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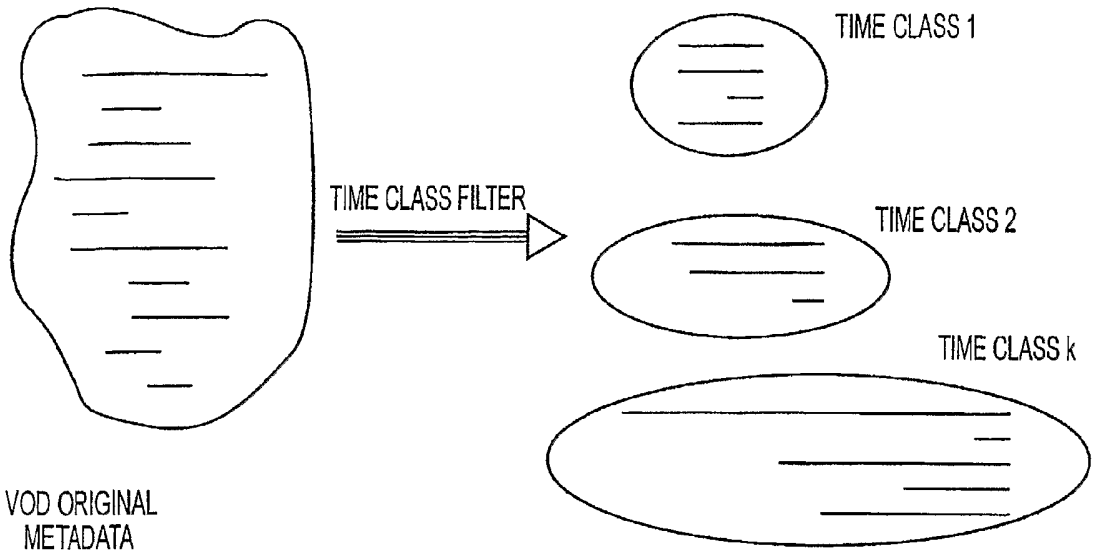
(54) **Title:** METHODS AND APPARATUSES FOR VIDEO ON DEMAND (VOD) METADATA ORGANIZATION



(57) **Abstract:** A method and system for optimizing the transmission of VOD metadata is disclosed. VOD metadata can be filtered, processed and/or organized prior to being packetized for transmission to client devices. The filtering, processing and/or organization can, for example, be based on a time duration associated with VOD media items and/or by groups of information elements available within the sets of metadata.

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METHODS AND APPARATUS FOR METADATA ORGANIZATION FOR VIDEO ON DEMAND (VOD) SYSTEMS

RELATED APPLICATION

[0001] This application is related to, and claims priority from, U.S. Provisional Patent Application Serial No. 60/575,313, filed on May 28, 2004, entitled "Method and Apparatus for Metadata Organization for Video on Demand (VOD) Systems", the disclosure of which is incorporated here by reference.

BACKGROUND

[0002] The present invention describes systems and methods for efficiently supplying multimedia metadata usable to create, for example, sophisticated entertainment user interfaces in the home through optimizing Video on Demand (VOD) metadata delivery.

[0003] Technologies associated with the communication of information have evolved rapidly over the last several decades. Television, cellular telephony, the Internet and optical communication techniques (to name just a few things) combine to inundate consumers with available information and entertainment options. Taking television as an example, the last three decades have seen the introduction of cable television service, satellite television service, pay-per-view movies and video-on-demand. Whereas television viewers of the 1960s could typically receive perhaps four or five over-the-air TV channels on their television sets, today's TV watchers have the opportunity to select from hundreds and potentially thousands of channels of shows and information. Video-on-demand technology, currently used primarily in hotels and the like, provides the potential for in-home entertainment selection from among thousands of movie titles. Digital video recording

(DVR) equipment such as offered by TiVo, Inc., 2160 Gold Street, Alviso, CA 95002, further expand the available choices.

[0004] The technological ability to provide so much information and content to end users provides both opportunities and challenges to system designers and service providers. One challenge is that while end users typically prefer having more choices rather than fewer, this preference is counterweighted by their desire that the selection process be both fast and simple. Unfortunately, the development of the systems and interfaces by which end users access media items has resulted in selection processes which are neither fast nor simple. Consider again the example of television programs. When television was in its infancy, determining which program to watch was a relatively simple process primarily due to the small number of choices. One would consult a printed guide which was formatted, for example, as series of columns and rows which showed the correspondence between (1) nearby television channels, (2) programs being transmitted on those channels and (3) date and time. The television was tuned to the desired channel by adjusting a tuner knob and the viewer watched the selected program. Later, remote control devices were introduced that permitted viewers to tune the television from a distance. This addition to the user-television interface created the phenomenon known as "channel surfing" whereby a viewer could rapidly view short segments being broadcast on a number of channels to quickly learn what programs were available at any given time.

[0005] Despite the fact that the number of channels and amount of viewable content has dramatically increased, the generally available user interface and control device options and frameworks for televisions have not changed much over the last 30 years. Printed guides are still the most prevalent mechanism for conveying programming information. The

multiple button remote control with simple up and down arrows is still the most prevalent channel/content selection mechanism. The reaction of those who design and implement the TV user interface to the increase in available media content has been a straightforward extension of the existing selection procedures and interface objects. Thus, the number of rows and columns in the printed guides has been increased to accommodate more channels. The number of buttons on the remote control devices has been increased to support additional functionality and content handling. However, this approach has significantly increased both the time required for a viewer to review the available information and the complexity of actions required to implement a selection. Arguably, the cumbersome nature of the existing interface has hampered commercial implementation of some services, e.g., video-on-demand, since consumers are resistant to new services that will add complexity to an interface that they view as already too slow and complex.

[0006] An exemplary control framework having a zoomable graphical user interface for organizing, selecting and launching media items is described in U.S. Patent Application Serial No. 10/768,432, filed on January 30, 2004 to Frank A. Hunleth, the disclosure of which is incorporated here by reference. This framework provides exemplary solutions to the afore-described problems of conventional interfaces. Among other things, such exemplary frameworks provide mechanisms which display metadata associated with media items available for selection by a user in a manner which is easy-to-use, but allows a large number of different media items to be accessible.

[0007] The creation of these types of advanced user interfaces is hamstrung by the type and availability of rich metadata that describes the content. The term "metadata" as it is used herein refers to all of the supplementary information that describes the particular content

of interest associated with media items available for selection by a user. As an example for movies, the metadata could include, e.g., the title, description, genre, cast, DVD cover art, price/availability, and rights associated with the content among others. Beyond this it could include cast bios and filmographies, links to similar movies, critical reviews, user reviews, and the rights associated with the metadata itself. It could also include advertising metadata that is linked to the content of interest. However these types of metadata are not currently available for use in generating user interfaces for several reasons. First, the universe of service providers that offer metadata is fragmented with various vendors supplying only a limited subset of the metadata information and usually in proprietary form. Second, to utilize these types of metadata would require sophisticated software processing that links the disparate pieces of metadata into a unifying set that is easy to consume by, for example, typically lower-end client devices in the home (e.g., set- top boxes). An exemplary method and system for enabling the capturing, processing, synthesizing and forwarding of metadata suitable to enable advanced user interfaces to be generated is described in U.S. Patent Application Serial No. 11/037,897, filed on January 18, 2005, the disclosure of which is incorporated here by reference.

