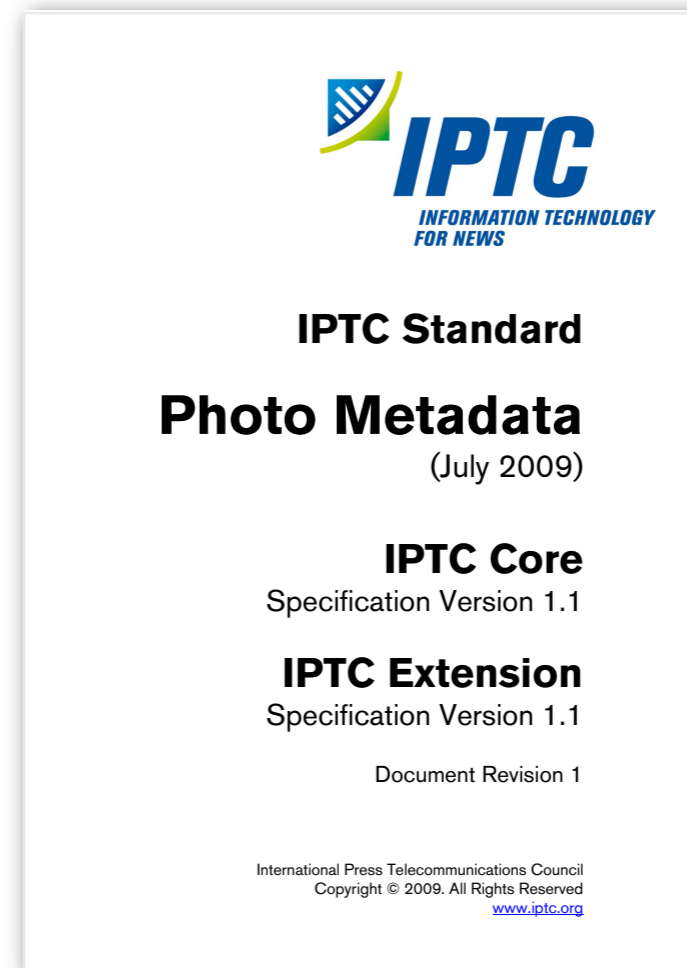
Make                         : Apple
Camera Model Name            : iPhone
Orientation                  : Horizontal (normal)
X Resolution                  : 72
Y Resolution                  : 72
Resolution Unit              : inches
Modify Date                   : 2009:08:14 19:58:39
Exposure Time                 : 1/407
F Number                      : 2.8
ISO                           : 70
Exif Version                 : 0221
Date/Time Original           : 2009:08:14 19:58:39
Create Date                   : 2009:08:14 19:58:39
Focal Length                  : 3.9 mm
User Comment                  : { . AEAverage = 210; . AELimitsReached = 0; .
AEStable = 1; . AFStable = 1; . AFStatus = 4; . AGC = 256; . AWBGGain =
147; . AWBGGain = 64; . AWBRGain = 180; . AWBStable = 1; .
AccelerometerDeltas = "(0.0061 0.0063 0.0100) @ 0.0200"; . ApertureValue = 3; .
BrightnessValue = 7.506720948106046; . CurrentFocusPosition = 34; .
ExposureBias = 0; . ExposureTime = 0.002454730434782609; . Fnumber = 2.8; .
FocalLength = 3.85; . FocusBand = "39.63 in [26.69, 57.38]"; . FocusMode = 0; .
FocusPeakSumArray = ( . 95678, . 98220, . 100977, .
104146, . 254116. ); . FocusScan = "(0,37.42) (34,37.85) (66,27.65)
(95,19.44) (123,14.58) (149,11.99) (173,9.92) (195,8.41) (216,7.61) (236,7.01)
(255,6.71) 0.1s ago"; . FocusScoresArray = ( . 938527, . 975276, .
1014148, . 1062237, . 5436353. ); . FocusWindow = "72/165
188x250"; . FullyExposed = 1; . ISO Speed Rating = 70; . NoiseReduction = "S:4
C:8 Y:0"; .
