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15
16 * Pro Hac Vice application to be filed

17   **IN THE UNITED STATES DISTRICT COURT**

18   **FOR THE CENTRAL DISTRICT OF CALIFORNIA**

19   **WESTERN DIVISION**

20

PRESERVATION TECHNOLOGIES LLC,	Civil Action No. 2:23-cv-03306
Plaintiff,	**ORIGINAL COMPLAINT**
v.	
EPIX ENTERTAINMENT LLC d/b/a MGM+ ENTERTAINMENT,	
Defendant.	

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Plaintiff Preservation Technologies LLC ("Preservation" or "Plaintiff"), by and through its attorneys, for its Original Complaint against Epix Entertainment LLC d/b/a MGM+ Entertainment ("MGM+" or "Defendant"), hereby alleges as follows:

I. NATURE OF THE ACTION

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1.   This is a patent infringement action to end Defendant's direct, joint, contributory, and/or induced infringement of Plaintiff's patented inventions, including but not limited to Defendant's unauthorized and infringing use, sale, offering for sale, manufacture, and/or importation of methods and products incorporating Plaintiff's inventions.

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2.   Preservation has obtained all substantial rights and interest to U.S. Patent No. 6,353,831 (the "Asserted Patent" or "Patent-in-Suit").

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3.   Defendant has provided, used, put into use, sold, offered for sale, distributed, and/or imported infringing products and services, and encouraged others, including its customers, to use Defendant's products and services in an infringing manner.

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4.   Plaintiff seeks past damages and prejudgment and post judgment interest for Defendant's past infringement of the Asserted Patent.

II. PARTIES

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5.   Plaintiff is a limited liability company organized and existing under the laws of the State of Delaware.

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6.   On information and belief, Defendant MGM+ is a corporation organized and existing under the laws of Delaware with an established place of business in this District at 245 N. Beverly Drive, Beverly Hills, CA 90210-5317. Defendant may be served by serving its registered agent in California, Amanda Garcia of CT Corporation System, at 330 N. Brand Boulevard, Glendale, CA 91203.

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7.   Defendant owns, offers, and/or operates a streaming service(s) and websites focused on movies and television series, including but not limited to epix.com.

Civil Action No.   -2-   ORIGINAL COMPLAINT

III. JURISDICTION AND VENUE

8.   This is an action for patent infringement, which arises under the Patent Laws of the United States, in particular, 35 U.S.C. §§ 271, 281, and 283-285, among others. This Court has subject matter jurisdiction of the action under 28 U.S.C. § 1331 and § 1338(a).

9.   The Court has general and/or specific personal jurisdiction over Defendant in that Defendant has, directly or through agents and/or intermediaries, committed acts within the State and this District giving rise to this action and/or has established minimum contacts with this State and this District such that the exercise of jurisdiction would not offend traditional notions of fair play and substantial justice. Among other things, (1) Defendant maintains a regular and established place of business in this State and in this District; (2) Defendant has used, sold, advertised, marketed, and distributed products in this State and in this District; (4) the patent infringement claims arise directly from Defendant's conduct and continuous and systematic activity in this State and this District; (5) Defendant derives substantial revenue from the sale of infringing products distributed within this District, and/or expects or should reasonably expect its actions to have consequences within this District and derive substantial revenue from interstate and international commerce. Venue is proper in this District pursuant to 28 U.S.C. §§ 1331, 1338(a), 1391(b)-(d), and 1400(b) because, among other things, Defendant maintains an established place of business in this District. Moreover, a substantial part of the events and omissions giving rise to the claims at issue occurred in this District.

IV. PATENT-IN-SUIT

10.   On March 5, 2002, United States Patent No. 6,353,831 (the "'831 Patent" or the "Patent-in-Suit") was duly and legally issued for a "Digital Library System." The invention disclosed by the '831 Patent relates to a digital library system that includes systems and mechanisms for capturing, managing, and distributing multimedia data. The claims of the '831 Patent cover, by way of example only, a

1 digital library system comprising a means for cataloguing multimedia data, a means

2 for managing access, and a means for distributing.

3 ### V. HISTORY OF THE INVENTION

4 11. The Asserted Patent is currently owned by the University of Southern

5 California and Preservation has obtained a license with all necessary rights from the

6 Shoah Foundation of the University of Southern California (the "Shoah Foundation")

7 to enforce this patent against Defendant in its own name. The Asserted Patent is fully

8 incorporated herein by reference with the same force and effect as if it was given in

9 full text. In the mid-1990s, Steven Spielberg founded the Shoah Foundation to

10 preserve the testimonies of the then living 50,000 holocaust survivors before their

11 first-hand accounts of the Holocaust were lost as that generation passed away. The

12 Shoah Foundation's impetus was to gather, catalog, and make available for access

13 thousands of video testimonies. In doing so, the Shoah Foundation sought to build

14 one of the largest video libraries in the world comprising nearly 52,000 video

15 testimonies in 32 languages from 56 countries.

16 12. In 1996, there was no multimedia system that could handle the large

17 volume of video testimonies collected and maintained by the Shoah Foundation, so

18 Samuel Gustman, CTO of the Shoah Foundation and an inventor of the Patent-in-

19 Suit, set out to design one. Gustman created a multimedia distribution system that

20 incorporated a unique distributed modular infrastructure and advanced techniques for

21 indexing, accessing, distributing, and surveying multimedia data. Hundreds of

22 researchers participated in the implementation of a working system over a multi-year

23 period. It was important to the system was the need to interact and be compatible

24 with various portals at 199 sites in 39 countries and 12 different languages.

25 13. Gustman eventually created a multimedia distribution system that

26 incorporated a unique distributed modular infrastructure and advanced techniques for

27 indexing, accessing, distributing, surveying multimedia data that was compatible

28 with disparate technologies of multimedia components. The inventions underlying

Gustman's system were captured in several patents, including the Patent-in-Suit. Today, these inventions are used to enhance the consumer multimedia streaming experience in nearly every major internet company.

VI. OVERVIEW OF THE PATENTED TECHNOLOGY IN VIEW OF PATENT ELIGIBILITY UNDER 35 USC SECTION 101

14.   The Asserted Patent and claims are not merely directed to the basic idea of a digital library, a card catalogue, or even a multimedia system. Rather, the patent reflects the Shoah Foundation's multi-year efforts involving hundreds of researchers to actually create and implement a well-functioning, large scale multimedia system across multiple platforms using nonconventional technology.

15.   Early multimedia systems suffered from technical problems that were simply not present with brick-and-mortar document libraries and card catalogues such as:

1. Interoperability between components of differing platforms or computer systems;

2. Effective content-based searching of non-textual video material and the inability to search within a video;

3. Inadequate an inefficient data structures and system architectures; and

4. Long query response times, prohibitive system processing consumption and bandwidth consumption.

16.   The Patent-in-Suit describes and claims several specific technological improvements to address these real-life technical problems in early prior art multimedia delivery systems. These specific implementation features embody inventive concepts that were unconventional for the time period and can be grouped into at least six categories of distinctly claimed non-abstract technological improvements:

1. The Distributed Architecture Claims for addressing compatibility and replacement problems associated with the closed architecture of early prior

art multimedia systems;

2. The API Protocol Interface Claims for Interfacing Multimedia Components of a Distributed Architecture to address compatibility and inoperability problems;

3. The Catalogue Data Structure Claims for Searching Multimedia;

4. The Phrase Data Structure Claims for Searching within a Video;

5. The Search Query and Search Result Caching Claims for Preprocessing Search Results; and

6. The Video Caching Claims for Efficient Video Delivery.

17. The essence of the inquiry into whether a claim is improperly directed into an abstract idea is whether the limitations as a whole are merely directed to a desired, but abstract, result or whether they specify a particular technological means to achieve such result, with the former being an improper abstract idea and the latter being a patent-eligible technological improvement. Importantly, the claimed solutions of the Patent-in-Suit are not merely directed to abstract results, but rather are directed to specific architectures, multimedia components, interfaces and protocols, data structures, processing steps and other features that represent non-abstract technical improvements that provide the technological means to achieve a solution to a technological problem. Similarly, the non-abstract improvements specified by the ordered combination of the claims also contain one or more non-conventional, non-routine and non-well understood inventive concepts that also confer patent eligibility.

A.   <u>Distributed Architecture Claims for Interoperability</u>

18. At the time of invention, development of multimedia distribution systems was in its infancy. Transmission of video and multimedia over existing computer communication networks, including the Internet, struggled with bandwidth, system resource processing, and compatibility issues that impeded the development of early multimedia distribution systems. At the time of the Patent-in-

1 Suit, multimedia protocols for transmission over the internet had not yet been

2 developed.

3   19.   As late as 2007, nearly a decade after the original filing date of the

4 Patent-in-Suit, the widespread use of proprietary protocols is described as a key

5 obstacle to the distribution of video via the Internet and the development of non-

6 proprietary protocols for multimedia is lauded as a significant advancement:

7   By the mid-2000s the vast majority of the Internet traffic was HTTP-

8   based and content delivery networks (CDNs) were increasingly being

9   used to ensure delivery of popular content to large audiences. Streaming

10   media, **with its hodgepodge of proprietary protocols** - all mostly

11   based on the far less popular UDP - suddenly found itself struggling to

12   keep up with demand. **In 2007 a company named Move Networks**

13   **introduced a technology and service that once again would change**

14   **the industry: HTTP-based adaptive streaming.**

15   **Instead of relying on proprietary streaming protocols and leaving**

16   **users at the mercy of the internet bandwidth gods, Move Networks**

17   **used the dominant HTTP protocol to deliver media in small file**

18   **chunks while utilizing the player application to monitor download**

19   **speeds and request chunks of varying quality (size) in response to**

20   **changing network conditions.** The technology had a huge impact

21   because it allowed streaming media to be distributed far and wide using

22   CDNs (over standard HTTP) and cached for efficiency, while at the

23   same time eliminating annoying buffering and connectivity issues for

24   customers.

25 Zambelli, A History of Media Streaming and the Future of Connected TV, available

26 at https://www.theguardian.com/media-network/media-network-blog/2013/mar/01/

27 history-streaming-future-connected-tv (emphasis added).

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20.   At the time of the filing of the Patent-in-Suit, the management and transmission of multimedia and video over wide scale networks, particularly the Internet, was not conventional or routine practice among generic computer systems. Special purpose computer software or hardware components that are not part of a generic computer programming, such as an indexing server, storage manager, or an archive server as well as media protocols, required to implement this functionality were just being developed or still in development in single component prior art systems.

i.   *The Distributed Architecture Claims Are Directed to Compatibility and Interchangeability Problems Caused by the Closed Architecture of Prior Art Multimedia Systems*

21.   The Distributed Architecture Claims provide a "particular arrangement" of server components (software and/or hardware) and data structures in a specific relational architecture that provides a solution to compatibility problems that were caused by the closed architecture of the then state of the art multimedia delivery systems—and they therefore represent non-abstract technological improvements to existing prior art multimedia systems. The patent was intended s to address the problems with existing technology. Although a few basic, but limited, commercial multimedia systems were available at the time of filing, the available multimedia systems used a closed architecture that hardwired (by software design or physically) the various multimedia components and functions into a single multimedia component or proprietary system and ran on a single platform. These existing prior art multimedia management systems merged the functionality of a multimedia system into a single component, thereby making it impossible to separate the merged system into discrete components. A related patent whose application is incorporated

by reference[1] criticizes prior art for its use of a closed architecture and proprietary interfaces that prevent interchangeability of multimedia components and cross platform solutions.