[0008] With these and other improvements to control frameworks and user interfaces related to metadata information, more metadata information can be expected to become available from content deliverers. However, current metadata delivery systems, e.g., those associated with Electronic Program Guides (EPGs) include data delivery carousels fort which the data update mechanism is primitive and may be unable to handle the growing amount of metadata that needs to be transmitted in a timely manner. This problem is particularly relevant for Video on Demand (VOD) metadata due to the variable time frame of potential

VOD events.

[0009] Accordingly, it would be desirable to provide methods and systems to optimize VOD metadata deliver.

SUMMARY

[0010] Various methods and systems for transmitting VOD metadata are described herein. VOD metadata can be filtered, processed and/or organized prior to being packetized for transmission to client devices. The filtering, processing and/or organization can, for example, be based on a time duration associated with VOD media items and/or by groups of information elements available within the sets of metadata.

[0011] According to one exemplary embodiment of the present invention, a method for processing metadata includes the steps of receiving a plurality of sets of metadata, each set of metadata having a plurality of information elements associated with a media item, grouping the sets of metadata based upon a time value associated with one of the plurality of information elements in each set of metadata, generating packets of metadata based on the groups and loading the packets of metadata into a data carousel.

[0012] According to another exemplary embodiment of the present invention, a client device for receiving video-on-demand (VOD) metadata includes a receiver for receiving the VOD metadata in packets, the VOD metadata having been filtered based upon a time during which each media item associated with each corresponding set of VOD metadata will be available for selection and a processor for generating a user interface screen based on the received VOD metadata.

[0013] According to yet another exemplary embodiment of the present invention, a

distribution node for transmitting video-on-demand (VOD) metadata includes a transmitter for transmitting the VOD metadata in packets, the VOD metadata having been filtered based upon a time during which each media item associated with each corresponding set of VOD metadata will be available for selection.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] The accompanying drawings illustrate exemplary embodiments of the present invention, wherein:

[0015] Figure 1 depicts a screen of a user interface which can be generated using metadata processed in accordance with the present invention;

[0016] Figure 2 depicts another screen of a user interface which can be generated using metadata processed in accordance with the present invention;

[0017] Figure 3 is a table showing exemplary metadata types and sources;

[0018] Figure 4 depicts the process flow of metadata according to an exemplary embodiment of the present invention;

[0019] Figure 5 depicts time class filtering of metadata according to an exemplary embodiment of the present invention;

[0020] Figure 6 depicts an apparatus in accordance with exemplary embodiments of the present invention;

[0021] Figure 7 depicts two groups of metadata according to an exemplary embodiment of the present invention;

[0022] Figure 8 depicts time class filtering of metadata according to an exemplary embodiment of the present invention;

[0023] Figure 9 depicts group filtering of metadata according to an exemplary embodiment of the present invention;

[0024] Figure 10 illustrates the process flow for optimization criterion generation;

[0025] Figure 11 illustrates packet generation according to an exemplary embodiment of the present invention.

DETAILED DESCRIPTION

[0026] The following detailed description of the invention refers to the accompanying drawings. The same reference numbers in different drawings identify the same or similar elements. Also, the following detailed description does not limit the invention. Instead, the scope of the invention is defined by the appended claims.

[0027] In order to provide some context for this discussion, an exemplary user interface screen which can be created using VOD metadata delivered in accordance with exemplary embodiments of the present invention is shown in Figure 1. Therein, a portion of a user interface screen has been magnified to show ten media selection items in more detail. For more information regarding this purely exemplary interface, including previous screens and navigation techniques, the interested reader is directed to the above-incorporated by reference U.S. Patent Application Serial No. 10/768,432. However for the purposes of this specification, it is primarily useful to see an exemplary end result of metadata processing in accordance with the present invention.

[0028] Therein, the image associated with the media selection item for the movie "Apollo 13" has been magnified by, e.g., passing a cursor (not shown) over this image. Some metadata, e.g., the movie title and a representative image, can be used to generate this

interface screen. At lower levels of the selection process, more metadata can be used. For example, as shown in Figure 2, user selection of this magnified image, e.g., by depressing a button on an input device (not shown), can result in a further zoom to display additional details. For example, information about the movie "Apollo 13" including, among other things, the movie's runtime, price and actor information is shown. Those skilled in the art will appreciate that other types of information could be provided here. Additionally, this GUI screen includes GUI control objects including, for example, button control objects for buying the movie, watching a trailer or returning to the previous GUI screen (which could also be accomplished by depressing the ZOOM OUT button on the input device). Hyperlinks generated from metadata processed in a manner described below can also be used to allow the user to jump to, for example, GUI screens associated with the related movies identified in the lower right hand corner of the GUI screen of Figure 2 or information associated with the actors in this movie. In this example, some or all of the film titles under the heading "Filmography" can be implemented as hyperlinks which, when actuated by the user via the input device, will cause the GUI to display a GUI screen corresponding to that of Figure 2 for the indicated movie. Some or all of the information used to generate the interface screens of Figures 1 and 2 comes from metadata provided by one or more metadata providers and processed in accordance with exemplary embodiments of the present invention as will now be described. Exemplary metadata types that could be received are listed in Figure 3.

[0029] The interface screens shown in Figures 1 and 2 are purely exemplary and metadata processed in accordance with the present invention can be used to support other interfaces or purposes other than interface generation. Specific techniques for organizing and processing VOD metadata are described below according to exemplary embodiments of the

present invention.

[0030] Figure 4 illustrates a generalized system for delivering metadata and content in which the present invention can be implemented. Therein, VOD metadata follows a flow path as illustrated in Figure 4. Initially, customer content 410 from one or a number of content providers is received by a head end unit 420. This metadata is transmitted from the head end 420 through a network 440 and is received at a customer location by, for example, a set-top box 450. The client side device could, alternatively, be a personal computer or any other processing device capable of handling metadata and video content for presentation to a user.

[0031] One technique for organizing the metadata for transmission is to use a data (or object) carousel 430, although the present invention is not so limited. The data carousel 430 transmits a data set repeatedly (continuous cycle) in a standard format. The set-top box 450 receives the metadata and processes the metadata into a format which can then be displayed on a customer device, such as a TV 460, e.g., in the manner described above with respect to Figures 1 and 2. The metadata tends to flow from the headend 420 to the set-top box 450, however, upstream communications are possible. For example, when a user makes a request for a VOD item to be delivered via a remote control device (not shown), the metadata-based image on the TV 460 could change when the request is processed by the set-top box 450. The set-top box 450 passes the request upstream for the desired VOD selection to be delivered. The above example describes a generalized system with only single inputs and outputs. Those skilled in the art will understand that the above system could have multiple inputs and multiple outputs at each step of the process. For a more detailed description of an interactive television architecture in which the present invention can be implemented, the

interested reader is pointed to U.S. Patent No. 6,804,708 B1, issued on October 12, 2004, the disclosure of which is incorporated here by reference.

[0032] When a user makes a request through set-top box 450, the amount of delay associated with generating a user interface screen may be partially dependent upon how much metadata is in the data carousel 430 and how efficiently that metadata is organized. To reduce this potential delay methods and systems according to exemplary embodiments of the present invention for organizing metadata will be described below.