Flashpix Version              : 0100
Color Space                   : sRGB
Exif Image Width              : 480
Exif Image Height             : 640
Sharpness                     : Soft
GPS Latitude Ref               : North
GPS Latitude                   : 61 deg 9' 19.80"
GPS Longitude Ref              : East
GPS Longitude                  : 10 deg 23' 15.60"
GPS Time Stamp                 : 19:58:39.01
GPS Dilution Of Precision     : 3
GPS Img Direction Ref          : True North
GPS Img Direction              : 133.5254545
Image Width                   : 480
Image Height                   : 640
Encoding Process               : Baseline DCT, Huffman coding
Bits Per Sample                : 8
Color Components               : 3
Y Cb Cr Sub Sampling           : YCbCr4:2:0 (2 2)
Aperture                       : 2.8
GPS Latitude                   : 61 deg 9' 19.80" N
GPS Longitude                  : 10 deg 23' 15.60" E
GPS Position                   : 61 deg 9' 19.80" N, 10 deg 23' 15.60" E
Image Size                     : 480x640
Shutter Speed                  : 1/407
Focal Length                   : 3.9 mm
Light Value                    : 12.2

```

EXIF and IPTC fields



<http://www.exif.org/Exif2-2.PDF>



http://www.iptc.org/std/photometadata/specification/IPTC-PhotoMetadata%28200907%29_1.pdf

2. Find out how to put metadata into your pictures and insert your name into a appropriate field. Show the content of the metadata before and after.

EXIF

Artist

Canon Maker Notes (Camera Owner)

IPTC IIM

Contact

Credit

```
Terminal — bash — 120x35
bash
Kjell-Are-Refsviks-MacBook:desktop refsvisk$ exiftool "-Artist=Kjell Are Refsvik" *.jpg
  1 image files updated
Kjell-Are-Refsviks-MacBook:desktop refsvisk$
```

3. Extract metadata from a range of file-types on your harddrive. What types of files have the most metadata?

```
Terminal — bash — 120x36
bash
Kjell-Are-Refsviks-MacBook:demo_files refsвик$ cat metasum.sh
#!/bin/sh

for f in *;
do
    echo $f
    exiftool -a $f | wc -l
done
Kjell-Are-Refsviks-MacBook:demo_files refsвик$ ./metasum.sh
07_kos.mp3
    25
Gjovik2006_22.jpg
    67
Gjøvik,2003.jpg
    20
Gjøvik-Nyhavna.JPG
    18
Gjøvik_sett_fra_Nordlia.jpg
    68
IMG_0137.JPG
    60
IMG_0137_metadata.txt
    6
ImageVaultHandler.jpg
    23
Kapittel4_4_5Idrettsanlegg.pdf
    15
READ_Final.pdf
    26
freeculture.pdf
    28
metasum.sh
    7
søknad.doc
    8
Kjell-Are-Refsviks-MacBook:demo_files refsвик$
```


4. Do you find any significant difference in terms of metadata when looking inside files created by computer software as opposed to files created by different types of devices (cameras, sound recorders, mobile phones, gps-systems)?

```
Terminal — bash — 120x36
bash
Kjell-Are-Refsviks-MacBook:demo_files refs vik$ pwd
/Users/refs vik/desktop/demo_files
Kjell-Are-Refsviks-MacBook:demo_files refs vik$ exiftool -a * > all_metadata.txt
Kjell-Are-Refsviks-MacBook:demo_files refs vik$
```

Amount of data?

Category of data?

Suggestions?