> Current multimedia systems attempt to provide some… of the components described in FIG. 1A. However, the components provided by these systems are merged to form a single component **thereby making it impossible to separate the merged components into the discrete components described** in FIG. 1A.

5,813,014 Patent, 1:39-43 (emphasis added).

> [N]one of the systems provide viable options for each of the multimedia components identified in FIG. 1A. **All of the systems merge the components identified in FIG. 1A into a single, component** that makes it impossible to replace one of the components. Further, by combining the components into a single component, each system must run on a single hardware platform. Further, there is no vendor-independent interface available to integrate components from different vendors to construct a optimum multimedia system.

'014 Patent, 3:38-47 (emphasis added). The specification with its incorporated documents further describes several of these prior art systems and their deficiencies. It distinguishes the claimed invention is distinguished from the closed prior art system by the lack of separable multimedia components (software or hardware) and non-proprietary interfaces between the components. These systems offer weak solutions because component interconnections are either hardwired or used proprietary protocols, and it is therefore impossible to substitute components of the

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[1] '831 Patent, col. 19-25 ("A more detailed discussions of an asset management System is provided in a co-pending U.S. Patent Application entitled "Method and Apparatus for Management of Multimedia Assets', pending Ser. No. 09/157,612, filed on Jul. 10, 1996 and incorporated herein by reference.")

1   system that can communicate using the existing connections for the existing

2   components. There is no ability to split the component into discrete components such

3   that replacement component can be substituted for one of the existing components.

4   Further, it is impossible to split the combined component into separate components

5   that can run on multiple hardware platforms.   This creates problems with

6   interoperability between systems and with upgrading components as technology

7   changes.   For example, a pre-packaged system having interconnected system

8   components with **hardwired, proprietary interconnections is illustrated in**

9   **FIG.1F.** Such a system is provided by Cinebase. System 178 includes a component

10 formed by method player 182, tertiary storage manager 184, archive server 186,

11 index server 188, and client 190. There is no clear delineation between components.

12 Further, there are no clearly defined lines of communication between the

13 components.   Component interconnections are hardwired, and it is therefore

14 impossible to substitute components that can communicate using the existing

15 connections for the existing components. There is no ability to split the component

16 into discrete components such that replacement component can be substituted for one

17 of the existing components. Further, it is impossible to split the combined component

18 into separate components that can run on multiple hardware platforms.   The

19 combined component offers a weak solution.   '014 patent, 2:20-30.

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21   FIG. 1A

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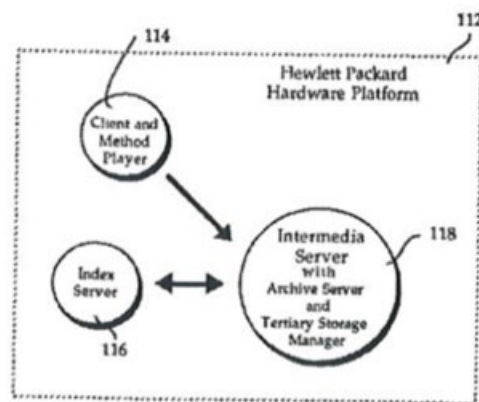
22.   Another example, Hewlett Packard's state of the art rudimentary system included an index server and a client with built-in player functionality, but does not include a separate method player component. Accordingly, this design is only viable with Hewlett Packard's system and is incompatible in a network that may use different clients or computers. Its archive server and tertiary storage management subsystems are integrated in intermedia server. Client and player and index server are interconnected with intermedia server to form a single component. The interconnections are hardwired such that it is impossible to replace one of the existing components.

23.   Similarly, another state-of-the-art existing multimedia management system by IBM has similar deficiencies. This system, like Hewlett Packard's, "offers index server (e.g., Oracle's DBMS), archive server, and tertiary storage manager in an integrated system." IBM's system does not include a client or method player and thus is again incompatible in a network that may use different clients or computers. Like the Hewlett Packard system, the IBM system merges the component into a single proprietary system thereby creating a closed architecture. The system is built to run in a mainframe environment using IBM hardware. Further, the system does not include a client or method player. Its multimedia functions are combined as a single component such that it is impossible to replace one or more of them.

24.   Another multimedia management system described by the '014 Patent, provided by Informix "includes kernel 170 that acts as a hub." Id., 2:60-62. The '014 Patent plainly states Informix's system "runs in a single hardware platform" and is once again incompatible in a network that may use different clients or computers:
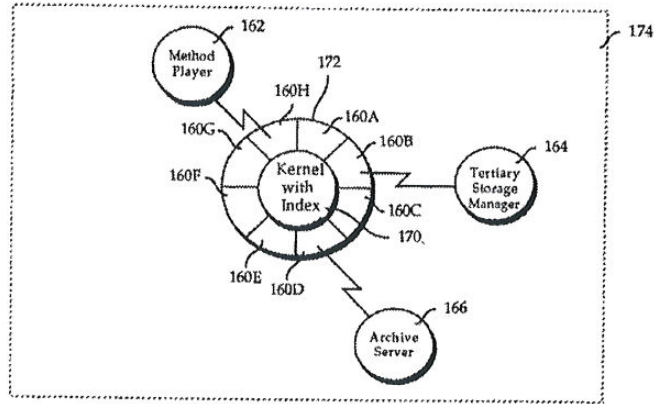
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FIG. 1E

9   '014 Patent, 3:8-9, Fig. 1E. Again, the patent specifically criticizes the use of a

10   proprietary interface to form a single proprietary system:

11   Thus, another component must communicate with the index via a

12   proprietary interface provided by a data blade (e.g., data blades 160A-

13   160H). Data blades 160H, 160B, and 160D provide a proprietary

14   interface to method player 162, tertiary storage manager 164, and

15   archive server 166, respectively. **The components provided by this**

16   **system are merged to form a single component that use a**

17   **proprietary interface to communicate. The component**

18   **combination runs in a single hardware platform 174.** Data

19   dictionary 172 can become large and cumbersome. In addition, a fault

20   that occurs in one data blade that is included in data dictionary 172

21   causes a fault for the entire system. **This system construction is not**

22   **fault tolerant and is unacceptable for a production environment.**

23   '014 Patent, 3:2-15 (emphasis added). Again, the Patent-in-Suit further criticize

24   this prior art for its use of a closed architecture using proprietary protocols.

25   A multimedia system having a hub is illustrated in FIG. 1C. Such a

26   system is provided by Oracle. The hub is provided by media server 130.

27   **The system runs on a specific hardware platform** (hardware platform

28   138, an N-Cube hardware platform) **and is not portable to other**

1 **platforms. Media server 130 acts as a hub that uses a proprietary**
2 **interface to communicate with the other services.** Components with
3 which media server 130 can communicate are method player 122,
4 tertiary storage manager 124, and client 120 (via lines 134, 132, and
5 136, respectively). . . .   The component formed by media server 130,
6 method player 122, tertiary storage manager 124, index server 128,
7 archive server 126 and client 120 **must run on a single hardware**
8 **platform**, platform 138. Further, while index server 128 is a powerful
9 database management system, client 120, archive server 126, method
10 player 122 and tertiary storage 124 **offer weak solutions.**
11 '014 Patent, 2:20-38 (emphasis added).
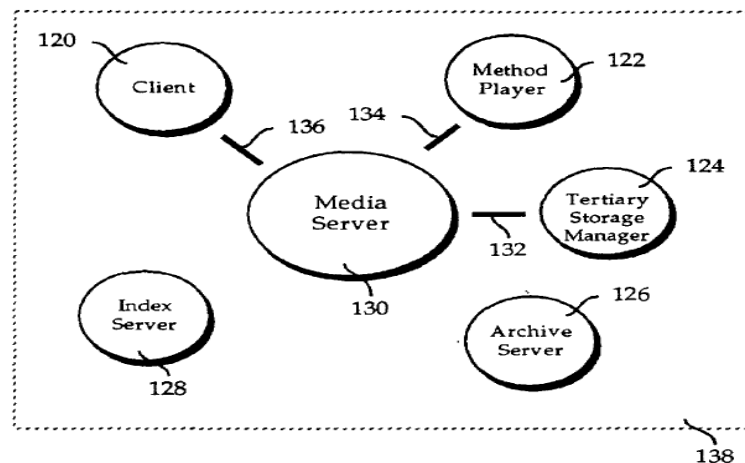
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FIG. 1C

21 '014 Patent, Fig. 1C. The patents explain that the "closed architecture" of the merged
22 prior art multimedia systems resulted in compatibility and replacement problems.
23 "This [closed] architecture is disadvantageous for at least two reasons: 1) there is no
24 ability to replace a less capable component with another, more capable component;
25 2) it forces each system to run on a single hardware platform." '014 Patent, 1:44-47.
26 Furthermore, "there is no vendor-independent interface available to integrate
27 components from different vendors to construct a optimum multimedia system"
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"mak[ing] it impossible to replace one of the components." '014 Patent, 3:45-47. Consequently, the prior art system cannot grow in size and capability as needs change. Nor could such closed system incorporate newer faster or more capable components as technology improved without replacing the whole system. Finally, since the systems ran on a "single platform," these early systems could not be used to distribute the multimedia to clients beyond the propriety clients developed solely for those multimedia systems and were ill-suited for general purpose use on computer networks such as the World Wide Web that required compatibility with disparate media players and clients of various uses on the web.

      ii.   *The Distributed Architecture Claims Provide a Particularized Technological Solution to the Compatibility and Interchangeability Problems of Prior Art Systems by Setting Forth an Unconventional Modular Distributed Architecture that Used Specialized Interfaces to Allow Interchangeability Among Platforms and System Components*

     25.   The Distributed Architecture Claims solve the compatibility and interchangeability problems of prior art systems identified in the specification by utilizing an unconventional distributed architecture with separable multimedia components (software or hardware) interconnected by unconventional generalized media specific interfaces created to handle media functions that allow for interchangeability and interoperability of system components. The Shoah claims implement a specific and unconventional architecture because, in addition to using a generalized API interface using a non-proprietary protocol, the claims distribute the functions of prior multimedia systems into separable components—differing from prior art system that fused (by design) the functions into a single component. Furthermore, the Shoah claims also specify additional limitations to the components including actual data structures (e.g., relationships in the catalogue data structure, additional storage management systems) and sets forth additional functional requirements of the components. Thus, the Shoah patents claim both generalized

1   interfaces and multimedia components that differed from that of the prior art and the

2   claims as a whole specify a particularized, unconventional solution.

3   26.   Unlike the prior art systems described above, this claimed architecture

4   was unconventional and non-routine in that it distributed the functions of the

5   multimedia system into multimedia components that can be separated from each

6   other rather than a single merged proprietary component (e.g., a browser, an indexing

7   server, an archive server, and a method player. This allowed functions to be handled

8   by different software components so that when certain functionality improved (e.g.,

9   superior indexing server or better media player or a more advanced browser) that

10   functionality could be incorporated without replacing the whole system.