[0033] Prior to transmitting metadata to the data carousel 430, the metadata is organized relative to the raw form in which it is received from the content providers. According to one exemplary embodiment of the present invention, the first organization step is to filter the metadata into time classes as depicted in Figure 5. When the metadata is filtered, all metadata in the same class will have the same or similar event demonstration period end time. For example, if one content provider is running a movie that is available for purchase through the end of the current week, the metadata associated with that movie could be filtered into a different time class from VOD metadata associated with a concert that is available for purchase through the end of the next month. Depending on the types of metadata available and their associated event demonstration period end time, there could be as many or as few time periods as needed for efficient organization.

[0034] According to another exemplary embodiment of the present invention the metadata describing each event can be separated into groups. For example, metadata groups could include one or more of front data (F-data), back data (B-data) and dynamic data (D-data). F-data includes data that will appear on, for example, higher level user interface screens, e.g., such as that shown in Figure 1, such as event name, year and length. B-data can

include VOD metadata that would, for example, be useful in user interface screens accessed by users seeking more information about an event than is seen from the F-data alone, such as event description and search indexes, e.g., as shown in Figure 2. D-data includes information that can be changed without removing the event off of the list, such as price, taxes and rules that define potential price changes for instance coupons. Elements can be added or deleted from the data groups. Additionally, the same metadata can be placed in more than one group and the number of groups can vary.

[0035] According to another exemplary embodiment of the present invention, an optimization criterion can be used to further organize metadata. A criteria generation manager that generates optimization criteria C based on a content provider's preferences is created and used to further organize metadata. The preferences can be defined interactively, and then applied to F-data, B-data and D-data in such a manner to minimize criteria C. For example, if a content provider only wanted to supply the event name and never the event year, optimization criteria C could be applied to the F-data to only show event name and not the event year. As another example, if the content provider's price is always the same (constant) price, that data would be considered as a part of the F-data group and optimization criteria C could be applied to the D-data and F-data simultaneously. Criteria C can also operate to remove or move metadata from one category (for example D-data) to another category (for example F-data).

[0036] As illustrated in Figure 6, the above described filtering and organization techniques are shown operating in conjunction with each other to optimize metadata transmission to the data carousel. VOD metadata is processed through a time class filter 610 and filtered into as many time classes as needed based on the event demonstration period end

time. These time filtered classes are then filtered into groups based on the group creation filter 620 based on data group types. Optimization criterion based upon user requests is created at step 630. These inputs are merged together at the packet generator 640. According to this exemplary embodiment, transmission packets are defined by time classes and groups, and these transmission packets are organized such that packets will be generated based on the same or similar time class and group and when possible, in a manner which minimizes criteria C. The packets are then forwarded to data carousel 650 for storage and subsequent forwarding to client devices. This allows for more efficient organization of VOD metadata in the data transmission carousel 650 which will in turn minimize the amount of unused metadata in the data transmission carousel 650.

[0037] Numerous variations of the foregoing exemplary embodiments are possible. For example, according to an exemplary embodiment of the present invention, the packet generator 640 provides data compression as part of the packet generation process to decrease bandwidth usage. Moreover, packets can be uploaded in a special order with variable frequency to minimize, for example, the download waiting time. Download waiting time refers to a time interval needed to download the data to, e.g., a plurality of client devices. Each packet can have its own download waiting time. A group of packets can be characterized by a maximum, minimum, or average waiting time. In one exemplary embodiment the download waiting time criteria used, for example to determine the uploading order to, e.g., the data carousel, refers to the average waiting time. In other exemplary embodiments the download waiting time criteria can be the maximum waiting time or a weighted average of the average waiting time and maximum waiting time.

[0038] To illustrate the manner in which exemplary embodiments of the present

invention operate to filter, organize and process metadata, an illustrative set of metadata will be discussed. Metadata, as shown in Figure 7, is received by a headend unit 420. According to an exemplary embodiment of the present invention, the metadata of Figure 7 is processed through a time class filter 610 and the outputs are put into different time classes based on the event end date as illustrated in Figure 8. Each time class is then filtered through a group creation filter 620 and put into data groups as illustrated in Figure 9. In this example, the metadata associated with each media item is broken up into the F-data, B-data and D-data groups described above. Optimization generated criterion C, as illustrated in Figure 10, has been previously generated from, for example, cable service provider inputs and is sent to the packet generator 640. Additionally the outputs from the group creation filter 620 are sent to the packet generator 640. The packet generator 640 combines these inputs into transmission packets (1120, 1140, 1160 and 1180) as depicted in Figure 11 to be sent to the data transmission carousel 650.

[0039] The above-described exemplary embodiments are intended to be illustrative in all respects, rather than restrictive, of the present invention. Thus the present invention is capable of many variations in detailed implementation that can be derived from the description contained herein by a person skilled in the art. All such variations and modifications are considered to be within the scope and spirit of the present invention as defined by the following claims. No element, act, or instruction used in the description of the present application should be construed as critical or essential to the invention unless explicitly described as such. Also, as used herein, the article "a" is intended to include one or more items.

WHAT IS CLAIMED IS:

1. A method for processing metadata comprising the steps of:

receiving a plurality of sets of metadata, each set of metadata having a plurality of information elements associated with a media item;

grouping said sets of metadata based upon a time value associated with one of said plurality of information elements in each set of metadata;

generating packets of metadata based on said groups; and

loading said packets of metadata into a data carousel.

2. The method of claim 1, further comprising the step of:

extracting similar information elements from said sets of metadata; and

generating said packets using said similar information elements.

3. The method of claim 1, wherein said time value is a time during which a media item associated with a corresponding set of metadata will be available for selection.

4. The method of claim 2, wherein said similar information is one of F-data, B-data and D-data.

5. The method of claim 1, further comprising the step of generating said packets based on user criterion.

6. A system for processing metadata comprising:

means for receiving a plurality of sets of metadata, each set of metadata having a plurality of information elements associated with a media item;

means for grouping said sets of metadata based upon a time value associated with one of said plurality of information elements in each set of metadata;

means for generating packets of metadata based on said groups; and

means for loading said packets of metadata into a data carousel.

7. The system of claim 6, further comprising:

means for extracting similar information elements from said sets of metadata; and

means for generating said packets using said similar information elements.

8. The system of claim 1, wherein said time value is a time during which a media item associated with a corresponding set of metadata will be available for selection.

9. The method of claim 7, wherein said similar information is one of F-data, B-data and D-data.

10. The system of claim 6, further comprising means for generating said packets based on user criterion.

11. A client device for receiving video-on-demand (VOD) metadata comprising:

a receiver for receiving said VOD metadata in packets, said VOD metadata having been filtered based upon a time during which each media item associated with each corresponding set of VOD metadata will be available for selection; and

a processor for generating a user interface screen based on said received VOD metadata.

12. The client device of claim 11, wherein said client device is one of a set-top box and a personal computer.

13. The client device of claim 11, wherein said VOD metadata is further organized within said packets based on groups of corresponding metadata information elements.

14. The client device of claim 13, wherein said groups of corresponding metadata information elements are one or more of F-data, B-data and D-data.

15. A distribution node for transmitting video-on-demand (VOD) metadata comprising:

a transmitter for transmitting said VOD metadata in packets, said VOD metadata having been filtered based upon a time during which each media item associated with each corresponding set of VOD metadata will be available for selection.