Command-line UNIX

Will enable you to compute on a remote machine and save your laptopcycles to do other things

Most likely be around and available your entire life and as such, be worth investing your time in

Very effective for non-visualized processing of large quantities of files (repetitive tasks)

Make a list of commands you often use to remember them



image.cr2
4000x3000

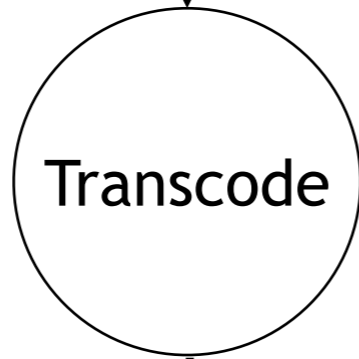


image.tif
4000x3000



image.cr2
4000x3000

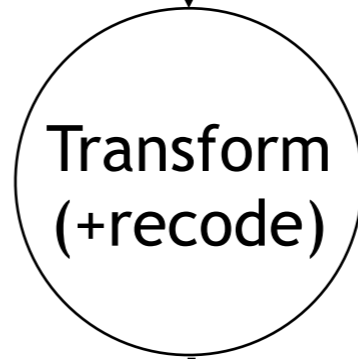
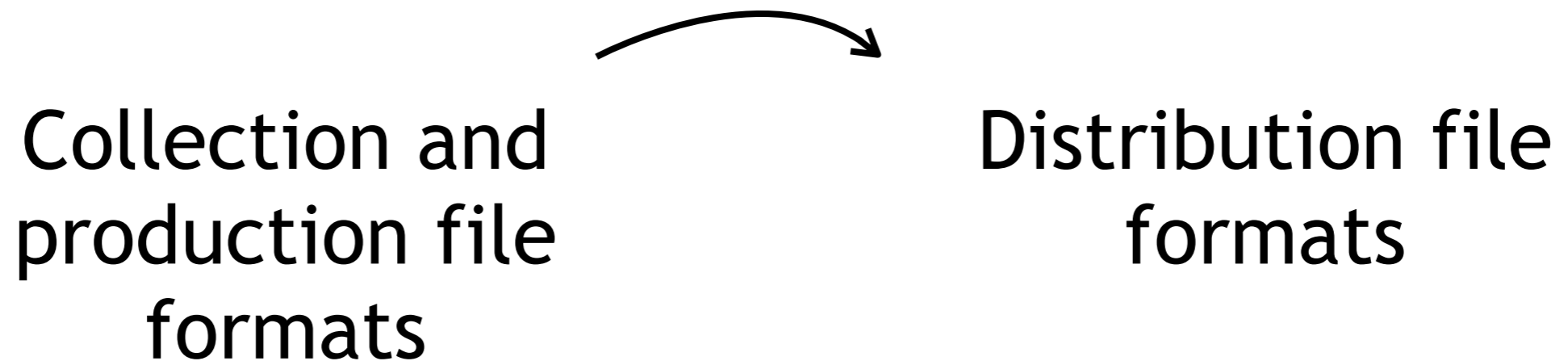


image.jpg
640x640

Transcoding

Moving a bitstream from one format to another [similar]



You will be transcoding and transforming a lot within the different formats and datatypes.

Hence the advantage of effective workflows to help you be more effective.