11   '831 Patent, Fig. 2 depicts the asset management system:

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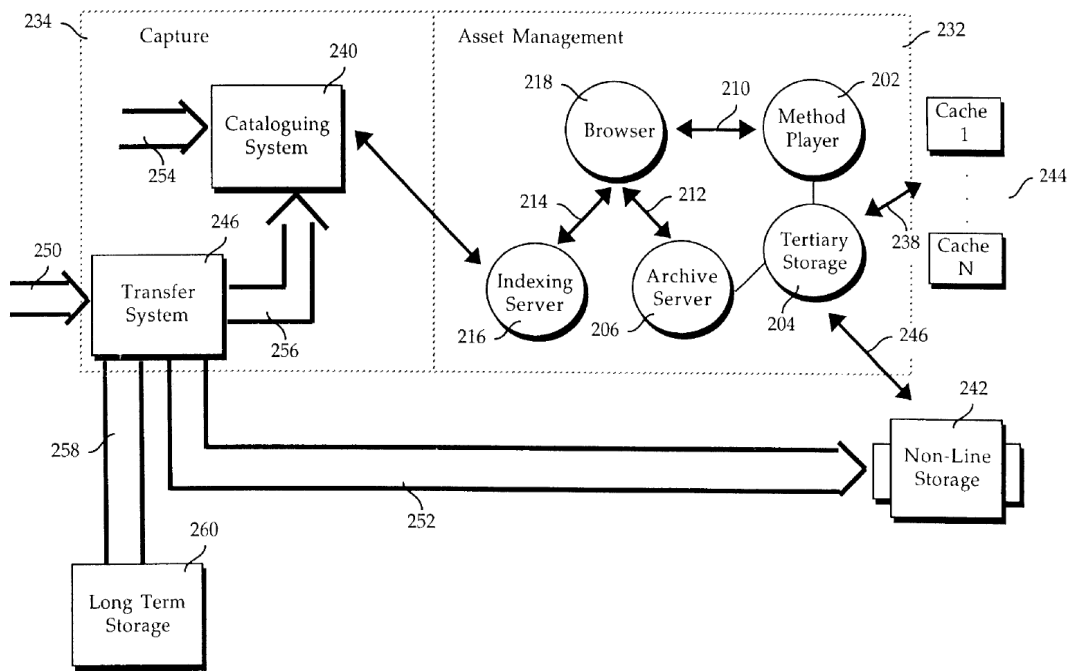
Figure 2

26   27.   Unlike the prior art systems that had no clear delineation between

27   components and used proprietary interfaces that could not operate with components

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outside of the same platform, the claimed invention uses non-proprietary interfaces (depicted as 210, 212 and 314 in Fig. 2 above) to allow for modular software components from different vendors to make up a single modular distributed system. The "interface" of the embodiment of the Distributed Architecture claims are nonproprietary interfaces that require the use of a non-proprietary "generalized" protocol:

> Generalized interfaces define a communication protocol that can be used by any vendor Supplied browser, indexing Server, archive Server, tertiary Storage manager, and/or method player to communicate with another asset management System component.

'831 Patent, Col. 3:66-5:3. These "media interfaces" were unconventional and non-routine because they were specially adapted for multimedia functions and used a non-proprietary protocol that could be utilized by components of different vendors for multimedia functions. In contrast, the prior art systems did not use generalized interfaces with generalized multimedia interfaces but rather were hardwired (physically or by software design) into a single component using a single platform.

28.   As technology improves or system needs change, new software or hardware components can be efficiently swapped in to replace less capable or malfunctioning components. This flexible system not only provides unique advantages over the art and allows the system to grow as technology improves without having to replace the system wholesale but is particularly suited to network data transmission mediums such as the Internet in which interoperability with different clients and different method players is expected, if not required. Indeed, this technology was specifically important to the Shoah Foundation as it needed to preserve and catalog more than 50,000 video testimonies for the public at large. Remarkably, this system remains still in use today.

29.   Furthermore, the '831 Patent claims specifically embody this architecture by arranging a separable browser, archive server, index server, method

player and interfaces into a particular relational configuration. This claim sets forth an unconventional distributed architecture for a multimedia delivery system that distributes functions among multimedia components that are separable from each other rather than using a single merged component that was in the prior art. Furthermore, these components are connected using generalized interfaces (denoted by the bold arrows in Fig. 2) that contain non-proprietary protocols that allow components of different vendors to communicate with each other. This unique and inventive modular distributed architecture solves the problems of prior art identified in the specifications of the patents because it allows multimedia components of different vendors to speak to each other and be combined in the same system. Thus, one can replace multimedia components with more capable components as technology develops to create and maintain an optimum system. Furthermore, because a single hardware platform is not required, the system can interact with players of many disparate users and could be suitable for widespread distribution to users over the web and intranets. Thus, the claims go far past merely defining an abstract idea and stating apply it on a computer. By reciting this explicit and unique modular architecture, the claims are directed to the means of producing the technological improvement (i.e., an improved architecture of a multimedia system that can interchange specific types of multimedia components) rather than merely claiming a result or desirable outcome on a computer.

B.   Catalogue and Phrase Data Structure Claims

i.   Technical Problems Encountered by the Shoah System

30.   In the early-mid 1990s, the Shoah Foundation wanted to preserve the testimonies of the 50,000 plus then living holocaust survivors in a searchable video format. A key idea for making the content easily accessible to researchers was that the video would be subdivided and indexed into one-minute increments so that the

exact point within a video of interest could be indexed, searched for, and located for a given researcher[2]:

This meant that the system would have to index and be able to retrieve over 6,000,000 portions of multimedia content[3]:

Each video testimony has been indexed by assigning indexing terms to the relevant one-**minute** segments of each testimony.

- VHA Metrics adn Details
  The USC Shoah Foundation's Visual History Archive, distributed by ProQuest, is a fully streaming video collection witnesses of the Holocaust and other crimes against humanity. It is the largest archive of its kind, preserving history testimony offering unique insight and knowledge rarely available in traditional content." Most testimonies contain after interviewees' firsthand experiences with genocide. The Archive includes:
  - More than 54,400 video testimonies at an average of two hours each.
  - Roughly 116,000 hours of film (equal to 13 years' continuous streaming content).
  - Transcripts being added over time (initially over 900 German transcripts and almost 1000 English transcripts).
  - Almost 65,000 index terms in English, applied at the one-minute segment.
  - Over 719,000 images (photographs, documents, works of art, artifacts from war, etc.).
  - 1.9 million names of family members and prominent figures.
  - Roughly 49,000 location references.
  - 2,500 recitations of literary works (poems, letters, diaries).
  - Over 2,100 musical recitals.

31.   The large amount of content of the Shoah system required more complex search methods using extensive categorization and uniformity of data content, further requiring more complex data structures to support these information retrieval ("IR") methods than previously used in conventional prior art systems and requiring search processing and delivery to be more efficient in its uses of system computing resources. At that time, no conventional multimedia system possessed the technological features to accommodate such a large library, nor were such systems capable of providing the advanced indexing and search capabilities necessary to search such a library effectively. This period was long before Netflix or YouTube, and IR techniques for large scale textual document databases were

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[2] https://sfi.usc.edu/vha/indexing
[3] http://researchguides.library.syr.edu/vha

largely experimented or just being developed. These conventional text-based IR techniques for term-based searching and document representation were simply inadequate for the needs of a large scale video library such as the Shoah system.

32. Furthermore, as discussed more extensively above, the Shoah system needed to implement a distributed architecture that used nonproprietary interfaces to integrate multimedia components from different vendors and across platforms. The Shoah system's complex search systems, large amount of data, and unique distributed architecture employed multiple applications to effectively retrieve and deliver its content—placing more demand on system computing resources. More efficient data structures supporting multiple applications were necessary to address bandwidth and search processing issues associated with a large-scale video collection.

ii.   *Conventional Text Based IR Methods and Data Structures Were Inadequate to Support Searching of a Large-Scale Video Collection*

33. Information retrieval in this time period for multimedia systems presented unique problems for the Shoah system that were not present in conventional text-based document retrieval   Consequently, conventional document representation in the data structures used by the then existing text-based searching were inadequate for robust searching of a large video collection. For example, U.S. Patent No. 7,240,003 titled "Database annotation and retrieval" to Charlesworth et al. at 1:18-23 notes:

> Existing database search tools allow the user to search the database using typed keywords. Whilst this is quick and efficient, this <u>type of searching is not suitable for various kinds of databases, such as video or audio databases</u>.

The lack of text in videos prevented implementation of conventional document IR techniques or early web-based methods of search. Since there is no native text in a video, one simply cannot match search terms to words found in the content of a video in the same way that one does for a textual document. In order to perform robust

term-based searching on a video, an additional "document representation" layer to a traditional word index was needed. For example, a text-based document can be effectively searched by creating a simple index of the words contained in a document. A video has no native text and may not even have spoken words and that the conventional indexes used by these systems would inadequately represent the document for effective term-based searching. Moreover, the lack of native text in the video itself also precluded automated extraction or creation of textual content to create traditional word indices for a large-scale system used for conventional searching.[4] Without automated extraction of text, the traditional approaches found in early large-scale web search systems employing conventional search methods and data structures could not be practically employed to search a large-scale database of millions of video portions. One simply could not use a crawler or extractor to create usable indices for term-based searching for videos in the same manner as a text-based systems such as those used in web search.

  iii. The Catalogue Claims Describe Structurally a Specific Technical Implementation of an Improved Data Structure that improved the Functioning of the Computer

  34. The original Shoah system employed significant improvements over prior art systems in creating unconventional data structure and databases directed to addressing the unique technological problems of searching for multimedia data discussed above and to efficiently enable multiple applications in a complex multimedia system by minimizing the need for multiple disparate data structures and databases supporting different applications.

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[4] Howard Wactlar et al., *Intelligent Access to Digital Video: Informedia Project*, IEEE Computer, May 1996, at 46, 48 (available at http://ri.cmu.edu/pub_files/pub2/wactlar_howard_1996_3/wactlar_howard_1996_3.pdf) ("Video information is temporal, spatial, often unstructured, and massive… As a result, a complete solution—**automatic extraction of semantic information or a general vision recognition system—is not yet feasible**.") (emphasis added).

35.   These improvements are found in the Catalogue Claims. To solve this problem with searching of large-scale video databases, Samuel Gustman created an additional document representation layer housed in a data structure called the "Catalogue." Rather than term indices just being directed to the textual content of the document or video itself, the Catalogue provide an unconventional document representation layer that is further indexed and searched by other indices:
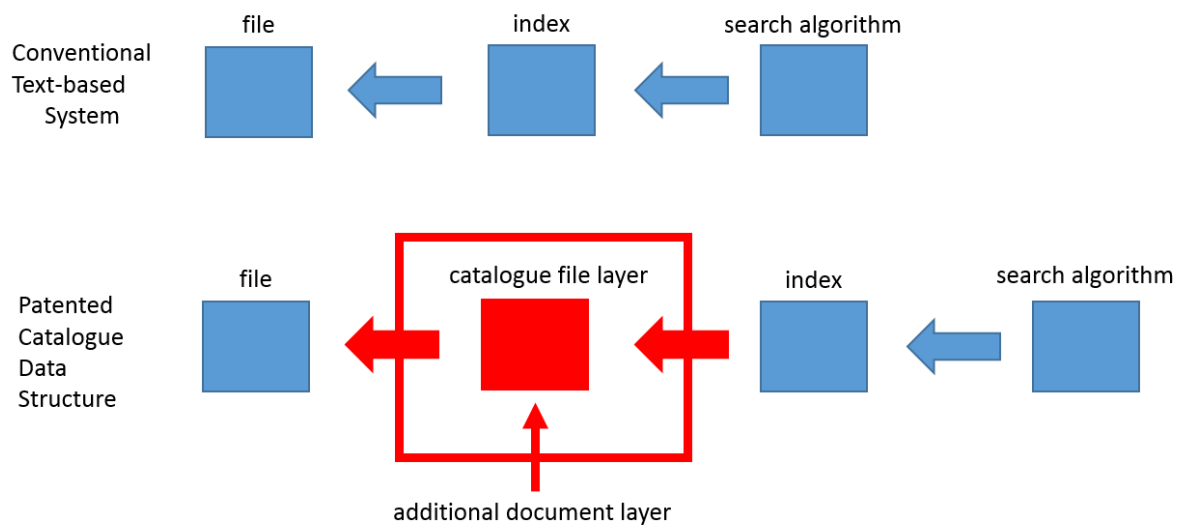
36.   Unlike the simple word index document representations used by conventional IR, the inventive catalogue element contains multiple storage dimensions (attributes and attribute elements) representing non-textual content of the video as well as specialized external and self-referencing relationships for improving search, bandwidth and processing efficiency. A feature of the claimed "Catalogue" is that it uses a data structure that can be housed in a separable indexing server multimedia component for use in the distributed architecture of the invention.