16. The distribution node of claim 15, wherein said distribution node is part of a headend of a cable communication network.

17. The distribution node of claim 15, wherein said VOD metadata is further organized within said packets based on groups of corresponding metadata information elements.

18. The distribution node of claim 17, wherein said groups of corresponding metadata information elements are one or more of F-data, B-data and D-data.

FIG. 1

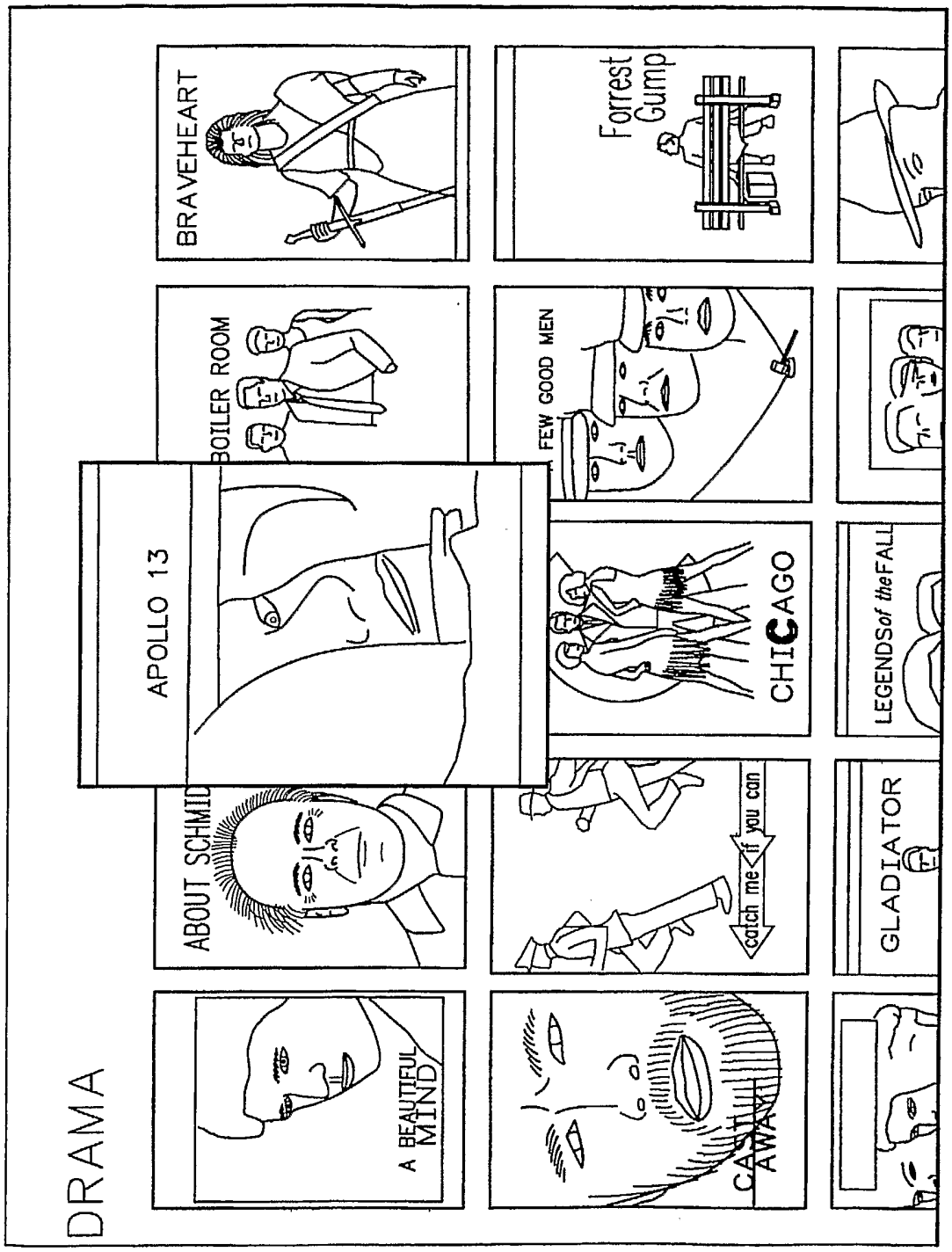

DRAMA
A BEAUTIFUL MIND
ABOUT SCHMIDT
APOLLO 13
BOILER ROOM
BRAVEHEART
CATCH AWAY
catch me if you can
CHICAGO
FEW GOOD MEN
Forrest Gump
GLADIATOR
LEGENDS of the FALL