Images

Imagemagick is a very powerful transformation AND transcoding tool

Has a lot of commands basic commands, each with their own flags and features:

animate, compare, composite, conjure, convert, display, identify, import, mogrify, montage, stream

<http://www.imagemagick.org/script/command-line-tools.php>

bash

```
Kjell-Are-Refsviks-MacBook:Desktop refs vik$ pwd
/Users/refs vik/Desktop
Kjell-Are-Refsviks-MacBook:Desktop refs vik$ cd demo*
Kjell-Are-Refsviks-MacBook:demo_files refs vik$ ls
07_kos.mp3          IMG_0137.JPG          all_metadata.txt
Gjovik2006_22.jpg  IMG_0137_metadata.txt freeculture.pdf
Gjøvik,2003.jpg    ImageVaultHandler.jpg metasum.sh
Gjøvik-Nyhavna.JPG Kapittel4_4_5Idrettsanlegg.pdf søknad.doc
Gjøvik_sett_fra_Nordlia.jpg READ_Final.pdf
Kjell-Are-Refsviks-MacBook:demo_files refs vik$ mogrify -format png *.jpg
Kjell-Are-Refsviks-MacBook:demo_files refs vik$ ls
07_kos.mp3          Gjøvik_sett_fra_Nordlia.jpg    Kapittel4_4_5Idrettsanlegg.pdf
Gjovik2006_22.jpg  Gjøvik_sett_fra_Nordlia.png    READ_Final.pdf
Gjovik2006_22.png  IMG_0137.JPG                  all_metadata.txt
Gjøvik,2003.jpg    IMG_0137_metadata.txt         freeculture.pdf
Gjøvik,2003.png    ImageVaultHandler.jpg         metasum.sh
Gjøvik-Nyhavna.JPG ImageVaultHandler.png         søknad.doc
Kjell-Are-Refsviks-MacBook:demo_files refs vik$
```

Norwegian reference catalog for IT standards in the public sector in Norway

Ministry of Government Administration and Reform, 2009

[http://www.regjeringen.no/en/dep/fad/Documents/rundskriv/2009/