37.   This data structure was designed to support several search methods as well as serve as a single repository of data that supports multiple applications found within the distributed architecture of the invention. By designing a flexible, central

1   repository for all applications rather than unique databases designed for each

2   application, the system has the benefits of increasing the efficiency and reducing the

3   memory consumption of the system, as well as expanding the search capabilities of

4   the system.

5   38.   The claim term "catalogue" is a coined term described in the

6   specification and file history of the patent. The specification describes the structure

7   of the catalogue embodiment as having three storage dimensions comprising a

8   catalogue element; attribute and attribute elements:

9   The search request contains search criteria that can be used to identify

10   catalogue

11   elements that identify portions of multimedia data. Attributes and/or attribute

12   elements associated with the catalogue elements contain information that can

13   be compared against the search criteria contained in the request.   The

14   comparison identifies catalogue elements that satisfy the search criteria. That

15   is, catalogue elements are selected that have attributes and/or attribute

16   elements that satisfy the search criteria.

17   '831 Patent, 8:56-9:4.

18   39.   Importantly, attribute elements and attributes are used to build an index

19   that is used by the search algorithms to search the catalogue. '831 14:34-37. Within

20   a catalogue, smaller catalogues can be created by, for example, querying and user

21   designation.

22   40.   Fig. 7A of the 831 patent depicts a catalogue with catalogue elements,

23   attributes and attribute elements as well as pointers between catalogue elements:

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catalogue elements

attributes

attribute element

Segment
ID
descriptive phrase
set(phrases)

Phrase
input data ID
ID
descriptive phrase
In/Out Timecodes
set(keywords)
set(images)
set(persons)
set(proposed keywords)
set(proposed persons)

Event
ID
type
sub-type
In/Out Timecodes
segment

Keyword
ID
set(types)
set(thesaural keywords)
set(parent keywords)
set(child keywords)
set(proposed keywords)

Type
ID
Label

Person
ID
Primary Name
Occupation
Date of Birth
set(proposed persons)

Thesaural Person
ID
Name
Preferred Flag

Thesaural Keyword
ID
keyword ID
Label
Language of Choice
Preferred Flag
Characteristic

Proposed Keyword
ID
Label

Proposed Person
ID
Name

Image / Video
ID
In/Out Timecodes
Locator

Person Information
Person ID
Person Attribute

FIG. 4A

41.   A "catalogue element" refers to a data structure about a specific data type (types, keywords, persons, segments etc.) or multimedia (whole or portion of a video) An attribute is contained within the catalogue element and contains information about the given catalogue element. Id. An attribute element represents a further elaboration of data relevant to a given attribute. Typical attributes include segment references; phrase references; person references; type references; keyword references and other associations. The catalogue elements are interrelated with each other with pointers or references.

42. Important to this unconventional structure and a difference with conventional data representation of video and other files is the fact that each catalogue element represents a modular datum component that can be combined through relationships (e.g., pointers) to represent a particular video. See Fig. 7A and B of the '831 patent. A particular video is represented by the interrelation of various catalogue elements. For example, a video portion can be catalogued by a phrase identifying a portion of video. This phrase may be associated with a combination of type, person, keyword, and segment catalogue elements to create an efficient document representation of the video. The attributes of the representation may be efficiently searched by the novel search algorithms of the system. These storage structures contain among other things structured data that could be used to locate multimedia in a file which otherwise does not contain any text—a problem uniquely associated with retrieval of multimedia files as opposed to documents. Other claims from additional Patent-in-Suit also reflect the structure of the claimed catalogue including the three storage dimensions and interconnection. It should be noted that certain claims of the Patent-in-Suit vary significantly in scope (and specificity) and each claim contains different relevant features for a 101 analysis and are not representative of each other. Additional claims bear limitations that vary in specificity and scope related to a given improvement discussed here but the dependents specify more relevant specific structure for purposes of a 101 analysis than the independents.

43. The Catalogue was also coupled to a relationship management and cataloguing facility that allowed modification of the data and addition to the relationships stored in the system so as to address the flexibility needs of multiple applications and general interfaces.

44. Another key unconventional feature of a catalogue element in the disclosed embodiment is that it contains unconventional self-referential relationships (e.g., pointers or references) to other catalogue elements so that more efficient

1   retrieval and the reduction of data structures could be had. Generally, the system
2   employed three kinds of relationships: associative; whole-part and inheritance
3   relationships. '831 patent, 19:1-55. These relationships are integrated into the
4   specific search query algorithms of the system and the interface protocols between
5   multimedia components so that specific catalogue elements and their attributes and
6   attributes could be efficiently retrieved.

7   45.   For example, one kind of relationship will associate two different
8   keywords. By use of the catalogue attributes a search will not only retrieve those
9   catalogue elements of the specified keyword but also catalogue elements containing
10 keywords of the associated keyword. '014 Patent, 15:9-23. Whole-part and/or
11 inheritance relationships allowed for an expanded retrieval set by not only retrieving
12 catalogue elements containing the relevant keyword but also retrieving portions of
13 multimedia data that are part of a given catalogue element that does not contain the
14 keyword or other catalogue elements that are of the same type or made by the same
15 person that lack the keyword. '831 Patent, 15:9-16:34.

16   46.   These relationships comprise self-referential relationships to the
17 catalogue in that they refer to other catalogue elements within the same catalogue
18 data structure. In the preferred embodiment, catalogue and attribute elements are
19 interrelated. Relationships are formed between two or more catalogue elements
20 within the catalogue data structure (e.g., keyword to type, marked in green, in FIG
21 7B below):

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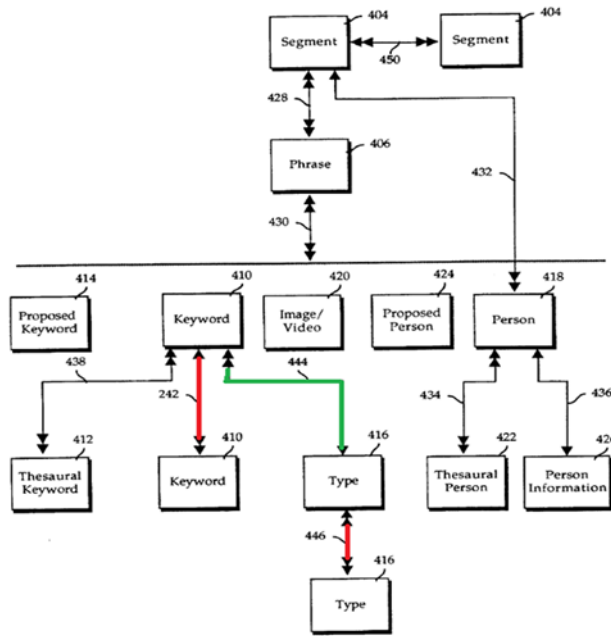
FIG. 4B

47.   Fig. 4B of the '014 Patent corresponds to Fig. 7B of the '831 Patent.

48.   The Catalogue embodiment also has self-relationships where a given catalogue element can refer internally to other elements within the same catalogue element. For example, a keyword can refer to another entry within the same keyword catalogue element or a type can refer to another type instance (e.g., keywords to other keywords; types to other types, marked in red above). Thus, the unconventional claimed catalogue using self-referencing relationships to internal elements of the catalogue allows many kinds of searches involving attributes that can be efficiently processed with less data tables and replications of queries on the catalogue—further reducing the bandwidth and processing resource consumption of the distributed network connecting multiple applications.

49.   Another type of self-referencing relationship of the catalogue is the use of an unconventional segment container catalogue element. Segments are container catalogue elements that contain list of references to other catalog elements and therefore are self-referential.   *See infra* at Section VI(D)(iii) for an extended

1 discussion of segment and container elements.   Other claims also reflect self-

2 referential relationships involving segment containers.

3   The cataloguing systems creates a catalogue that specifies the content

4   of the data. The catalogue includes one or more catalogue elements

5   which can be complex multimedia assets. A complex multimedia asset

6   can consist of one or more attribute elements. An attribute element is an

7   attribute that can have attributes (i.e., pieces of information).

8 '831 Patent, 4:47-55.

9 The invention utilizes an unconventional multimedia data structure used within the

10 Catalogue referred to as a "segment element" to identify and to relationally link

11 related multimedia data to a particular phrase or key word or cache:

12   Segment 704 is a container element. That is, as illustrated by

13   relationship 728, segment 704 can contain multiple instances of phrase

14   706. Segment 704 is defined by the set of elements that it contains. For

15   example, segment 704 is, for example, a chapter Segment, a testimony

16   Segment, or a general Segment. Instances of phrase 706 can be grouped

17   in the order in which they occur in the input data in a chapter Segment.

18   As a testimony segment, Segment 704 contains a grouping of instances

19   of 704 associated with the input data. For example, a testimony Segment

20   can contain all instances of segment 704 that are associated with a

21   videotaped interview. Person 718 can be related to segment 704 via

22   relationship 732. At least one instance of person 718 is related to an

23   instance of Segment 704 that is a testimony Segment via relationship

24   732. Relationship 750 illustrates the relationship between instances of

25   Segment 704 (i.e., a testimony Segment) that act as a container for other

26   instances of Segment 704. A general Segment contains a Set of instances

27   of phrase 706 that are not necessarily related to particular input data. A

28   general Segment can be a collection of phrases that meet a certain

criteria. For example, a general Segment can contain instances of phrase 706 that are related to an instance of keyword 710 having a value of "teacher". Segment 704 therefore identifies a group of catalogue elements (e.g., phrase 706. An instance of segment 704 can identify all catalogue element instances. Other instances of Segment 704 can identify a Subset of catalogue elements. Thus, for example, an instance of Segment 704 can identify all instances of phrase 706 or a some Subset of all of the instances of phrase 706. The set including all instances of phrase 706 is a catalogue. A smaller catalogue that contain a subset of all instances of phrase 706 is also a catalogue. Within a catalogue, a smaller catalogue can be created by, for example, a query operation or user designation.

'831 Patent, Col. 18:20-54.

50.   Figure 7A shows an example format of "segment element" data structure 404:
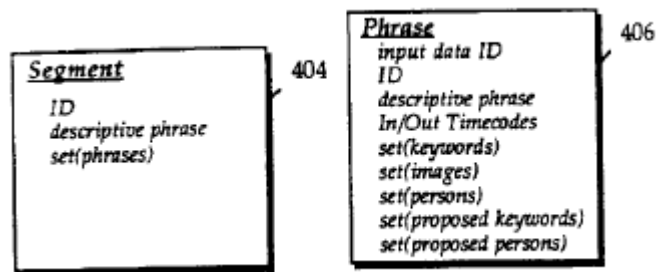
The "segment element" is relationally identified with another inventive data structure, the "catalogue element" or "phrase element," which may contain pointer identifiers to portions of multimedia data that satisfies the search.