FIG. 2

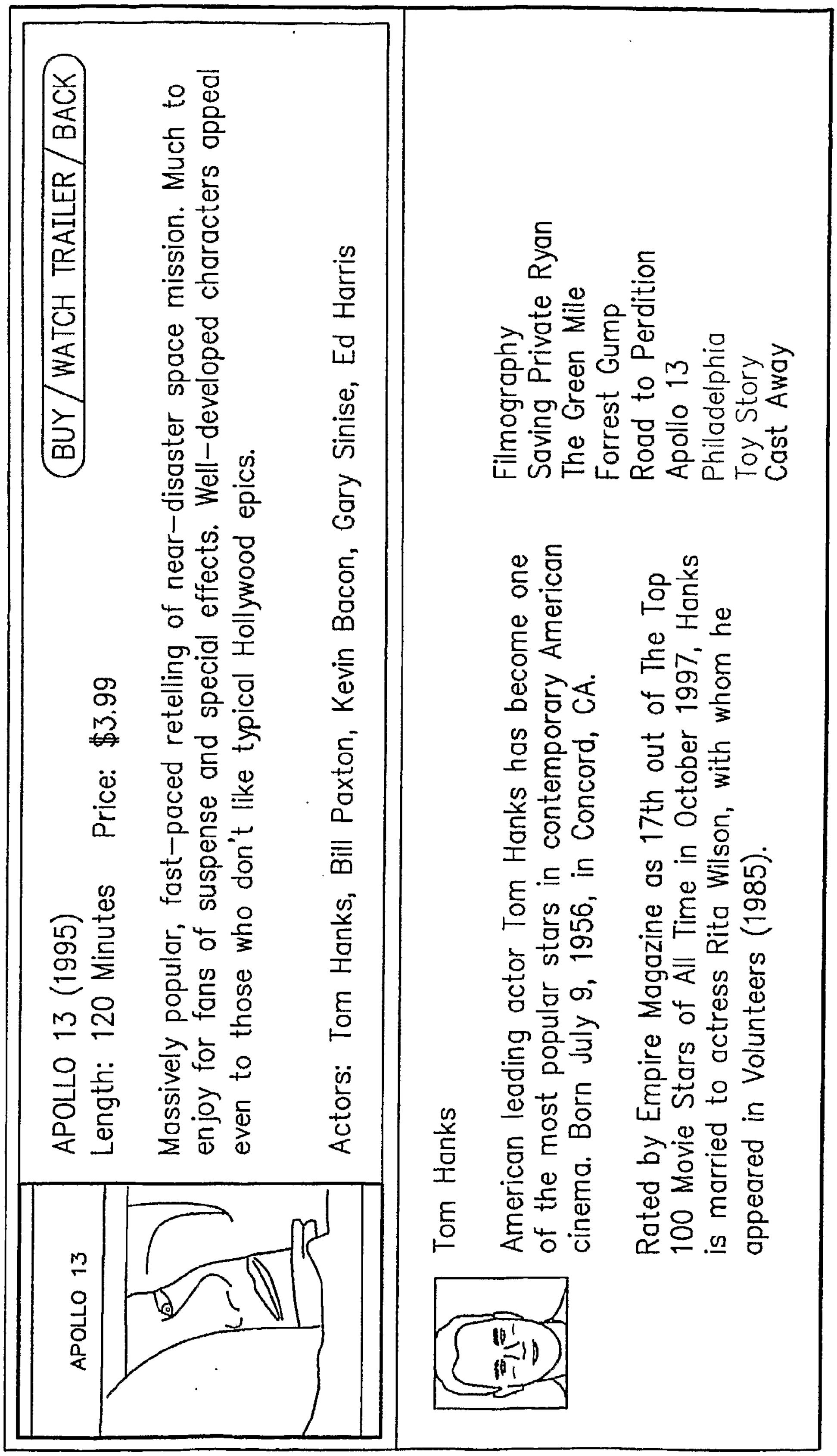

DRAMA
APOLLO 13
APOLLO 13 (1995)
Length: 120 Minutes Price: $3.99
BUY / WATCH TRAILER / BACK
Massively popular, fast-paced retelling of near-disaster space mission. Much to enjoy for fans of suspense and special effects. Well-developed characters appeal even to those who don't like typical Hollywood epics.
Actors: Tom Hanks, Bill Paxton, Kevin Bacon, Gary Sinise, Ed Harris
Tom Hanks
American leading actor Tom Hanks has become one of the most popular stars in contemporary American cinema. Born July 9, 1956, in Concord, CA.
Rated by Empire Magazine as 17th out of The Top 100 Movie Stars of All Time in October 1997, Hanks is married to actress Rita Wilson, with whom he appeared in Volunteers (1985).
Filmography
Saving Private Ryan
The Green Mile
Forrest Gump
Road to Perdition
Apollo 13
Philadelphia
Toy Story
Cast Away

FIG. 3

Metadata Categories		Content																								Cast			Collaborative			Instance						
		Title	Year	Studio/Publisher	Episode Name	Synopsis	Description	Plot Keywords	Producer	Director	Principal Cast	Extended Cast	Artist	Writers	Category	Genre	Airing (P,F,R)	Runtime	Rating	Picture/Cover art	Tracks	Trailers	Content Lookup	Bios	Credits	Photo	User Rating	Editorial Rating	Critical Reviews	Links to other Media	System ID	Time	Location	Price	Usage Restrictions	Copy Restrictions
TV Browser/PVR		X	X	X	X	X	X	X	X	X	X																									
TMS		X	X	M	X	X	X		X	X	X			X		X	X	X	X						X		M				X		P			
Gemstar																																				
MSO																															X					
VOD Browser		X	X		X	X	X	X	X	X	X			X		X	X	X	X	X?				X	X	X					X	X	X	X		
Muze																																				
IMDB		X	X			X	X	X	X	X	X	X		X		X		X	X								X					X				
AllMovieGuide		X	X	X		X	X	X	X	X	X			X		X	X	X	X	X	D			X	?	X			X	X						
Music Browser		X											X		X	X	X	X	X	X	X		X	X												
AllMovieGuide		X	X	X									X		X		X	X	X					X			X	X	X							
Muze																																				
Gracenote		X	X	X											X		X	X	X		X		X													
Freedb.org		X	X										X		X		X	X	?				X													
Musicbrainz.org		X											X					X					X													

