Avid Media Composer and Avid DS in a Digital Intermediate Workflow

Avid

Introduction

Digital Intermediate is the process of manipulating high resolution digital motion picture images to change the color and other characteristics of the overall look of a movie during the finishing and mastering stages of post production. The Digital Intermediate (DI) process is now a standard procedure and has largely replaced photochemical color timing in most post production markets.

It's crucial for a post production solution to allow an easy transition from tape-based conform to file-based conform with full metadata management. During this transition, the need for tape-based metadata does not go away, but must co-exist with file-based metadata for the duration of the production. Productions may choose to start as film-to-tape-based (SD and HD), transition to the dual existence of tape-based and file-based, and then finish as file-based for the mastering and delivery requirements, or they may choose to work entirely as files from the start of the process.

Avid's mission is to streamline and redefine the digital intermediate workflow from acquisition to deliverable, maintaining a link with its unsurpassed metadata management between all the disciplines of the entire post production process.

Let's look at the process of a DI workflow from editorial to finishing.

First Step

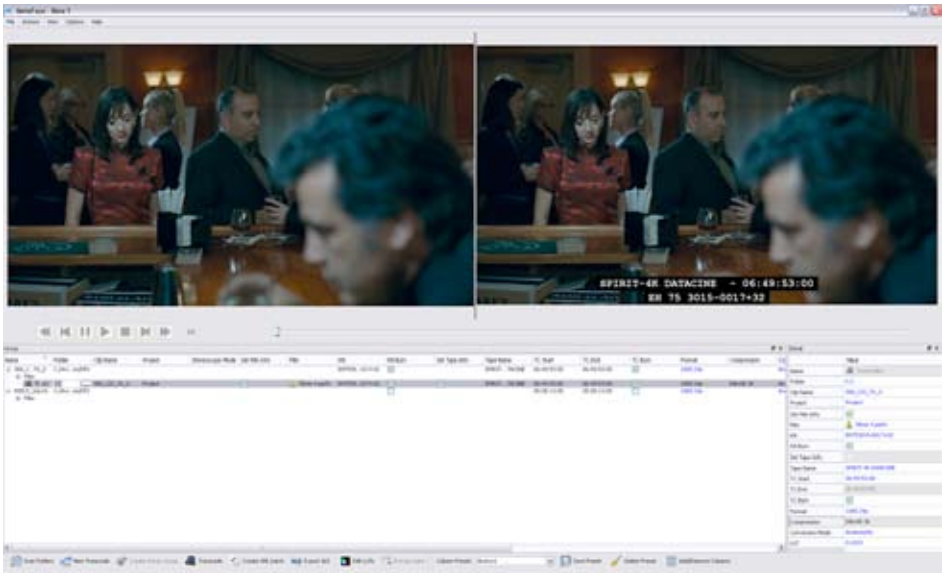
The Film offline workflow

Avid's Academy Award® winning Film Composer® technology, which is built into today's Avid editing systems, has delivered editing and metadata management solutions for over 15 years that are targeted to feature film production or any production working at 23.976, 24, and 25 frame rates. Building on its ability to track source type metadata for all gauges and formats, the user can easily recreate the creative decisions done in post at any point in the process; KeyKode, timecode at different rates (24p HD master, SD down converts), production audio timecode, playback timecode, etc. Each frame of picture and sound carries with it one or more pieces of frame based metadata as well as overall metadata such as shoot date, camera roll, scene, take, as well as user defined custom information such as comments and descriptions. All frame-based metadata can be tracked and displayed on a per frame basis above the source and record monitors for sources as well as reel and sequence lengths (record side timings). All of this

management allows the user to track back from the edited final sequences to each and every one of the original sources even when spanning different formats throughout the post process.

Avid MetaFuze

An important part of this workflow solution is Avid MetaFuze™. Avid MetaFuze bridges the gap between file-based formats such as DPX and TIFF, as well as offloading the process of creating Avid DNxHD™ proxy files from the 2K scans with all pertinent metadata embedded in the MXF metadata wrapper. MetaFuze is also designed to create Avid DNxHD files for stereoscopic workflows. Outputting complete and accurate descriptions of all the sources anywhere in the process is achieved using the Avid FilmScribe™ XML export tool. The XML file is easy to parse and contains a complete description of all sources and record timings in the sequence, along with all Avid and user defined custom metadata.