A "one" relationship is identified using a single arrow. Relationship 728, for example, is a "many-to-many' relationship. That is, one or more instances of Segment 704 can be related to many instances of phrase

706. Alternatively stated, segment 704 contains one or more instances of phrase 706. One instance of phrase 706 can be related to multiple instances of segment 704. That is, an instance of phrase 706 is contained within one or more instances of Segment 704. As illustrated by relationship 746, one or more instances of type 716 can be related to other instances of type.

'831 Patent, 17:33-44.

51. Still further, the catalogue data structure with its storable attributes and attribute elements (in combination with the claimed relationships) is designed to enable the specific search algorithms disclosed in the patents. Unlike conventional systems, this unconventional data structure included specific multimedia data that reflect non-textual content of the video such as associated (1) "key words" associated with the video (2) type classifications, (3) identification of segment containers grouping related content; (4) segments attributes associating catalogue elements with prior searches; (5) person associations; (6) testimony attributes; (7) general description of the content of the video; (8) key word to key word associations; (9) cache identification; (10) associative; inheritance and whole part relationships; and (11) phrase elements. Thus, the Catalogue allowed for much more advanced searching based upon several categories of information that was not explicitly contained with the video text to address the unique problems of video searching. These algorithms address limitations in conventional systems by improving search capability using improved document representation structures over prior art systems and allowing expanded search results based upon associative; whole part; and inheritance relationships—structures not in conventional use or understanding.

52. Routines enabled by the Catalogue are part of the non-proprietary interfaces and protocols disclosed in the specification that are necessary to implement the open and distributed architecture containing multiple applications discussed above with the Distributed Architecture claims. The means plus function claims

directed to interfaces specifically claim as limitations the use of the attribute, attribute elements, segment, and phrases of the claimed catalogue. The design of the Catalogue improves the limitations in the prior art in that they can be used to implement the unconventional nonproprietary protocols disclosed in the specification and incorporated in the claims. The catalogue enabling these interfaces addresses the interoperability problems in the art between applications of multiple vendors that are discussed at length in the '831 Patent as well as reduces the number of data structures used by the multiple applications of the invention.

53.   The unconventional specific structures of the Catalogue with the features described above represent technical improvements to conventional data structures used in multimedia systems and electronic search systems. Consolidation of the features described above in a given claimed catalogue data structure reduces the number of necessary data structures that have to be stored and referenced. This improves the art by reducing memory requirements, system resource and bandwidth consumption, and the time necessary to process the complex search algorithms described in the specification.   Also, the claimed relationships contained in the system enable multi-faceted complex searches that reduce the number of times the interface must query catalogue -again freeing up bandwidth, reducing processing time and the number of times the indexing server must be accessed. Each of the above described and claimed features when considered within the ordered combination of the claims define an unconventional data structure that constitutes an inventive concept that renders patent eligibility.

     iv.   *The Specification Confirms that the Claimed Catalogue is an Unconventional, Non-Routine and Not Well Understood Technical Improvement to the Data Structures of the Prior Art Multimedia Systems*

54.   The Shoah patents' conception in the early 1990s occurred during the early development of multimedia delivery systems and the data structure design of those systems. Only a few systems with limited capabilities were in production by

the time of filing of the application. The basic catalogue document representation layer as well as other more specific claimed features of the catalogue discussed above[5] were not conventional or well understood activities in routine practice within existing multimedia systems and represent inventive concepts that support patent eligibility. Existing systems lacked the basic catalogue documentation layer searched by word indices as well as the unique other claimed features concerning the claimed catalogue.

55.   The lack of conventionality of the claimed catalogue is further confirmed by contemporaneous external sources:

> If [a reader] has specific questions (queries) in mind, such as finding a term or a key word, he can go to the Index page and find the corresponding book sections containing that question. Both aspects are equally important in helping users access the book's content. For today's **video** data, unfortunately, **we lack both the ToC and video Indexes to facilitate browsing and retrieval.**

Syed, M., *Design and Management of Multimedia Information Systems: Opportunities and Challenges,* 22-49 (2001).

> In known systems, information is simply "pushed" to the user with no provisions for interactivity. **Known systems do not address audio-visualization of content information at all…**There is no way for the user to learn additional information about the subject of the image as displayed.

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[5] For example, the catalogue includes specific multimedia data that reflect non-textual content of the video such as associated (1) "key words" associated with the video (2) type classifications, (3) identification of segment containers grouping related content; (4) segments attributes associating catalogue elements with prior searches; (5) person associations; (6) testimony attributes; (7) general description of the content of the video; (8) key word to key word associations; (9) cache identification and storage locations; (10) associative; inheritance and whole part relationships; and (11) phrase elements.

U.S. Patent No. 6,070,167 titled "Hierarchical method and system for object-based audiovisual descriptive tagging of images for information retrieval" to Qian et al. at 1:32-39.

> In theory, semantic primitives of video, such as interesting objects, actions and events, should be used. However, such **general semantic analysis is not feasible**, especially when information from soundtracks and/or close caption is not available. **In practice, we have to rely on low-level image features and other readily available information.**

Zhang, H., "Content-based video analysis, retrieval, and browsing," Multimedia Information Retrieval and Management: Technological Fundamentals, 44 (2003).

> **Because** media assets are so crucial to these [media and advertising/business] companies, they have an **extreme need for an intelligent and efficient way to catalog, browse, search and manage their media assets**....

U.S. Patent No. 6,567,980 titled "Video cataloger system with hyperlinked output" to Jain et al. at 1:45-50.

C.   Query and Search Result Caching Claims

i.   Early Multimedia Systems Struggled with Problems with System Processing and Bandwidth Consumption

56.   In 1996, computer processing costs, system congestion and bandwidth consumption were major problems to early multimedia systems.   The resource consumption problems of content-based searching are particularly acute with prior art multimedia systems:

> Obviously, **full content data searching is better, but it is typically cost prohibitive in prior art systems**, because of the demands on system resources. **Therefore, there is a need in the art for an efficient full content data searching technique.** The technique should work with disparate content data sources and disparate content data types.   The technique also should minimize search times by utilizing a build process to **pre-process the full**

content data to streamline searching during run-time operation. The technique also should support natural word search queries and should use alternative search words and word pairs to increase the accuracy of search results and search process speed.

U.S. Patent application No. 2007/0282822 titled "Content data indexing with content associations" to Anderson et al.

Existing database technology is not designed to manage digital video … These techniques are not suitable for very large collections of video, as they require a great deal of computational power and processing time.

Ahanger, G., Benson, D., and Little, T., Video Query Formation, Proc. Storage and Retrieval for Images and Video Databases III, IS&T/SPIE Symposium on Electronic Imaging Science & Technology, vol. 2420, pp. 280-291, available at http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.477.5252&rep=rep1&type=pdf.

57.   Similarly, problems associated with multimedia networks' consumption of bandwidth remained well into the 2000s and was considered "a challenge multimedia networking must face":

However, multimedia networking is not a trivial task. We can expect at least three difficulties. First, compared with traditional textual applications, multimedia applications usually require much higher bandwidth. A typical piece of 25 second 320x240 QuickTime movie could take 2.3MB, which is equivalent to about 1000 screens of textual data. **This is unimaginable in the old days when only textual data is transmitted on the net.**

Second, most multimedia applications require the real-time traffic. Audio and video data must be played back continuously at the rate they are sampled. If the data does not arrive in time, the playing back process will stop and human ears and eyes can easily pick up the artifact…Third, multimedia data stream is

1   usually bursty. Just increasing the bandwidth will not solve the burstiness

2   problem….Contrary to the high bandwidth, real-time and bursty traffic of

3   multimedia data, in real life, networks are shared by thousands and millions of

4   users, and have limited bandwidth, unpredictable delay and availability. **How**

5   **to solve these conflicts is a challenge multimedia networking must face.**

6   Liu, Multimedia Over IP: RSVP, RTP, RTCP, RTSP, http://www.cse.wustl.edu/

7   ~jain/cis788-97/ftp/ip_multimedia/#multi1 (emphasis added).

8   58.   This was a particular problem to the claimed solution of the Shoah

9   system because its architecture required multiple applications and system

10   components operating over a network and full content-based searching.

11   *ii.   The Query and Search Result Caching Claims Represent a*

12   *Technological Improvement to Address the Technical Problem of System*

13   *Processing and Bandwidth Consumption*

14   59.   The Patent-in-Suit attempted to address the system and bandwidth

15   consumption limitations of prior arts systems by using pre-processed search results.

16   Pre-processing all queries is an impractical task. The system used prior search history

17   saved within the catalogue as a proxy for the most important queries to pre-process.

18   By doing so, the system removes the inefficiency of repeated duplicate or similar

19   search queries—thereby lessening the consumption of system resources and

20   bandwidth (between multimedia components over a network) and reducing response

21   times. Unlike prior art systems, the claimed catalogue caches queries and search

22   results so there is no need to repeat a search.

23   60.   The Shoah patents describe the feature of a specific sub-catalogue data

24   structure that associates previous searches with specific data representations of

25   queries. This sub-catalogue stores both (1) the previous query and (2) the previous

26   results of that search, or (3) it may be used to stored frequently used multimedia in

27   caches. The claimed search algorithms queries the catalogue to identify previous

28   queries on the catalogue or results so as to avoid having to re-run the search or

retrieving data from remote storage—thereby creating benefits with respect to reducing bandwidth and system processing costs.

        iii.   The Query and Search Result Caching Claims Provide a Specific Technological Solution to the Problem through Use of an Inventive "Catalogue" Data Structure for Caching Prior Search Queries

61.   The query and search result caching claims are not merely addressed to the idea of a more efficient system or even the pre-processing of search results. Rather, the specification describes, and the claims claim a specific technological means and data structures for achieving the technological improvement and are therefore non-abstract.

62.   The patent embodiment describes the use of the segment container within the catalogue and the associative self-referencing relationships and attribute elements of the catalogue to associate particular results with a particular query so that prior searches can be retrieved.

63.   Thus, these claims which further elaborate on the unconventional, non-routine, and not well understood data structures used to cache search results claim further inventive concepts used within an unconventional ordered combination of claim limitations that provide a non-abstract technical solution (including the inventive concepts described above) to the technical problems of bandwidth and system processing resource consumption. They provide the specific, therefore non-abstract, technological means in terms of improved data structures and processing for reducing bandwidth and resource consumption rather than merely being directed to a desirable but abstract result.

D.   Video Caching Claims

        i.   The Video Caching Claims Address the Problem of Bandwidth and System Resource Consumption by Improved Storage of Multimedia Data

64.   The video caching claims represent a further technological improvement to prior art systems designed to address bandwidth and system

1   processing limitations of prior art multimedia systems described above. These claims

2   provide limitations directed to an improved architecture of storage systems and the

3   use of the improved catalogue described above that caches search results to reduce

4   system processing and bandwidth consumption as well as response times and

5   efficient delivery.

6   65.   In addition to improving multimedia search functionality by caching

7   search queries and their results in the catalogue, the Shoah patents also store the

8   underlying videos that are identified as search results (i.e., specific portions of videos

9   responsive to a search) in a two-tier architecture using local caches and remote caches

10   and creating a sub-catalogue. The patents recognize that prior art systems retrieved

11   complete videos from magnetic tape systems, optical discs, and other forms of

12   permanent storage:

13   When a tape system must be accessed to retrieve the data, retrieval time will most

14   likely be slower. Therefore, it is preferable to determine whether the data is

15   resident in cache before accessing a storage system such as a tape system. Further,

16   it is preferable to manage the cache such that the data that is most likely to be

17   needed is resident in cache.