referanse katalogen.html?id=570673](http://www.regjeringen.no/en/dep/fad/Documents/rundskriv/2009/referanse katalogen.html?id=570673)

[http://www.regjeringen.no/en/dep/fad/press-centre/press-releases/
2009/new-obligatory-it-standards-for-the-stat.html?id=570650](http://www.regjeringen.no/en/dep/fad/press-centre/press-releases/2009/new-obligatory-it-standards-for-the-stat.html?id=570650)

[Open or nearly open] Distribution formats



Production
format

PDF/PDF-A	Document format
ODF 1.1	Document format
HTML 4.01	Web pages
XHTML 1.0	Web pages (XML)
ECMA OOXML	Document format
JPEG	Lossy image format
SVG	Scalable Vector Format
PNG	Lossless image format
VORBIS I	Lossy audio compressor
OGG	A/V encapsulation format
MP3	MPEG I, Audio Layer 3
FLAC	Free Lossless Audio Codec
THEORA	Lossy video compressor
MPEG-4	Video compressor
AAC	Lossy audio compressor
MP4	A/V encapsulation format
UTF-8	Text encoding format

Transforming

Reshaping the bitstream
[completely] to fit needs

Compress

	Lossy	<u>Lossless</u>
Images	JPEG, PGF,	JPEG2000, PNG
Audio	MP3, AAC, OGG Vorbis	FLAC, ATRAC...
Video	MPEG, H.26X, OGG Theora...	Animation, CorePNG...
General	-	ZIP*

*Archive formats

http://en.wikipedia.org/wiki/List_of_archive_formats

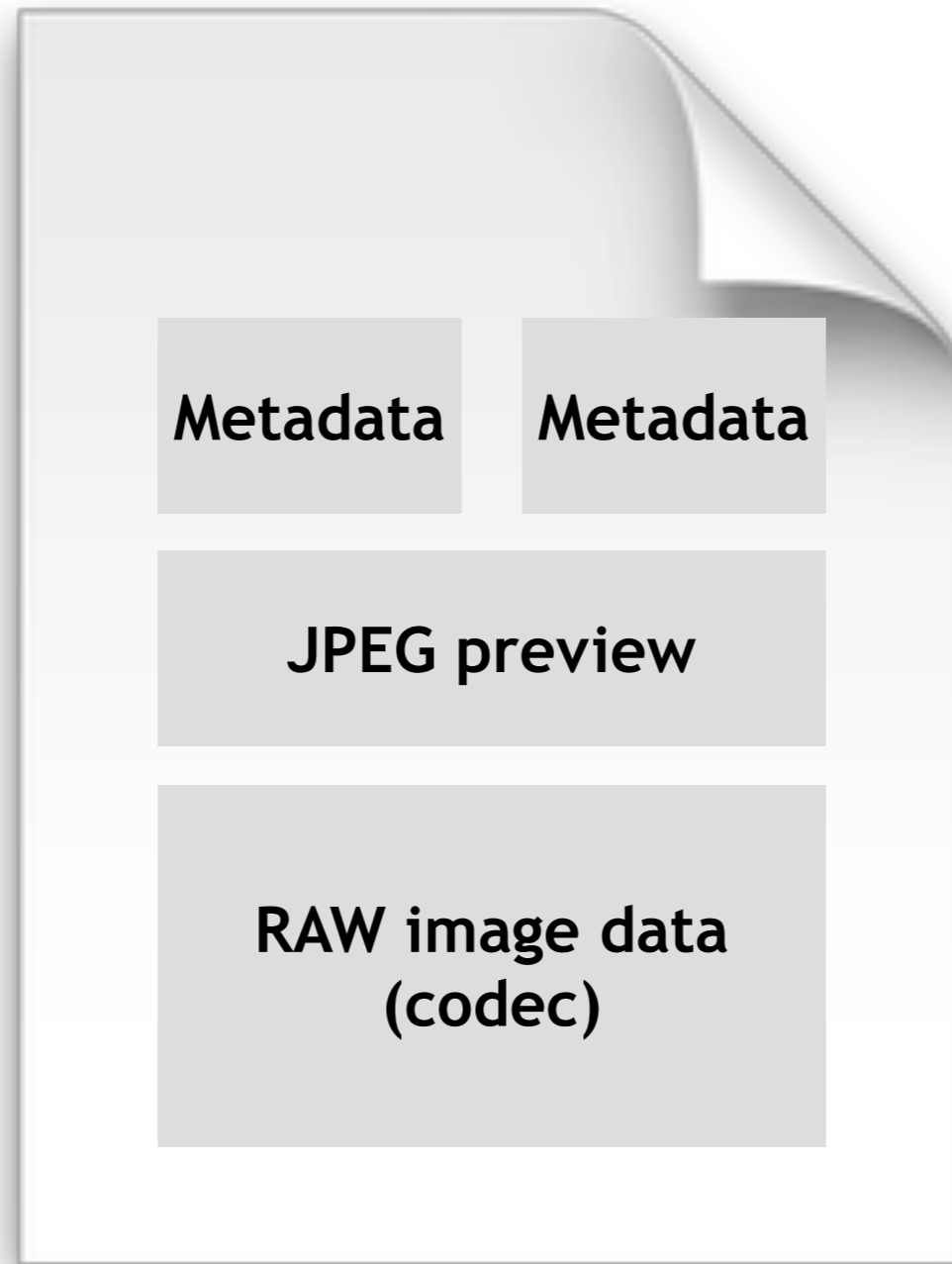
Storing data

Formats

Wrappers

Encoding/compression algorithm

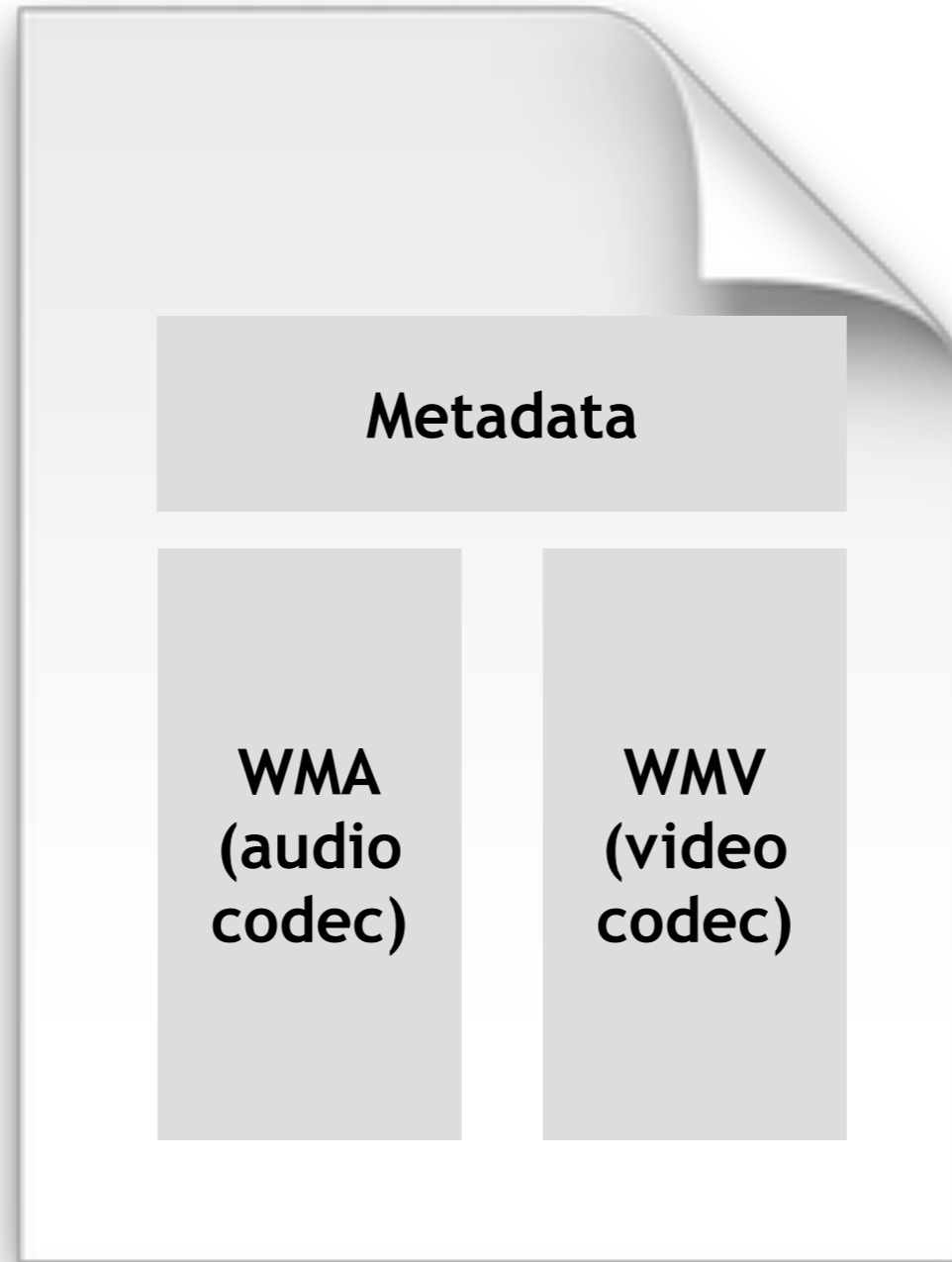
Formats: wrappers & encoders



TIFF



Wrapper format
Meta-format
Container format



.ASF



Wrapper format
Meta-format
