



HEIF Overview

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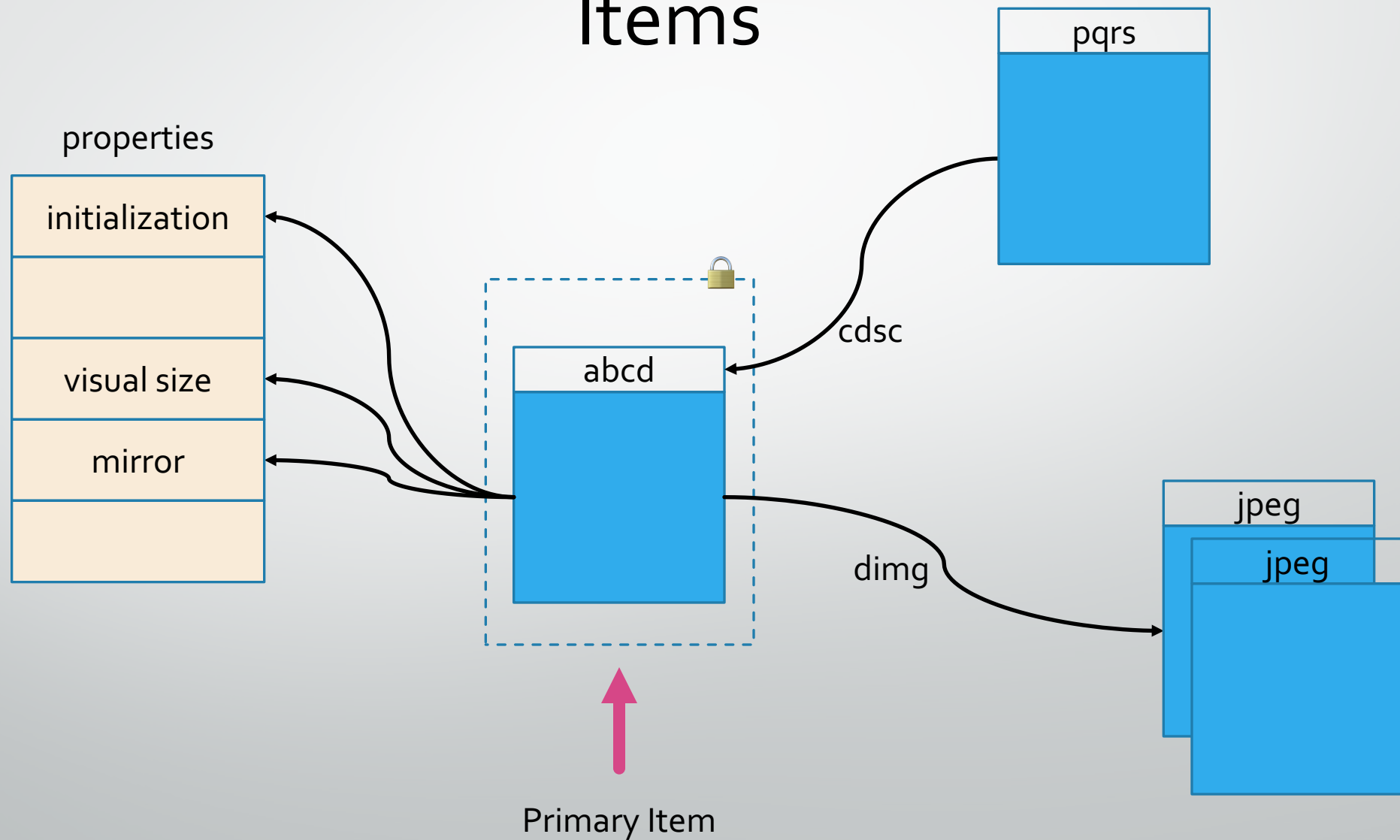
Genesis

- Built on the ISO Base Media File Format
- Uses and enhances structures defined for
 - MJ2 and MP₄, timed media files
 - MPEG-21, digital items

Two kinds of storage

- Sequences (e.g. bursts, brackets): as tracks, MP₄-style
- Images (coded or derived) as Items, MPEG-21-style

Items



Typed Items

- Coded Items
 - HEVC, AVC, JPEG, (JPEG-XR),...
- Derived items
 - Image overlay (compose)
 - Image Grid
 - ...
- Metadata Items
 - EXiF, XMP, MPEG-7, ...

Item Attributes

- Type
- Name
- Where they are stored (which file, and where in that file)
- Association with *properties*
- Optional association with content protection (DRM)

Item Properties

- Are 'small'
- Are either
 - Descriptive or transformative
 - Essential (e.g. initialization info) or non-essential
- Examples: decoder init, visual size, color coding, mirror, 90° rotation, crop...

Categories of Images

- Primary; 'the' image (e.g. when printing or interactivity is not possible)
- Coded image
- Thumbnail of another image
- Derived at run-time (e.g. an adjustment or composition)
- Pre-derived ('I made this for you but here are the ingredients')
- Hidden (only used for composition), auxiliary (e.g. alpha plane)
- Equivalent alternatives (e.g. different codecs)

File Structure

- MP₄-style: file header and data body
- Item bodies are referenced as
 - a concatenation of extents,
 - by offset and size
 - In this file or another
- Properties are in the file header

Sequences and Collections: Tracks

- MP₄ format;
 - video tracks ⇒ picture tracks
 - Picture tracks just like video tracks but have 'informative' timing only
- File header (tracks, sizes, etc.) and data body
- All data referred to by offset, size in this file or another
- Currently under consideration: derived tracks

Linking Items and Tracks

- Structures to say that *'this'* item is related to *'that'* time in *'that'* track
- Storage by offset/size means data can be shared (point to the same bytes)

Formal Derivation

- Structural definitions, this is a box-structured file:
 - Boxes and structure all in the ISO Base Media File Format (ISO/IEC 14496-12)
- Item storage uses the 'meta box' at file-level (i.e. not inside another box)
 - Use for images is in the HEIF specification, ISO/IEC 23008-12
- Tracks are in the 'movie box' (also file level)
- Data, if in the same file, typically in a media data box

Profiles and Brands

- The FileTypeBox remains, with brands that
 - Mark the file as conformant to the specification that defined the brand ('claim')
 - Allow processing by a reader that implements (perhaps only) that brand ('permission')
- Brands may define various levels; HEIF has both structural and codec-specific brands
- 'profiles' (brands), 'codecs' (tracks) and 'itemtypes' (items) MIME parameters

Registration Authority

- MP₄RA.org, to handle:
 - Track types
 - Item types
 - Reference types (track and item references)
 - Protection types
 - Brands

Codecs

- Developed for HEVC still image coding
- Also specified: how to store
 - JPEG
 - AVC pictures
- Under way in JPEG: JPEG-XR, JPEG 2000
- Under way in the Alliance for Open Media: AV1 -in-HEIF

Profiling

- MIAF (Multi-Image Application Format) under way
- Like CMAF, aims to define some generally adoptable conformance points
 - Codec, profile and level of codec
 - Item storage (same file, number of extents etc.)
 - Transformations
 - Derived items (thumbnails)
 - Etc.