18   '831 Patent, 11:9-22

19   *ii.*   *The Video Caching Claims Provide a Particularized Technological*

20   *Solution to the Multimedia Storage Problem Through Use of a Novel*

21   *Data Structure for Storing Specific Requested Portions of Multimedia*

22   *Data Referenced by Pointers in the Sub-Catalogue*

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66.   The patents disclose a two-tier caching structure using remote and local caches to improve retrieval efficiency, as shown in Fig. 2:
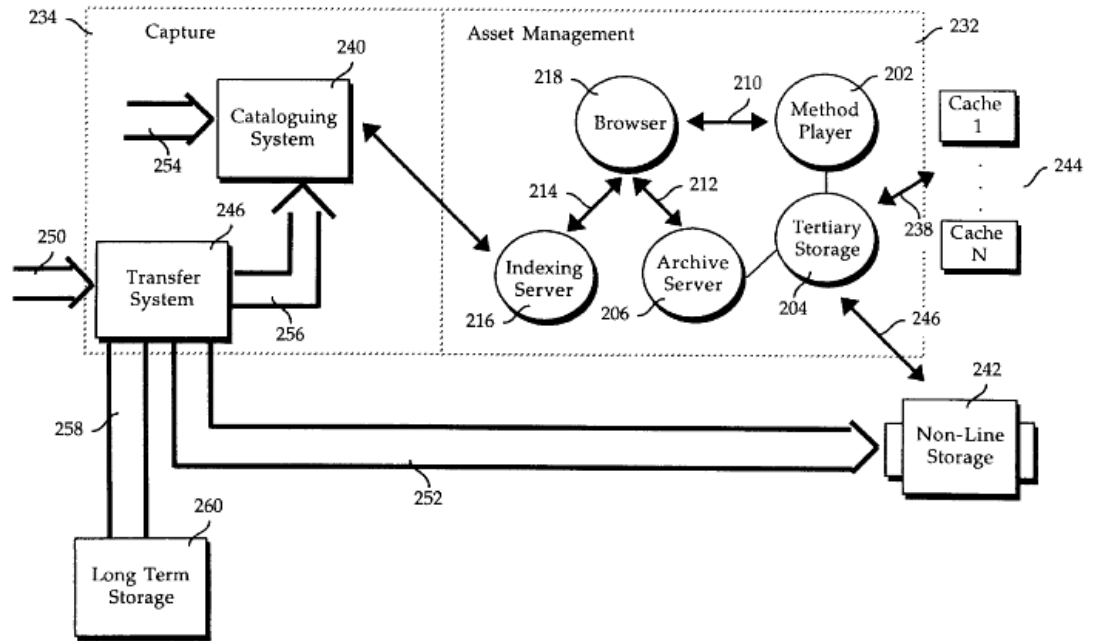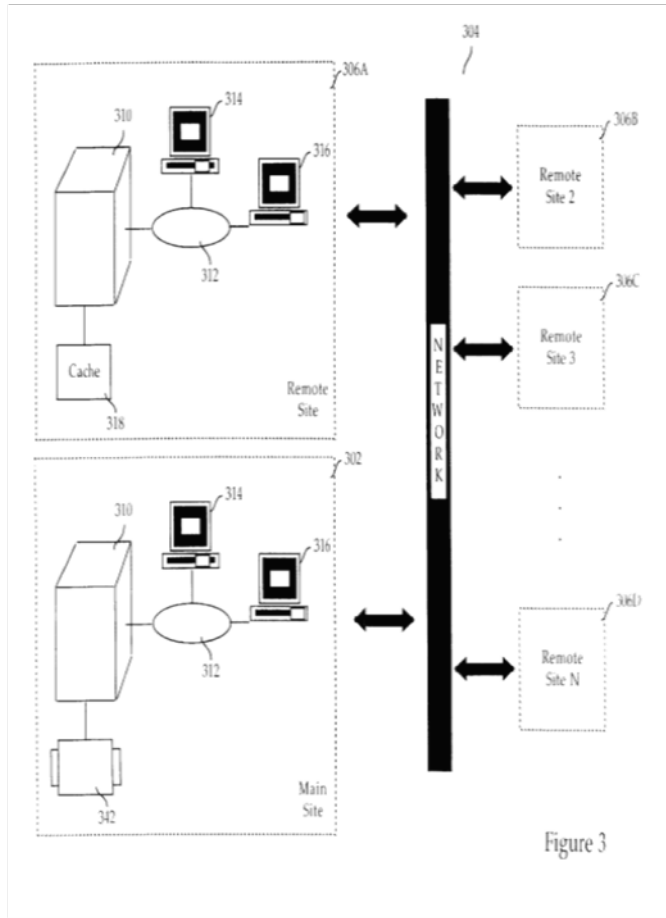

Figure 2

Figure 3

67.   The inventive system includes an architecture with a series of local caches 1 through N (at 306), a remote cache, and if necessary permanent storage. By caching search results (portions of multimedia data responsive to a search query) in a tiered system using remote and local caches, the system provides a technological improvement to prior systems that only retrieved multimedia data from tape systems and other forms of permanent storage:

> When a tape system must be accessed to retrieve the data, retrieval time will most likely be slower. Therefore, it is preferable to determine whether the data is resident in cache before accessing a storage system such as a tape system. Further, it is preferable to manage the cache such that the data that is most likely to be needed is resident in cache.

'831 Patent, 11:9-22

1   68.   The patent also provides an algorithm for retrieving multimedia data

2 from the two-tier cache system by first searching in the local cache and, only if the

3 data is not found, repeating the search on the remote cache and finally searching

4 permanent storage, as shown in Fig. 4:

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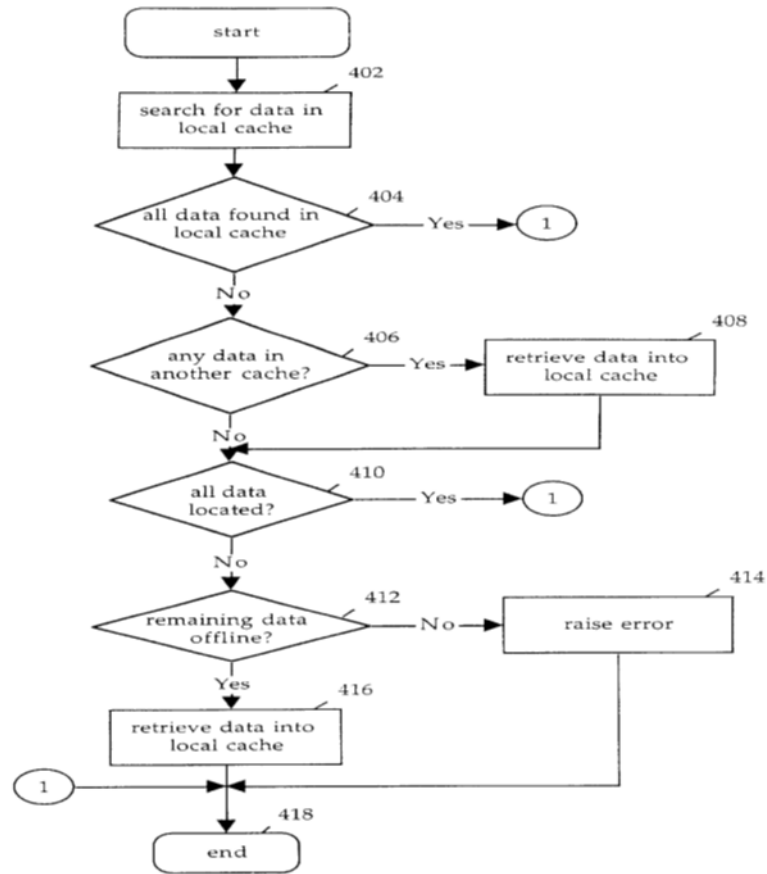
22   69.   The patents in Fig. 4 also describe algorithms to efficiently maintain

23 these caches:

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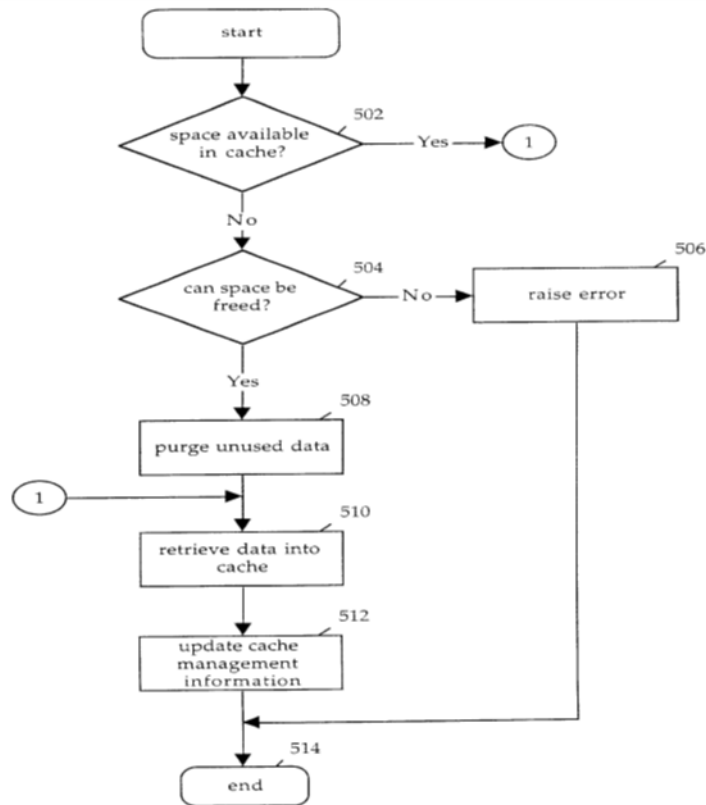
70.   The patents further disclose an embodiment using "named caches" to store frequently requested multimedia data on a semi-permanent basis to reduce the need to retrieve multimedia data from permanent storage:

Named Cache

In addition to the regular cache that can be managed as discussed above, the invention includes a plurality of named caches. **A named cache can be used to store data on a more permanent basis. A named cache is a portion of cache (e.g., cache 318) that is can be managed separate from the general cache pool. A named cache may be used for data that is accessed or has the potential for access on a more permanent basis. For example, one or more searches can yield a sub-catalogue (e.g., a subset of the set of catalogue elements associated with multimedia data 252) that contains data pertinent to a particular subject area or group of users. The named**

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cache can be used to store the portions of multimedia data 252 associated with the sub-catalogue at a remote site such that it is not purged despite its LRU statistics. The portions of multimedia data 252 associated with a sub-catalogue can be retained permanently or semi-permanently. That is, the contents of the named cache can be retained for a specified period of time and is not subject to purge.

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'831 Patent, 12:31-49. The named cache identified by the catalogue solves the problem of retrieval from permanent storage by providing a semi-permanent storage location for multimedia data that is still more accessible than permanent storage devices such as magnetic tapes or optical discs. Thus, the named cache further reduces the need to retrieve multimedia data from permanent storage even for systems utilizing smaller caches.

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     71.   The inventive two-tier architecture disclosed by the patent is reflected in the claims. The patent sets forth and claims a specific architecture of multimedia components and storage systems using multiple caches to store portions of multimedia data and an algorithm for retrieving portions of multimedia related to a specific search request from the caches. It describes specialized data structures (i.e., the improved catalogue) that represent programmable characteristics of the cache. This system dramatically improves multimedia retrieval from prior art systems by storing (1) videos in local caches (2) relevant to prior search request and results to improve response times, delivery, and system processing and bandwidth consumption. Indeed, the "cache" implementation stores portions of multimedia data associated with particular "catalogues" of previous search requests to facilitate the retrieval of portions of multimedia data associated with past searches. The Video Caching claims in turn represent a non-abstract technical solution to a technical limitation of the art.   The claims specify a particularized technical means (architecture; data structures; and processing steps using the aforementioned) for achieving an improvement to existing technology rather than being directed merely

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to an abstract idea of a desirable result. The above-described claimed features also represent an unconventional, non-routine, not well understood solution that contains inventive concepts that render the claims patent eligible.