Container format

1 100-1 120[ish]

UNIX this week: wget

```
wget -A.png -r -l1 -np http://www.ansatt.hig.no/kjellr/index.html
```

the command `curl` may be an equivalent on some systems.

<http://www.gnu.org/software/wget/>

UNIX this week: wget

```
wget -A.png -r -l1 -np http://www.ansatt.hig.no/kjellr/index.html
```

Accepted list of formats

Format

Recursive search

Number of recursive levels

No parents (do not go up in the directory tree)

URL

<http://www.gnu.org/software/wget/>

PortAuthority

ffmpe

Installed	Port	Version	Category
	gst-ffmpeg	0.10.8	gnome
Yes	ffmpeg	0.5	multimedia
	ffmpeg-devel	18984	multimedia

ffmpeg @0.5, Revision 2 (multimedia)
 Variants: no_gpl, no_mmx, speex

FFmpeg is a complete solution to record, convert and stream audio and video. It includes libavcodec, the leading audio/video codec library. The project is made of several components: ffmpeg is a command line tool to convert one video file format to another. It also supports grabbing and encoding in real time from a TV card. ffmpeg is an HTTP (RTSP is being developed) multimedia streaming server for live broadcasts. Time shifting of live broadcast is also supported. ffmpeg is a simple media player based on SDL and on the ffmpeg libraries. libavcodec is a library containing all the ffmpeg audio/video encoders and decoders. Most codecs were developed from scratch to ensure best performances and high code reusability. libavformat is a library containing parsers and generators for all common audio/video formats.