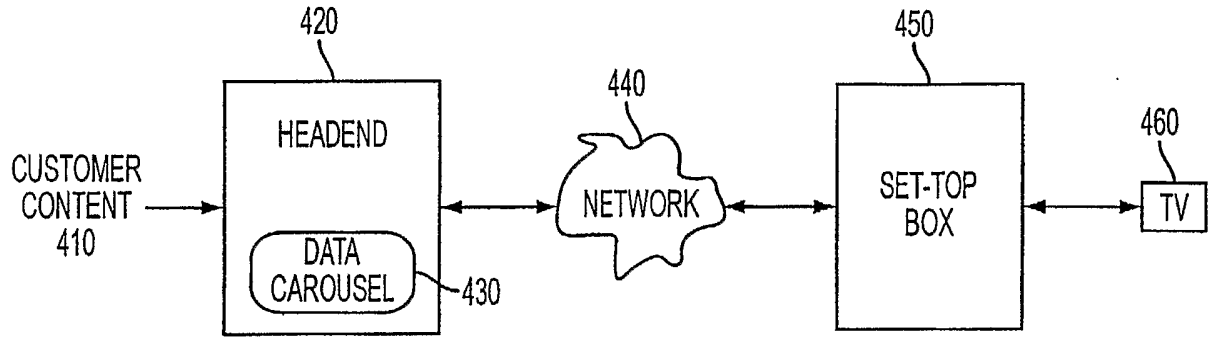

420
HEADEND
DATA
CAROUSEL
430
CUSTOMER
CONTENT
410
440
NETWORK
450
SET-TOP
BOX
460
TV

FIG. 4

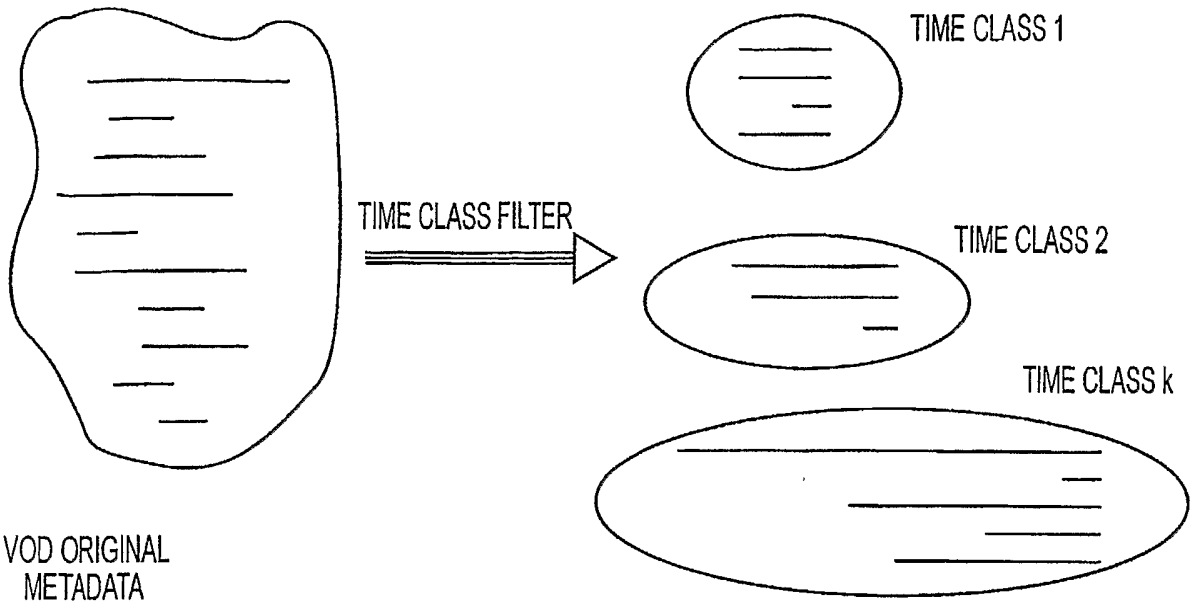

TIME CLASS 1
TIME CLASS FILTER
TIME CLASS 2
TIME CLASS k
VOD ORIGINAL METADATA

FIG. 5

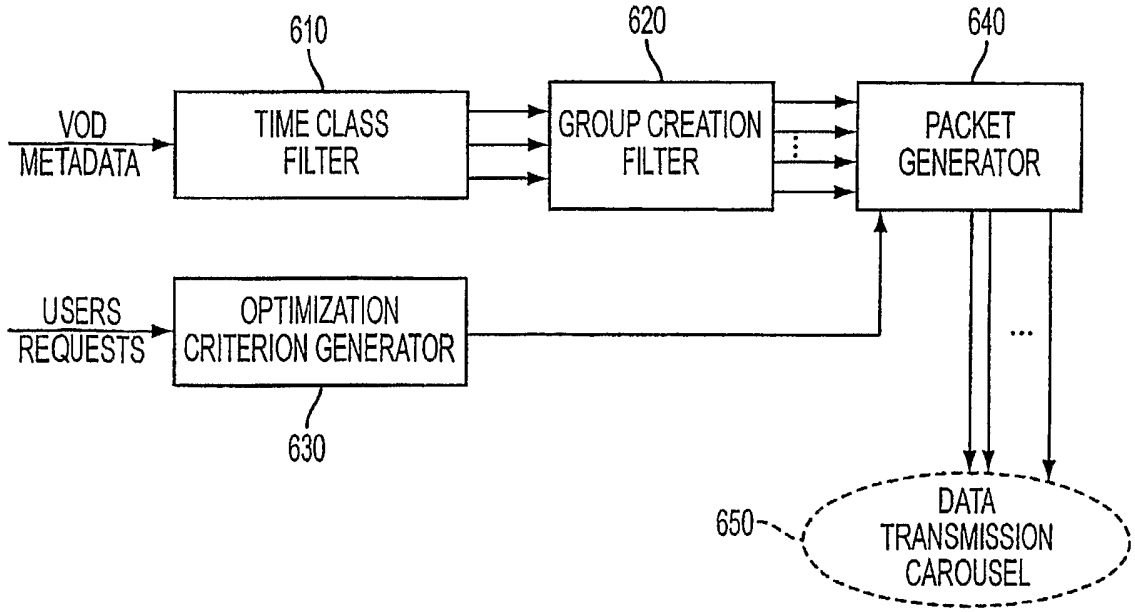

610
620
640
VOD METADATA
TIME CLASS FILTER
GROUP CREATION FILTER
PACKET GENERATOR
USERS REQUESTS
OPTIMIZATION CRITERION GENERATOR
630
650
DATA TRANSMISSION CAROUSEL

FIG 6

EVENT NAME 2	TOP GUN
YEAR 2	1986
LENGTH 2	110 MINUTES
STUDIO 2	PARAMOUNT PICTURES
RATING 2	PG
EVENT DESCRIPTION 2	NAVAL AVIATOR TRAINING SCHOOL
MOVIE POSTER 2	MOVIE POSTER
SEARCH INDEXES 2	SEARCH INDEXES
PRICE 2	3.99
TAXES 2	0.35
PRICE RULES 2	PRICE RULES
END DATE 2	6/5/2005

EVENT NAME 1	APOLLO 13
YEAR 1	1995
LENGTH 1	120 MINUTES
STUDIO 1	UNIVERSAL STUDIOS
RATING 1	PG
EVENT DESCRIPTION 1	NEAR DISASTER SPACE MISSION
MOVIE POSTER 1	MOVIE POSTER
SEARCH INDEXES 1	SEARCH INDEXES
PRICE 1	3.99
TAXES 1	0.35
PRICE RULES 1	PRICE RULES
END DATE 1	5/5/2005

FIG. 7

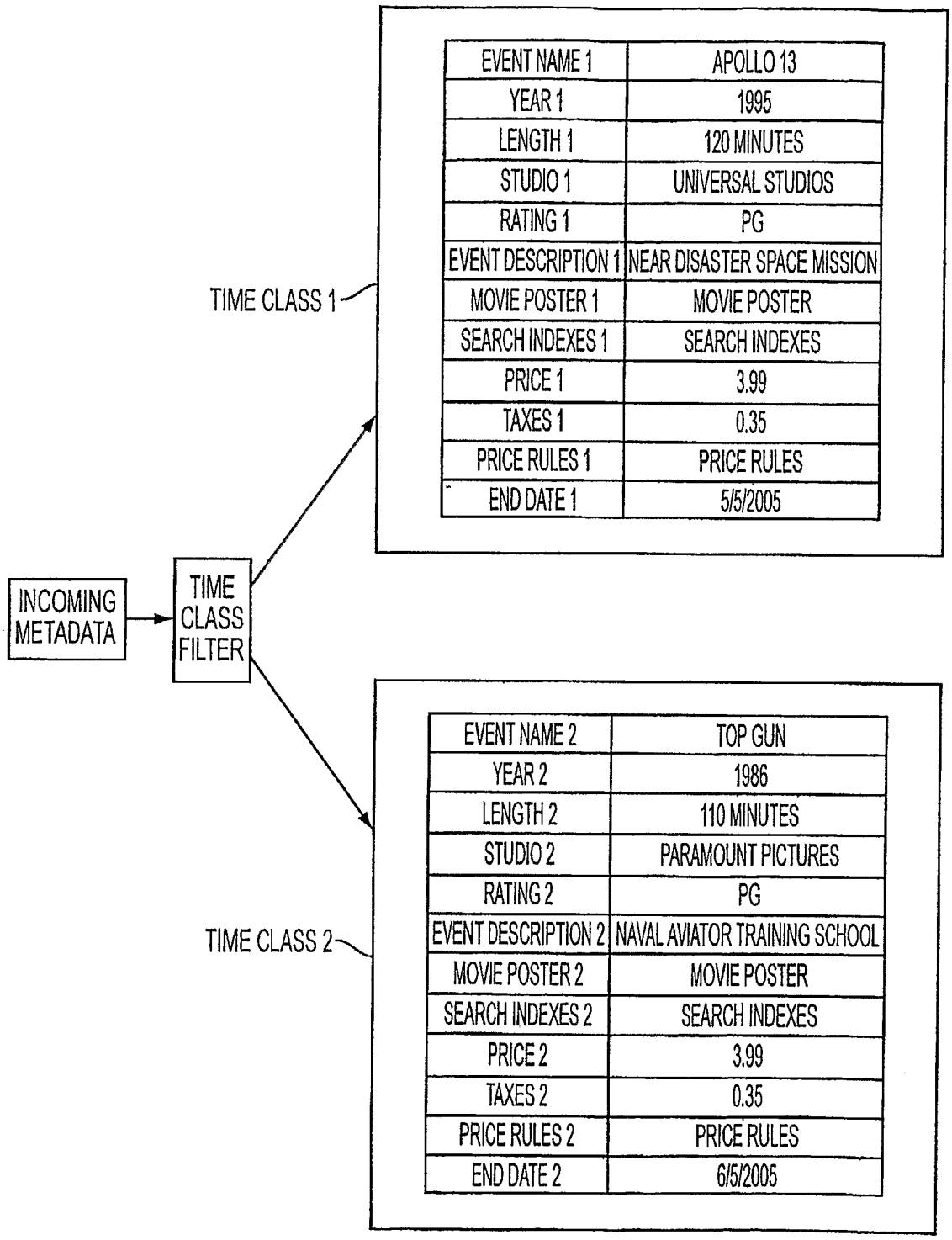
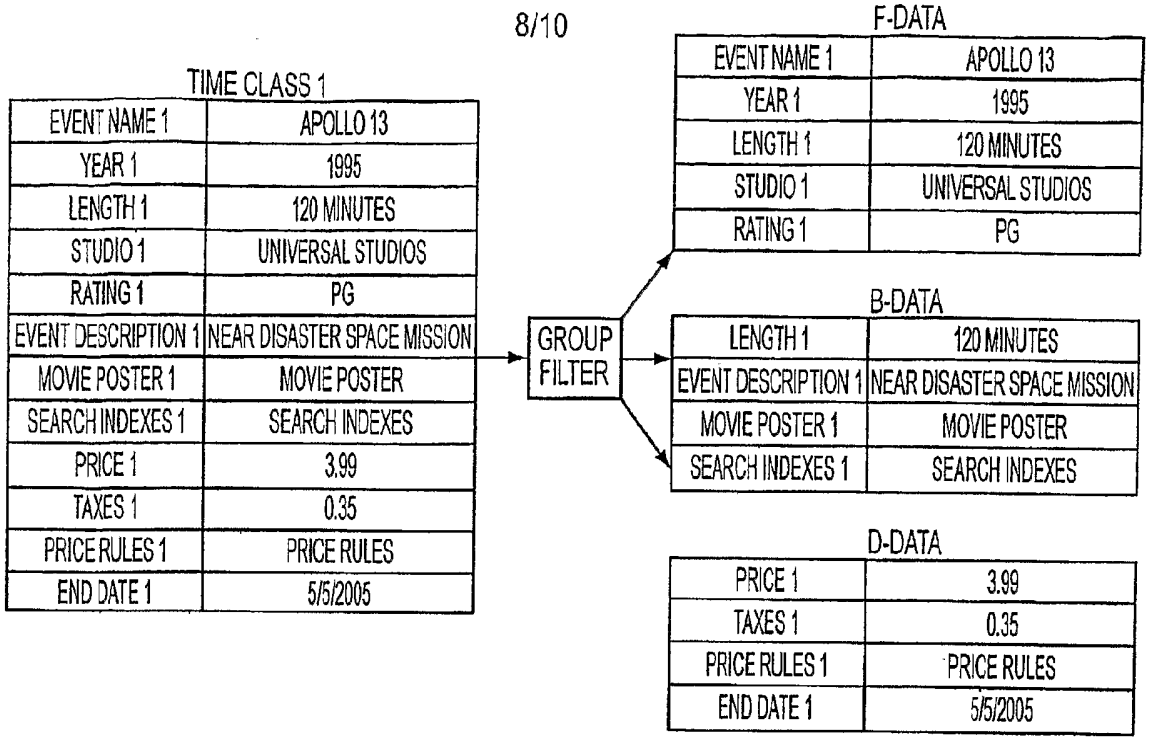

