



Brief:

Digital Dailes

Introduction

It is clear that Hollywood is headed towards the full digital production, post-production and distribution of movies. While it will take years to get there (and much will be learned along the way), the end result will be a more efficient and better quality product that is ultimately more affordable to the end consumer.

With current movie production methods, too much money is spent in the viewing and reviewing of the day's camera work. When using film, the average movie consumes over \$300,000 in film prints during the production process alone. This money is spent solely for distribution to those making the film: the colorists, the graphic artists, the executive producers, etc.

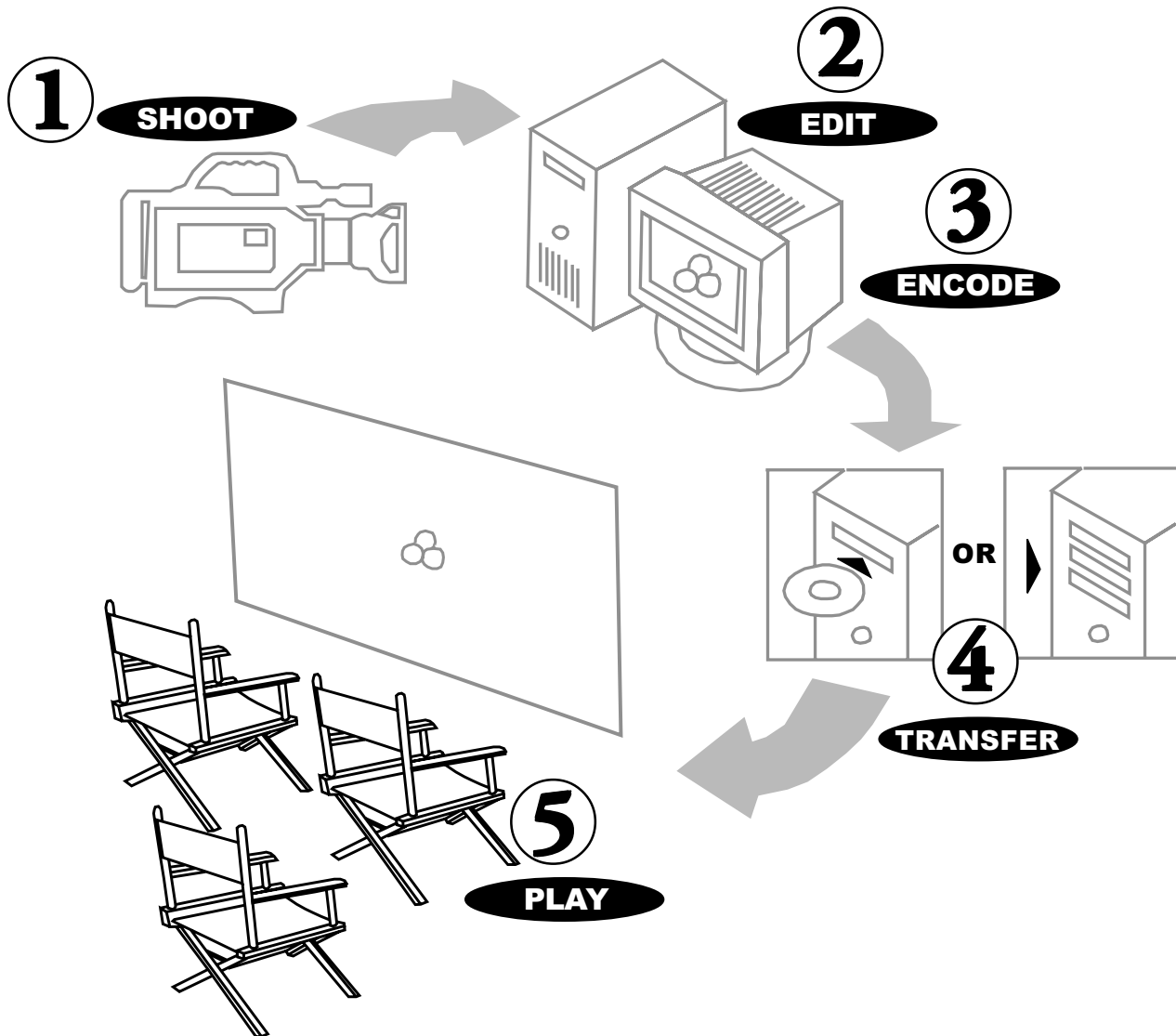
The proposed "digital dailies" uses digital technologies to duplicate and distribute the "dailies" in a more cost-effective and efficient manner.