VII. DEFENDANT'S ACTS

72.   The infringing systems, articles, and methods include, but are not limited to, systems, articles, and methods relating to the cataloguing, organizing, searching, rating, and provisioning of digital multimedia data, including but not limited to Defendant's software and hardware supporting various Internet websites for streaming video, and related home and mobile device specific applications, including as set forth in Plaintiff's forthcoming infringement contentions and any amendments thereto (the "Accused Systems"). The Accused Systems, among other things, puts into use components from other parties (such as CDNs and customers) that infringe the Patent-in-Suit as set forth below. Preservation alleges infringement of the Patent-in-Suit by the Accused Systems by all websites (including premium versions) operated by or for the Defendant that use, without limitation, the following platforms (and all other platforms operated by or on behalf of the Defendant that use similar domains, systems, platforms and/or protocols) collectively referred to herein as "the Accused Systems":

- Epix streaming service on Android, Apple iOS, Playstation, Nintendo Switch, Android TV, Universal Windows Platform, Xbox, Chromecast, Apple TV, Roku, Amazon Fire TV and native streaming capabilities in Smart TVs;
- Epix premium streaming service;
- www.Epix.com;
- Epix channel on YouTube; and
- related provision of streaming videos that are substantially similar.

73.   Defendant's Accused Systems represent an exemplary and non-exhaustive list of the streaming services and websites owned and operated by Defendant.

74.   Defendant's streaming services provide streaming services of videos in both sub and dub versions. In addition, many of the video offerings are episodic. The Accused System includes a digital library system used to catalog, provide access to, and distribute online media offerings. This system provides users with the ability to search for and access multimedia assets using Internet-enabled devices including computers, tablets, gaming consoles (e.g., Playstation, Xbox, Nintendo), media players (e.g., Roku, AppleTV), and mobile devices such as iOS and Android powered devices.

https://www.epix.com/

75.   Categories of video are selectable from the catalogue, and multiple filters may be applied. The Accused System further comprises functionality to search

content residing within its digital cataloging system by keyword. For example, videos, original shows, full episodes, clips, and other types of media associated with the keyword "Godfather" are returned when this keyword is provided in the search facility made available to end-users.

https://www.epix.com/search/
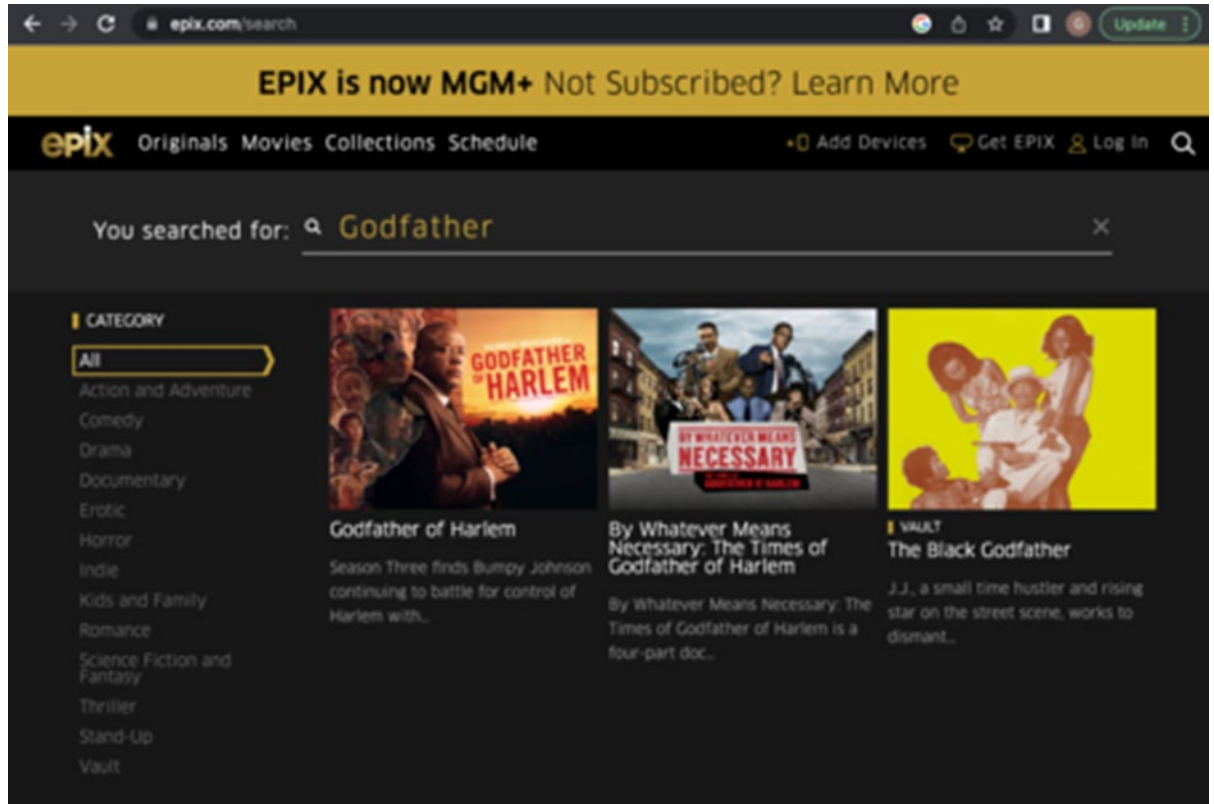
76.   MGM+ also engages the YouTube platform to stream its video.

https://www.youtube.com/user/EPIXHD
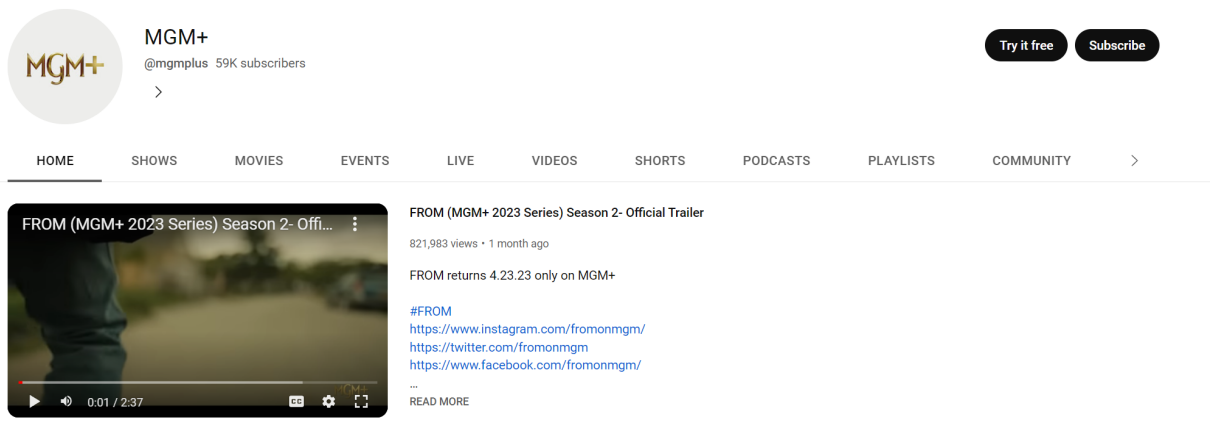
77.   Customers who download, use, or put into use Defendant's software, applications, and/or mobile applications in accordance with Defendant's provided instructions also engage in infringing activity as described above. Defendant's software and servers also use, instruct, and control components owned by Defendant and third parties.

78.   The Accused Systems provide commands that use protocols established by an API to select multimedia data from an indexing server satisfying one or more criteria specified by a browser, wherein the indexing server is associated with a catalogue.

79.   These commands may include those commands issued to identify and display multimedia data that is responsive to the one or more keywords specified by the end-user as a query to search for videos, clips, and other types of media. The indexing server searches for multimedia data in the catalogue for those videos, clips, and other types of media in order to select those entries in the catalogue that are responsive to the end-user's query.

80.   The Accused Systems associate multimedia data with a multimedia catalogue. The catalogue is maintained by an indexing server and is comprised of one or more data structures used to support searches for content that contains information concerning the content of multimedia data. See screenshots below. The catalog includes data structures containing records of information about videos, clips, and other types of media. These records are catalog elements. As shown below, the catalogue elements have information, such as keywords, identifying associated multimedia data. Examples of keywords include the title, from, categories, production, tags, date added, date featured of a given video, clip, or other type of media.

81.   End users can specify requests, i.e., input keywords, using the text interfaces. The indexing server processes the specified request by searching the

catalogue (for example, using keywords) for multimedia data that satisfies the specified request.

82.   The indexing server of the Accused System uses a catalogue comprising a plurality of catalog elements associated with a plurality of keywords of the catalogue. For example, the data structure or database that holds the descriptive information shown below concerning each video, is a catalogue.

83.   Catalog elements pertaining to videos, clips, and other types of media are associated with one or more keywords. Examples of keywords include among other things tags of a given video, clip, or other type of media.

84.   The catalogue is associated with additional system components including, but not limited to, a text interface. The browsers of the Accused System are coupled to text interfaces. These text interfaces comprise at least one class of methods configured to specify a request for multimedia data. The text interface is a generalized interface for text commands that establish a protocol that can be used or adopted by a browser and/or an indexing server of different vendors to enable those multimedia components to communicate. The text interface is configured to specify a request for multimedia data (e.g., a search request based upon end-user supplied keywords).

85.   The computer code for browsing the multimedia data includes code specifying a text interface for transmitting textual commands. Using the text interface, end users are able to specify a request for multimedia data and send the request to the indexing server.

86.   The catalogue is maintained by an indexing server and is comprised of one or more data structures used to support searches for content that contains information concerning the content of multimedia data. See screenshots above. The catalog is the data structures containing records of information about videos, clips, and other types of media. These records are catalog elements. As shown below, the catalogue elements have information, such as keywords, identifying associated

multimedia data. Examples of keywords include the title, from, categories, production, tags, date added, date featured of a given video, clip, or other type of media.

87.   End users can specify requests, i.e., input keywords, using the text interfaces. The indexing server processes the specified request by searching the catalogue (for example, using keywords) for multimedia data that satisfies the specified request.

88.   For example, videos, clips, and other types of media associated with the keyword "hero" are returned when this keyword is specified in the text interface and processed by the indexing server.

89.   Upon information and belief, Defendant exercises control over the devices of customers and third parties. Defendant's customers and third parties download Defendant's software and/or mobile applications to their devices and Defendant exercises control over those devices by sending computerized instructions, providing infringing software, providing user and other interfaces, and providing protocols to allow its customers and third parties to interact with Defendant's servers and to use Defendant's systems and that of third parties in an infringing manner. Defendant control and put into use the interactions between customer and third-party devices and Defendant systems in an infringing manner in this jurisdiction and elsewhere.

90.   Upon information and belief, Defendant's employees, in this District and elsewhere, operate the Accused Systems in an infringing manner, such as by way of example only (1) using the Accused Systems to support websites and applications; (2) putting into use by others (3) demonstrating the Accused System, (4) testing the Accused System, and (5) using the Accused Systems to catalogue multimedia.

91.   Defendant also has agreements with users, content providers, customers, CDNs and other third parties that provide the requisite relationship, agency, and control for joint infringement. Defendant and third parties engaged in the above

activity expect, instruct, aid and abet, intend, know and derive economic and other benefit from the infringement's described above and below.