Avid MetaFuze Interface

VFX

First phase of file-based workflows

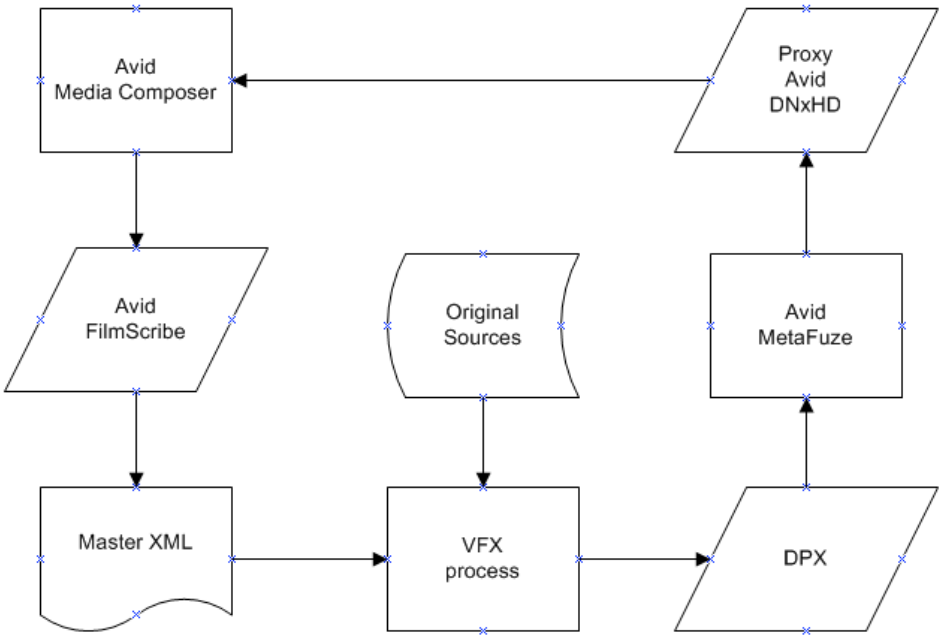
During the editorial process, the VFX elements will need to get generated from the temp effects created by editorial. This is done by generating an Avid Optical Pull list for the visual effects that need to be created. All lists for downstream processes are created from a master XML file of the sequence that is generated from Avid FilmScribe.

Transforms can be applied to the master XML file to generate lists with a subset of the metadata as needed for any one particular process. These lists can be exported in any file format including TAB delimited, CSV (comma separated values), HTML, or as another XML file.

After the VFX shots are created, they are returned to the editorial system via a proxy file (e.g. sequential TIFF files) for importing back into the picture editing system. This is the first step in tracking file-based sources within an existing film/tape-based workflow.

Once imported, these files can be tracked as VFX shots in a metadata column called "VFX." VFX is a frame-based metadata column that allows for a 32 alphanumeric prefix and a frame count from 0 to 999,999 separated by a hyphen (-). An example would look like "VFX32_v3_top-000001".

The Avid MetaFuze application can also be used to take DPX files (Digital Picture Exchange) exported from visual effects and animation systems and create MXF metadata and Avid media formats (Avid DNxHD, for example) to best fit the workflow. For example, Avid MetaFuze can be used at the VFX facility to create smaller data rate files such as DNxHD 36 as a proxy to move more easily over a network connection.



Avid has licensed the Avid DNxHD encoding technology to a number of third party visual effects and compositing solutions manufacturers so that VFX can be exported as Avid media direct from their systems.

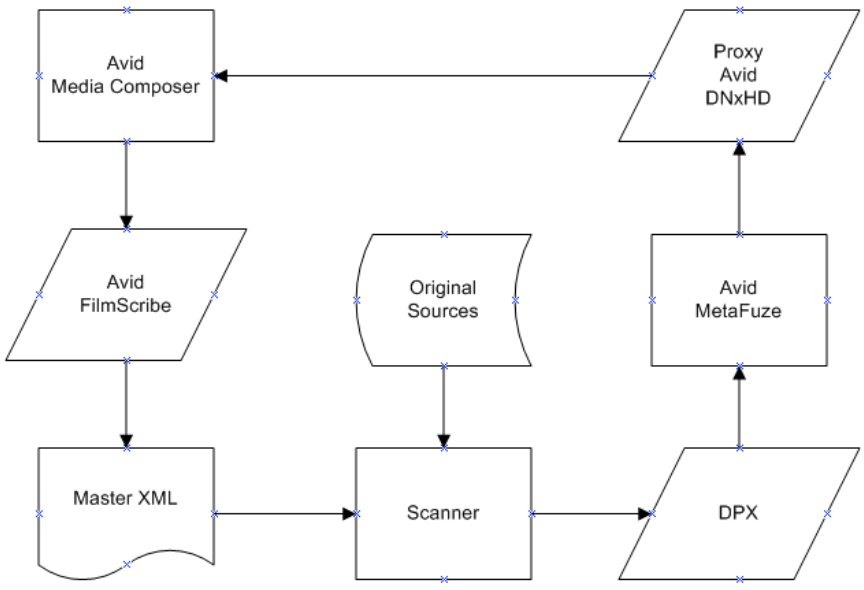
The VFX process continues until the VFX are finalized. During this recursive process, "Change Lists" can be generated to reflect frame(s) that were not used in the final effect because of editorial decisions reducing the number of frames that need to be rendered in the final process.