INCOMING METADATA
TIME CLASS FILTER
TIME CLASS 1
EVENT NAME 1 APOLLO 13
YEAR 1 1995
LENGTH 1 120 MINUTES
STUDIO 1 UNIVERSAL STUDIOS
RATING 1 PG
EVENT DESCRIPTION 1 NEAR DISASTER SPACE MISSION
MOVIE POSTER 1 MOVIE POSTER
SEARCH INDEXES 1 SEARCH INDEXES
PRICE 1 3.99
TAXES 1 0.35
PRICE RULES 1 PRICE RULES
END DATE 1 5/5/2005
TIME CLASS 2
EVENT NAME 2 TOP GUN
YEAR 2 1986
LENGTH 2 110 MINUTES
STUDIO 2 PARAMOUNT PICTURES
RATING 2 PG
EVENT DESCRIPTION 2 NAVAL AVIATOR TRAINING SCHOOL
MOVIE POSTER 2 MOVIE POSTER
SEARCH INDEXES 2 SEARCH INDEXES
PRICE 2 3.99
TAXES 2 0.35
PRICE RULES 2 PRICE RULES
END DATE 2 6/5/2005

FIG. 8


TIME CLASS 1
EVENT NAME 1
APOLLO 13
YEAR 1
1995
LENGTH 1
120 MINUTES
STUDIO 1
UNIVERSAL STUDIOS
RATING 1
PG
EVENT DESCRIPTION 1
NEAR DISASTER SPACE MISSION
MOVIE POSTER 1
MOVIE POSTER
SEARCH INDEXES 1
SEARCH INDEXES
PRICE 1
3.99
TAXES 1
0.35
PRICE RULES 1
PRICE RULES
END DATE 1
5/5/2005
GROUP FILTER
F-DATA
B-DATA
D-DATA

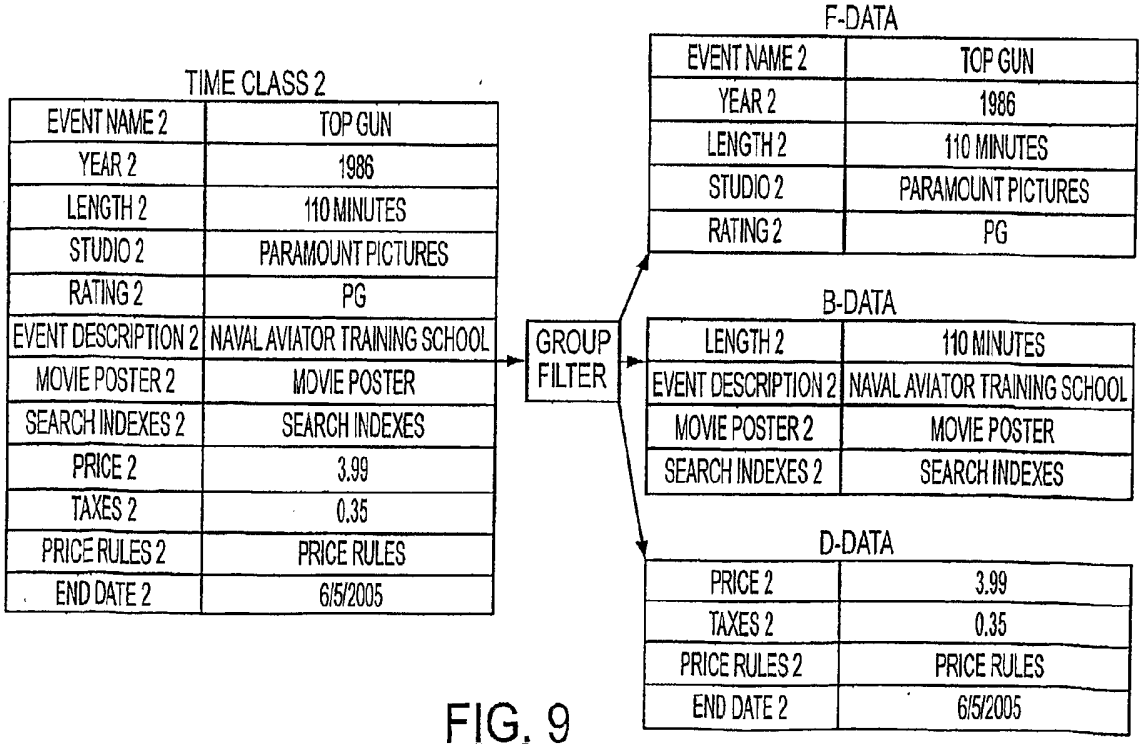

TIME CLASS 2
EVENT NAME 2
TOP GUN
YEAR 2
1986
LENGTH 2
110 MINUTES
STUDIO 2
PARAMOUNT PICTURES
RATING 2
PG
EVENT DESCRIPTION 2
NAVAL AVIATOR TRAINING SCHOOL
MOVIE POSTER 2
MOVIE POSTER
SEARCH INDEXES 2
SEARCH INDEXES
PRICE 2
3.99
TAXES 2
0.35
PRICE RULES 2
PRICE RULES
END DATE 2
6/5/2005
GROUP FILTER
F-DATA
B-DATA
D-DATA