92. All of the above acts constitute acts of direct and joint infringement.

Induced and Contributory Infringement

93. Preservation restates and realleges each of the allegations set forth above and incorporates them herein.

94. Upon information and belief, Defendant's acts described as acts of direct infringement concerning the manufacture, use, putting into use, offering for sale, sale, operation, distribution, and/or installation of Defendant systems and/or software and those described above and below also constitute acts of induced and contributory infringement.

95. Upon information and belief, Defendant induces the direct infringement of end users of the Defendant and/or third party CDNs that operate the infringing websites by providing corporate instruction, direction, capital, technical knowhow or expertise, content, domain names, trademarks, advertising, legal defense, capital, and advertising sales that facilitate the operation of the Accused Systems in conducting infringing activity. All of the above are performed with knowledge of and with the specific intent to infringe the Patent-in-Suit.

96. Upon information and belief, third parties including Defendant's customers, users, CDNs, storage facilities, content providers and owners within this jurisdiction and elsewhere directly infringe the Asserted Patent and Defendant induce and/or contribute to that infringement. As an example only, end users of Defendant's Accused Systems retrieve videos, clips, and other multimedia types by using (and putting into use) the systems and solutions claimed by the Asserted Patent. Further, users upload multimedia to Defendant's system and catalogue the uploaded multimedia in an infringing manner. Both the software made available at Defendant's websites and instructions provided by Defendant induce users and third parties to use an infringing system and method, and the third parties do in fact infringe.

97.   Defendant induces users and third parties to infringe by providing monetary and/or other compensation, such as for uploading and cataloguing multimedia.

98.   To the extent that some elements of a claim are performed by or owned by a different party than Defendant, Defendant, through software and infringing systems, put the claimed system of the Asserted Patent into service or use as described herein and receive a benefit upon performance of steps of the methods of the Asserted Patent. To the extent multimedia is provided by third-party servers or networks, Defendant's systems and/or Defendant's end-user's systems put these third-party systems into use. For example, Defendant provides software instructions downloaded by third parties that put into use the third parties' players, CDNs and other systems. Third parties put into use Defendant's systems by indexing, searching for and retrieving multimedia in an infringing manner and vice versa. Further, Defendant's software establishes the manner and/or timing of the performance of steps of the Asserted Patent, such as establishing the manner and/or timing of user's cataloguing, searching or playback of multimedia.

99.   Upon information and belief, Defendant receives a benefit from such actions by the third parties as it allows Defendant to provide a desirable product or allows the third parties to purchase products and services from Defendant.

100.   Upon information and belief, Defendant provides customers and/or other third parties instructions, materials, advertisements, services, encouragement, and software to use, load, and/or operate the Accused Systems in an infringing manner. Sending computerized instructions are acts of control by Defendant on the players of third parties. Upon information and belief, Defendant further induces customers and third parties to use the Accused Systems by providing subscriptions for the Accused Systems. Defendant has actively induced infringement by customers and/or third parties in this jurisdiction.

101. Upon information and belief, Defendant has acted with the specific intent to induce or cause infringement and to conduct acts of infringement as described herein within this jurisdiction and elsewhere. Defendant continues to provide instructions to customers and third parties to operate the Accused Systems in an infringing manner since having notice and actual knowledge of the Asserted Patent. Defendant's notice and actual knowledge of the Asserted Patent are more fully set forth below.

102. Upon information and belief, customers and users of the Accused Systems reside in this jurisdiction and conduct acts of infringement within this jurisdiction. Upon information and belief, Defendant has and continues to indirectly infringe the Asserted Patent within this District and elsewhere in the United States by, among other things, inducing and/or contributing to third parties' infringement of the claims of the Asserted Patent without Plaintiff's authority.

103. Upon information and belief, Defendant provides, makes, sells, and offers its Accused Systems with the specific intention that customers and/or other third-party direct infringers use the Accused Systems in an infringing manner. Upon information and belief, Defendant provides and instructs third parties to use the Accused Systems in the manner claimed in the Asserted Patent.

104. Upon information and belief, the Accused Systems have no substantial non-infringing use and are especially made and/or adapted so as to infringe the Asserted Patent.

105. Upon information and belief, Defendant knows its systems, articles and services are especially made or especially adapted for use in an infringement of the Asserted Patent and are not a staple article or commodity of commerce suitable for substantial non-infringing use.

106.   Defendant acquired knowledge of the Asserted Patent on or about December 3, 2014.[6] Upon information and belief, Defendant has had actual and constructive notice of Plaintiff's rights in the Asserted Patent since at least December 2014.

107.   No later than December 2014, Defendant obtained knowledge that its actions constituted direct infringement of the Asserted Patent, induced infringement of the Asserted Patent and/or contributed to infringement of the Asserted Patent.

108.   Notwithstanding, Defendant continues to willfully and with specific intent infringe upon and cause others to infringe upon one or more claims of the Asserted Patent.

VIII.   ASSERTED CLAIMS

109.   Plaintiff alleges infringement of the following claims[7]:

Patent	Claims
'831	3-9, 12-16, and 18-19

110.   With respect to the claims not identified above, Plaintiff further does not aver all claims of the Patent-in-Suit are infringed or will be asserted in this litigation or be in controversy.   Most of the claims of the Patent-in-Suit are directed to back-end computer systems and the source code and complete operation of the accused systems is not publicly available to fully assess all issues of infringement and invalidity. With respect to the claims not identified above, Plaintiff anticipates that this group of claims will be limited to a specific number by claim election at the appropriate Court scheduled time after appropriate discovery of source code with respect to infringement and disclosure of Defendant's invalidity defenses.

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[6] Plaintiff's notice letter was addressed to Studio 3 Partners, LLC, Defendant's legal name as of December 3, 2014.

[7] Although other claims are discussed above for purpose of explaining how claims of the patent reflect patent eligible concepts, Plaintiff's assertion of specific claims as being infringed in this Complaint is governed by this section.

COUNT 1

(Direct and Indirect Infringement of United States Patent No. 6,353,831)

111. Preservation restates and realleges each of the allegations set forth above and incorporates them herein.

112. Defendant, without permission of Preservation, has been and is presently infringing the '831 Patent, as infringement is defined by 35 U.S.C. § 271(a), by making, using, offering to sell, and selling the Accused Systems and those of third parties including without limitation customers and CDNs. By way of example only, Defendant's Accused Systems directly infringe claim 6 as follows:

1. A digital library system comprising: a means for cataloguing multimedia data using at least one catalogue element associated with a plurality of keywords identifying said multimedia data;

Defendant's Accused Systems are a digital library system that catalogues multimedia using keyword associations. At least one of the data structures containing descriptive information and tags associated with the multimedia portion, among other things, may meet this limitation. There are also child-parent relationships between the catalogue elements described above.

a means for managing access to said cataloguing system; and

Defendant's Websites include an access management system that provides different interfaces based upon the type of audience. For example, Defendant's websites provide access through a variety of devices and browsers such as tablets and mobile devices such as iOS and Android powered devices.

a means for distributing said multimedia data.

Defendant, through its own or third party CDNs, provides a distribution system that distributes multimedia data so the data may be accessed on its users' devices.

6. The system of claim 1 wherein said distributing said multimedia further comprises: a means for permanently storing said multimedia data in said digital library system at a main site; a means for temporarily storing some or

all of said multimedia data in said digital library system at a plurality of remote sites.

Upon information and belief, Defendant and third party CDNs employ multiple caches and other memory and/or storage at different sites and prioritize certain caches for storage and retrieval based on various factors.

113.   Thus, Defendant uses the invention covered by at least one claim of the '831 Patent. The above description is not intended to comprehensively show how Defendant's Accused Systems infringe the Patent-in-Suit in all cases for all software and/or hardware. Not all infringing features of the Accused Systems are addressed, nor are all infringing features of the Accused Systems mapped to elements of the claims. However, each claim limitation is mapped to at least one infringing feature, Plaintiff reserves the right to rely other features of Defendant's Websites to meet the same limitations of the Patent-in-Suit, or the above-described features of the Accused Systems to meet other limitations of the Patent-in-Suit. The descriptions are only meant as exemplary evidence to assist Defendant in identifying Accused Software and to show how Defendant's Websites plausibly infringe one claim of the Patent-in-Suit in one specific instance.

114.   Defendant indirectly infringes the '831 Patent by inducing or contributing to the infringement of the '831 Patent, including but not limited to infringement by its customers/consumers, in violation of 35 U.S.C. § 271(b)-(c)&(f). To the extent that Defendant is not directly liable for infringement of the '831 Patent, they collectively and individually induce the operators of the Accused Systems to infringe the '831 Patent.

115.   Defendant does not have a license or permission to use the claimed subject matter of the '831 Patent.

116.   As a direct and proximate result of Defendant's direct, joint, induced, and/or contributory infringement of the '831 Patent, Preservation has been injured and has been caused significant financial damage.

117. Preservation alleges upon information and belief that Defendant has, knowingly or with willful blindness, willfully infringed one or more claims of the '831 Patent. Defendant had knowledge of the Asserted Patent as set forth above, having been advised of the existence and substance of the Asserted Patent by Preservation. Defendant acted with knowledge of the Asserted Patent, and, despite its knowledge or despite that it should have known of an objectively high likelihood that its actions constituted infringement of Preservation's valid patent rights, continue to infringe.

118. This objectively defined risk was either known or so obvious that it should have been known to Defendant. Preservation seeks enhanced damages pursuant to 35 U.S.C. § 284 from Defendant.

119. As a result of Defendant's infringement of the '831 Patent, Preservation has suffered monetary damages. Defendant is thus liable to Preservation in an amount that adequately compensates it for Defendant's infringement, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

JURY DEMAND

120. Plaintiff Preservation hereby requests a trial by jury on all matters to which it is entitled to trial by jury pursuant to Rule 38 of the Federal Rules of Civil Procedure.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff Preservation respectfully requests that the Court:

A. Enter judgment that Defendant directly infringes, contributes to infringement, or induces others to infringe one or more claims of the Asserted Patent literally and/or under the doctrine of equivalents;

B. Award Plaintiff past and future damages together with prejudgment and post-judgment interest to compensate for the

1   infringement by Defendant of the Asserted Patent in accordance

2   with 35 U.S.C. § 284;

3   C.   Declare this case exceptional pursuant to 35 U.S.C. § 285; and

4   D.   Award Plaintiff Preservation its costs, disbursements, attorney's

5   fees, and such further and additional relief as deemed appropriate

6   by this Court.

7

8   DATED: May 1, 2023   SML AVVOCATI P.C.

9   By: */s/ Stephen M. Lobbin*
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11

12   DINOVO PRICE LLP
                                 Andrew G. DiNovo
13   (*pro hac vice application to be filed*)
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14   (*pro hac vice application to be filed*)
                                 Michael D. French
15   (*pro hac vice application to be filed*)

16   ATTORNEYS FOR PLAINTIFF
                                 PRESERVATION TECHNOLOGIES LLC
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1   **<u>DEMAND FOR JURY TRIAL</u>**

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3   Pursuant to Rule 38(b) of the Federal Rules of Civil Procedure and Local

4 Rule 38-1, Plaintiff Parity Networks, LLC hereby demands a trial by jury on all

5 issues raised by the Complaint.

6

7   DATED: May 1, 2023   SML AVVOCATI P.C.

8   By: */s/ Stephen M. Lobbin*
                                ATTORNEYS FOR PLAINTIFF

9   PRESERVATION TECHNOLOGIES LLC

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