With existing technology, a low-cost system can be created using compressed High Definition (HD) data for the duplication and distribution of "dailies". Advantages include:

- No need for large film projectors.
- No need to use a D5 for review. Inexpensive (\$500) DTV computer decoders can be used instead.
- No film replication required.
- Ability to save time by delivering straight from the post-house to the reviewers, bypassing the need for "rushes."
- Ability to deliver through many digital methods including rewritable DVDs, broadband, or Internet, or even DVHS. Increasing reliability of delivery.

Workflow overview

The diagram below depicts how the proposed process will work. The movie is delivered to a facility for editing, and it is acquired using SDI to on-line storage. (This facility uses D5 and similar equipment for general manipulation of the movie.) Next, the movie is encoded for "digital dailies" distribution. This step uses an MPEG compression algorithm that is tailored for HD film review. Once the material is encoded, it can be transferred to rewritable optical drives, burned to DVD-ROM, or even sent directly to the client via broadband or Internet connections. After the client receives the movie it is easily viewed within a DTV equipped computer or DVHS system.



Proof of Concept

The “proof of concept” demonstration consists of two primary components. The first component serves three purposes:

- Acquisition of the HD content through a SDI interface.
- Editing and manipulation of the HD content.
- Encoding of the HD content.

The first component consists of:

- Apple G4
- Pinnacle Cinewave SDI Acquisition Card
- Rorke Data Raid for storage of uncompressed HD
- HEURIS MPEG Power Professional – HD software encoder
- Panasonic DVD-RAM rewritable optical drive

The second component is an inexpensive computer for HD playback. It consists of:

- 500mhz Pentium III-based computer.
- DTV decoder card.
- DVD-RAM rewritable optical drive.
- Panasonic large format plasma or digital projector.

Prototype and proposed product specification

The “proof of concept” demonstration shows a working system capable of delivering “digital dailes.” Several enhancements will be made to the “proof of concept” to create the prototype. These enhancements will greatly increase the appeal of the system and its marketability.

First, the prototype will include support for SDTI only. This will generate several benefits, including:

- Greatly reducing the need for hard drive storage space on the encoding system where only SDTI is used.
- Creating a dedicated rack system specifically for encoding, allowing the editing system to remain decoupled from the encoding system.
- Reducing the cost of the encoding system by eliminating SDI support (since all modern VTRs and HD cameras already support SDTI).
- Allowing the encoder to be decoupled from the editing system, yet be part of the editing process when needed.

The term “dailes” implies the need for real-time performance. Ultimately the “proof of concept” system performance will be increased from a non-real-time to real-time. A “render farm” approach will be used to obtain the necessary performance. The prototype system will use multiple computers to enable real-time performance. Eight processors (or less) will be required to achieve this result. The prototype will exist on both a PC architecture using a high-speed interconnect bus and an Apple system using an interconnect bus compatible with Avid.

To protect the distributed content, the system will employ a simple security measure to protect and prevent casual copying. The prototype will use “conditional access” keys in order to secure the content and provide the necessary security. This technology is already utilized by Hollywood to protect and deliver content through the existing digital broadcast network.

Ultimately, the encoding system will be delivered in a “turn-key” manner with only the following abilities:

- Acquire the SDTI input.
- Transcode to HD compressed.
- Write to rewritable optical and eject the disc for distribution.
- Hook up to more systems that will enable a “render farm” approach to encoding.

Thus, the complex encoding interface in the “proof of concept” system will be replaced with a very simple interface.

Conclusion

Hollywood creates more than two hundred movies each year. This adds up to well in excess of \$60 million being spent on film prints for dailies alone. It is expected that the cost to rollout the concept of digital dailies could be as little as \$10K per installed client and \$30K per server/encoder.

The costs to complete the proposed prototype are under \$1 million. The “digital dailies” systems could be deployed through several revenue earnings methods including sales of discrete systems or sales of a “digital dailies service” as part of the production or post-production process.

The initial prototype could be deployed in less than six months, with complete and fully functioning product, all bugs worked out, in less than 12 months.



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