

# The Bright Side of Data Migration!

Reto Kromer • AV Preservation by reto.ch

**Migration von Film- und Videodaten**  
Lichtspiel, Bern, 31. Oktober 2018

1

## Data Migrations

**2014**

- our internal archive from LTO-4 to LTO-6 (5.7 PB)

**2014–[2019?]**

- [...]

**[2019?]**

- our internal archive from LTO-6 to LTO-8

2

```
Terminal — -bash
Help:
migratelto -h
[16:21:59]reto@Castor:~/Desktop$ ./migratelto -h
Abstract:
migratelto - Migrate one or more LTO cartridges from one generation to
another.
Syntax:
migratelto {-D [-I] [-N]} [-x] -d [-i] [-n]
migratelto -h
Parameters:
-D source desk
-I source cartridge identifier
-N source cartridge name
-x path to code to execute
-d destination desk
-i destination cartridge identifier
-n destination cartridge name
-h this help
See also:
man openlto
About:
Version: 2018-03-05_alpha
Websites: https://avpres.net/openLTO/migratelto/
https://github.com/AVpres/openLTO
[16:22:19]reto@Castor:~/Desktop$
```

3

```
Terminal — less · man openlto
migratelto {-D desk [-I identifier] [-N name]} [-x path] -d desk [-i iden-
tifier] [-n name]
migratelto -h
Migrate from one LTO generation to another LTO generation.

-D one or more source desk's identifiers
-I one or more source cartridge's identifier
-N one or more source cartridge's name
-x path to script to execute
The data are read from the source desk, piped to the script,
piped to writing onto the destination desk:
read | script | write
-d destination desk's identifier
-i destination cartridge's identifier
-n destination cartridge's name
-h display a help message
```

4

read | script | write

script to modify

- container
- codec
- both container and codec

5

# Examples

6

## #1: ProRes-born Content

**from:**

- ProRes stored inside QuickTime (.mov)

**to:**

- ProRes stored inside Matroska (.mkv)

7

## Update the Container

→ read file from source LTO

→ demultiplex file

- ProRes 422, 10 bit [yuv422p10le]
- ProRes 4444, 10 bit [yuv444p10le or yuva444p10le] or 12 bit [yuv444p12le]

→ multiplex file

→ write file to destination LTO

8

## SMPTE REGISTERED DISCLOSURE DOCUMENT

### Apple ProRes Bitstream Syntax and Decoding Process



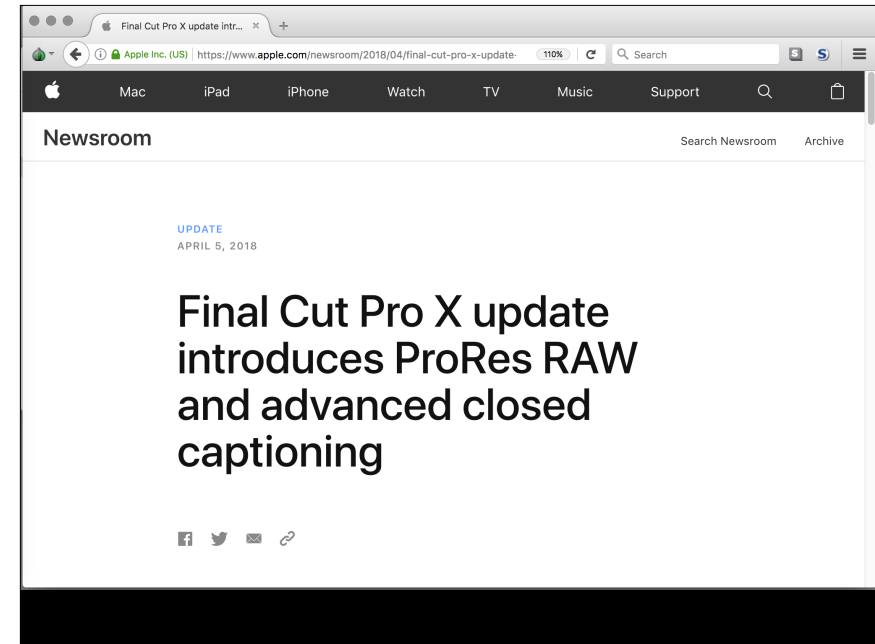
Page 1 of 39 pages

The attached document is a Registered Disclosure Document prepared by the sponsor identified below. It has been examined by the appropriate SMPTE Technology Committee and is believed to contain adequate information to satisfy the objectives defined in the Scope, and to be technically consistent.

This document is NOT a Standard, Recommended Practice or Engineering Guideline, and does NOT imply a finding or representation of the Society.

Every attempt has been made to ensure that the information contained in this document is accurate. Errors in this document should be reported to the proponent identified below, with a copy to [eng@smpte.org](mailto:eng@smpte.org).

9



10



## Apple ProRes RAW

White Paper  
April 2018

11

## #2: Video

### from:

- AVI / 8-bit and 10-bit uncompressed
- MOV / 8-bit and 10-bit uncompressed
- MP4 / 8-bit and 10-bit uncompressed

### to:

- Matroska / FFV1

12

## Container and Codec

- read file from source LTO
- demultiplex file
- decode file
  - $Y'CbCr$ , 4:2:2, 8 bit, «raw» [uyvy422]
- encode file
- multiplex file
- write file to destination LTO

13

## Container and Codec

- read file from source LTO
- demultiplex file
- decode file
  - $Y'CbCr$ , 4:2:2, 10 bit, «raw» [yuv422p10le]
- encode file
- multiplex file
- write file to destination LTO

14

## #2: Video

### from:

- AVI / 8-bit and 10-bit uncompressed
- MOV / 8-bit and 10-bit uncompressed
- MP4 / 8-bit and 10-bit uncompressed

### to:

- Matroska / FFV1

15

## #3: Old Experimentations

### from:

- AVI / HuffYUV
- AVI / FFV1 version 1

### to:

- Matroska / FFV1 [version 3]

16

## #4: Mid Experimentations 1

### from:

- AVI / CineForm (VC-5) with Bayer
- MOV / CineForm (VC-5) with Bayer
- MOV / ProRes

### to:

- Matroska / FFV1 after de-mosaicking
- Matroska / ProRes

17

## #5: Mid Experimentations 2

### from:

- AVI / CineForm (VC-5) with Bayer
- MOV / CineForm (VC-5) with Bayer
- MOV / ProRes

### to:

- Matroska / FFV1 version 4 [with Bayer]
- Matroska / ProRes with 12-bit support

18

## #6: New Experimentations

### from:

- MXF / OpenEXR
- flavour of NUT / multispectral imaging
- flavour of NUT / RGB72 or Y'C<sub>B</sub>C<sub>R</sub> 24-bit
- flavour of NUT / expanded OpenEXR

### to:

- Matroska / FFV1 version 4 using RGB48, RGB72, floats and additional metadata

19

## AV Preservation by reto.ch

chemin du Suchet 5  
1024 Écublens  
Switzerland

Web: [reto.ch](http://reto.ch)  
Twitter: [@retoch](https://twitter.com/retoch)  
Email: [info@reto.ch](mailto:info@reto.ch)



20