FIG. 9

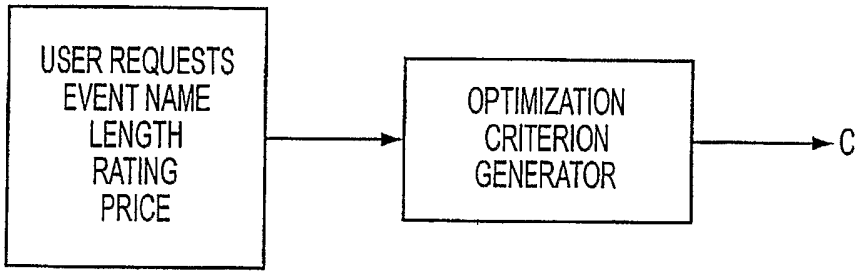

USER REQUESTS
EVENT NAME
LENGTH
RATING
PRICE
OPTIMIZATION
CRITERION
GENERATOR
C

FIG. 10

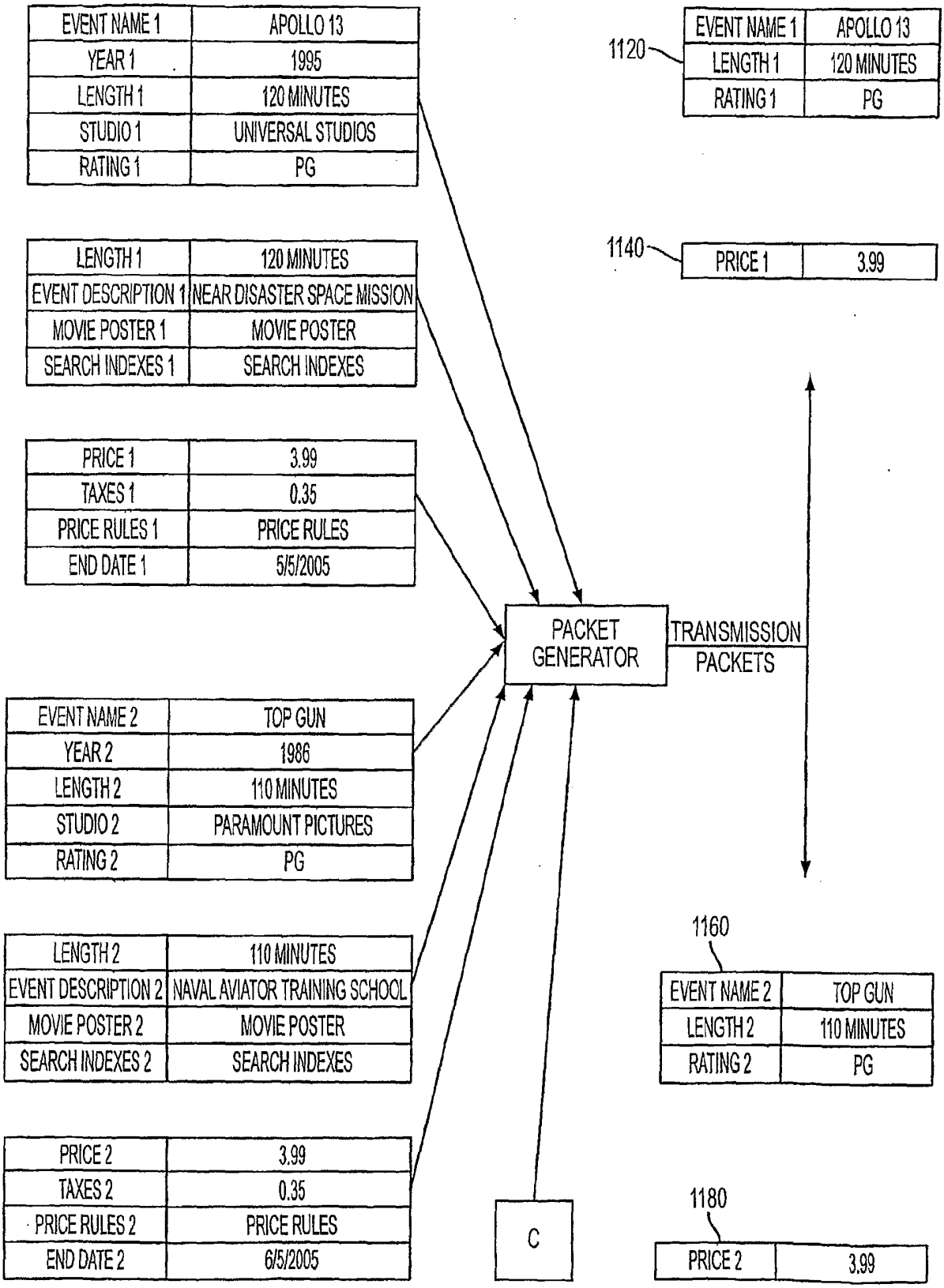

EVENT NAME 1
APOLLO 13
YEAR 1
1995
LENGTH 1
120 MINUTES
STUDIO 1
UNIVERSAL STUDIOS
RATING 1
PG
LENGTH 1
120 MINUTES
EVENT DESCRIPTION 1
NEAR DISASTER SPACE MISSION
MOVIE POSTER 1
MOVIE POSTER
SEARCH INDEXES 1
SEARCH INDEXES
PRICE 1
3.99
TAXES 1
0.35
PRICE RULES 1
PRICE RULES
END DATE 1
5/5/2005
EVENT NAME 2
TOP GUN
YEAR 2
1986
LENGTH 2
110 MINUTES
STUDIO 2
PARAMOUNT PICTURES
RATING 2
PG
LENGTH 2
110 MINUTES
EVENT DESCRIPTION 2
NAVAL AVIATOR TRAINING SCHOOL
MOVIE POSTER 2
MOVIE POSTER
SEARCH INDEXES 2
SEARCH INDEXES
PRICE 2
3.99
TAXES 2
0.35
PRICE RULES 2
PRICE RULES
END DATE 2
6/5/2005
PACKET GENERATOR
TRANSMISSION PACKETS
C
1120
EVENT NAME 1
APOLLO 13
LENGTH 1
120 MINUTES
RATING 1
PG
1140
PRICE 1
3.99
1160
EVENT NAME 2
TOP GUN
LENGTH 2
110 MINUTES
RATING 2
PG
1180
PRICE 2
3.99

FIG 11