Non FX Scanning

The next step in file-based conform processes

Similar to the VFX process, a Pull List is generated for all shots in the film in order to scan the frames for 2K/4K finish. In this case, the user can use the XML file which contains all of the metadata needed to start a scan process such as Lab Roll, Camera Roll and all shots contained within a sequence. The user can also extract from the XML file an abbreviated list that contains information such as the non VFX elements or elements that only contain values in the KN Start (KeyKode) column which would reflect OCN (original camera negative). During the scanning process DPX files are created and stored on a server. The scanning process inserts metadata into the header of the DPX file such as KeyKode and timecode, as well as Tape Name if desired. The DPX standard also allows for additional metadata such as Scene and Take.

One of the key steps in the 2K conform is the verification process to ensure that the scanning process is frame accurate and matches the offline locked picture. Currently this step is done in the 2K conform room which is a much more expensive room than using an "offline" editing system. Moving this process to the offline room in an efficient manner requires the use of Avid media proxies made from the scanned DPX files using Avid MetaFuze.



Conform Check

MXF and Avid DNxHD Proxies bridge the gap between offline and 2K mastering

The size and number of 2K files or 4K files used in the Digital Intermediate process makes it costly to move the media across a WAN environment. It is often the case that the production company is not located at the same facility that is providing the scanning and DI conforms. In these situations, moving proxies across a secure network is far more efficient and less costly. In order to facilitate this process and ensure that all metadata is available for tracking, Avid MetaFuze creates MXF wrapped DNxHD or JFIF proxies from the DPX files. As the name implies, MetaFuze merges the image from the DFX file with additional known metadata from the offline process based on the KeyKode and/ or timecode embedded within the files. KeyKode is the only form of metadata that is unique and consistent throughout the entire post production process..

During this process, Avid MetaFuze looks to the server and indexes all DPX files for the project. These files can be previewed as an image with the embedded metadata decoded and applied as an overlay on the image, much the same way a telecine transfer would provide window burn-ins of the timecode and KeyKode. The directory path of the original 2K files can be added to the Avid metadata column for specifically tracking the location of the file. A LUT (look up table) can also be referenced during this stage and it too will be tracked as a "path+file_name" of LUT in the Avid column; LUT. [See Avid Metadata Logging and Tracking whitepaper at www.avid.com/resources/whitepapers/ avidmetadata_wpv2.pdf?featureID=1122&marketID=]

All of this metadata becomes part of the MXF wrapper which contains the Avid DNxHD proxy of the scans. Avid MetaFuze will also export additional metadata in the ALE format which can then be merged into the files in the Media Composer®. Avid DNxHD proxies are available in four different data rates for progressive projects;

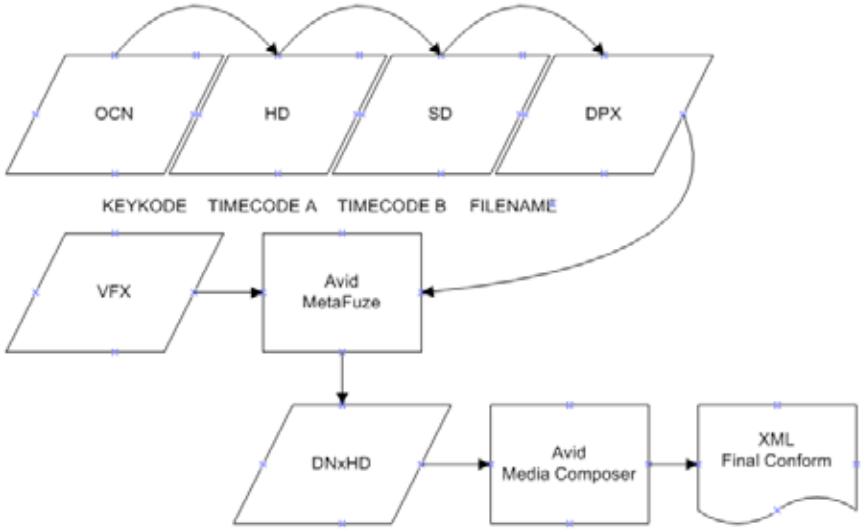
- Avid DNxHD 175x: 220Mb/s 10 bit, 4:2:2 16:9 aspect ratio
- Avid DNxHD 115: 220 Mb/s 8 bit, 4:2:2 16:9 aspect ratio
- Avid DNxHD 115: 145 Mb/s 8 bit 4:2:2 16:9 aspect ratio
- Avid DNxHD 36: 36 Mb/s 8 bit 4:2:2 16:9 aspect ratio