 Homepage: <http://www.ffmpeg.org/>

Build Dependencies: port:gmake
 Library Dependencies: port:lame, port:libvorbis, port:libogg, port:libtheora, port:dirac, port:schroedinger, port:faac, port:faad2, port:XviD, port:x264, port:libsdl, port:bzip2, port:zlib
 Platforms: darwin
 Maintainers: devans@macports.org openmaintainer@macports.org

Displaying information on ffmpeg

PortAuthority

Search: magick

Installed	Port	Version	Category
Yes	pkgconfig	0.23	devel
Yes	readline	6.0.000	devel
Yes	shared-mime-info	0.60	devel
Yes	gnome-common	2.26.0	gnome
Yes	gnome-doc-utils	0.16.1	gnome
Yes	gtk-doc	1.11	gnome
Yes	ImageMagick	6.5.4-0	graphics
Yes	cairo	1.8.8	graphics
Yes	fontconfig	2.7.0	graphics
Yes	gd2	2.0.35	graphics

ImageMagick @6.5.4-0 (graphics, devel)
 Variants: darwin_6, graphviz, gs, hdri, jbig, jpeg2, lcms, lqr, mpeg, no_plus_plus, no_x11, perl, q16, q32, q8, rsvg, universal, wmf

ImageMagick is a robust collection of tools and libraries to create, edit and compose bitmap images in a wide variety of formats. You can crop, resize, rotate, sharpen, color reduce or add effects or text or straight or curved lines to an image or image sequence and save your completed work in the same or differing image format. You can even create images from scratch. Image processing operations are available from the command line as well as through C, Ch, C++, Java, Perl, PHP, Python, Ruby and Tcl/Tk programming interfaces. Over 90 image formats are supported, including GIF, JPEG, JPEG 2000, PNG, PDF, PhotoCD and TIFF.
 Homepage: <http://www.imagemagick.org/>

Build Dependencies: port:pkgconfig
 Library Dependencies: port:xorg-libXext, port:xorg-libXt, port:bzip2, port:jpeg, port:libpng, port:tiff, port:zlib, port:freetype, port:fontconfig, port:libiconv, port:expat, port:libxml2
 Platforms: darwin
 Maintainers: ryandesign@macports.org

Displaying information on ImageMagick

TO DO - WEEK 36

1. Download the JPEG-files found on the page:
http://www.ansatt.hig.no/ansatt/kjellr/misc/20090901_images/index.html
to your local harddrive and convert it to the PNG format.
What happened to the filesizes after the file conversion?
2. Take the same file as in exercise 1 and make a 60 pixel wide thumbnail of each file. Place the thumbnails in a folder named `_thumbs` in the same folder as the main images themselves. State the command you used and list the files to show filesizes.
3. Repeat exercise 2, but try to reduce the thumbnail filesize to a minimum while keeping pixel size (by reducing colours or increasing compression).
4. Use Imagemagicks “montage” command to generate a web page of the images in:
http://www.ansatt.hig.no/ansatt/kjellr/misc/20090901_images/index.html.
Upload your montage-command and a png of the finished web page in a browser.

We would like you to upload your answers as a single utf-8 encoded plain text file (no Microsoft Word-files, please) into Fronter>imt4891...>Task>Week 36.

Please name the file `imt4891_week36_<your_surname>.txt`