The user can choose to crop or pad depending on the original aspect ratio of the sources in relation to the 16:9 DNxHD proxy aspect ratio:

- Anamorphic
- Letterbox
- Pillarbox

- 16:9 crop from top
- 16:9 crop from center
- 16:9 crop from bottom

Once these proxies are created, the MXF files are brought back into the offline editorial environment. The MXF files are opened in the original project where they can be played and viewed. All metadata columns are available in the Avid bins. If additional metadata is needed, the ALE file generated by Avid MetaFuze can then be merged. The original sequence is highlighted and a relink to the MXF files is performed. The relink is done based on the common KeyKode or original timecode and a duplicate sequence is created now referencing the scanned DPX. The offline and proxy versions of the timelines can be locked together via the "gang" feature or played against the original. Any changes to the sequence will be reflected in all subsequent lists created. This is done to ensure frame accuracy of the entire post process and scan. The Avid DNxHD proxies provide an additional benefit by providing high-quality images for projection room screenings.



Final Conform - 2K Mastering

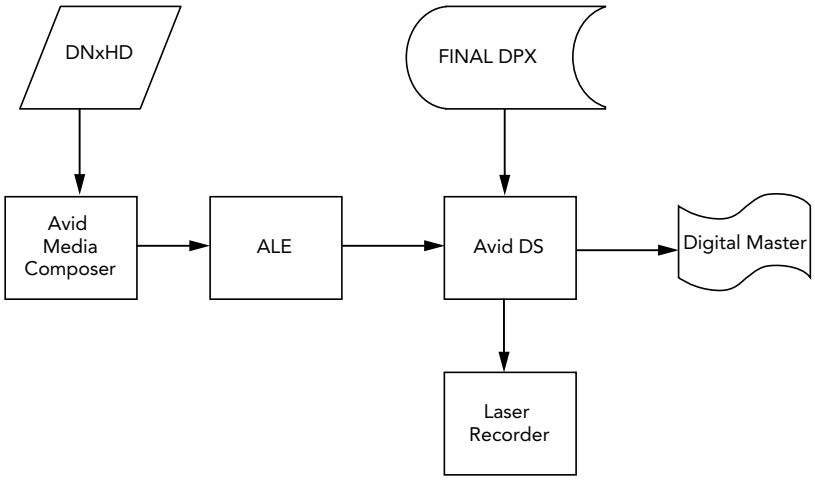
The project can move to the final finishing stage once the scans have been checked against the offline. Avid DS provides powerful features to conform any project at 2K or 4K resolutions. Avid DS is resolution independent and full RGB 4:4:4 compliant. A project that has been edited in SD or HD in Media Composer can be effortlessly conformed in full 2K or 4K using Avid DS. The locked sequence is copied from the Media Composer into the DS system with the use of an AFE file, this file contains all the metadata required

to rebuild the entire sequence including links to the media utilized in the offline suite and all of its effects. The core advantage of this relink function to the offline media is to allow a quick check of the conform making sure the 2K/4K files are exactly the same as the media used during editorial.

Regardless of its original resolution, the offline timeline can easily be opened in an Avid DS 2K/4K project. The Avid DS will recreate all the effects at the new finishing resolutions. This feature will save time and money in the finishing stage by doing all the basic VFX work automatically. This feature can also be used as a base for the finished composites removing guess work and allowing the finishing artist to spend more time in finessing his or her effects.

The conform is instant in Avid DS and the creative work can start right away in full RGB 2K/4K, the DS Artist can now color correct and composite the necessary VFX shots using the system's powerful node based compositing architecture.

For the final stage of this process, DS will export the entire finished sequence in full 2K/4K DPX (Digital Picture Exchange). Avid DS will manage the correct LUT on the output and therefore allow a simple integration to the laser recorder. This process within the Avid is completely transparent and the facility can be confident that the image quality will never be compromised, no matter the resolution, color space and compression.



Summary

Avid is focused on delivering the finest Digital Intermediate (DI) workflows. DI Offline is available today in Media Composer, with robust metadata management for DPX files as well as timecode and KeyKode. DI Conform for 2K/4K finishing is available today in the Avid DS system using AFE for file-based conform. The XML export of metadata will allow any downstream process to be streamlined, whether prepping files for a scan process or conform in a grading station of your choice. Avid is also working with partners in the 2K workflow such as Arri, Codex Digital, Digital Vision, FilmLight and other manufacturers to provide key pieces in the overall management of the workflow.

For more information, please visit the Film and High-Resolution Solutions page at www.avid.com/solutions/film-high-resolution-solutions.asp.

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Footage courtesy John Fiore "Johnny Slade's Greatest Hits"

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