Real-Time Encoding and Feeds in Oracle Video Server

An Oracle White Paper
March 1998

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INTRODUCTION

Today, as Internet and web-based applications become ubiquitous, companies are preparing for the next wave in online information exchange: multimedia content that truly engages users.

There are two ways to provide multimedia content, such as video, to those who want to view it. The first method is for the viewer to store the entire content—a video clip, commercial, or movie—locally on a VCR tape or PC drive. This is called *stored video* or *stored content*. The process of storing content on a tape or disk is called *encoding*.

The second method, *streaming*, sends data directly from the source to a viewing device such as a web browser, Network Computer™ or PC, or a set-top box attached to a television.

Feeds are streams of data sent directly from sources like video cameras, broadcast towers, and satellites. *Real-time feeds* are feeds that are displayed at the same time they are broadcast or captured by video cameras. *Real-time encoding* is the process of storing real-time feeds on disk at the same time the feed is being captured or broadcast.

ORACLE VIDEO SERVER REAL-TIME FEEDS

The Real-Time Feed capabilities of Oracle Video Server allow service providers such as telephone and cable companies, broadcasters, and corporations to stream content to viewers and store feeds on computers at the same time. This gives viewers VCR-style control—rewind, fast forward, and pause—over real-time feeds such as news, movies, financial news, sports, and entertainment events.

Viewers can pause a program to take a break, or rewind the program to watch something they missed or would like to see again, creating their own instant-replays. They can then either continue watching from that point or fast-forward to catch up to the current broadcast content.

With Oracle Video Server's real-time feed support, service providers can offer other value-added services such as storing a specified amount of content for customers to watch within a time window. This can range from the past few

minutes to the past week or longer, depending on available storage space, allowing their customers to create their own customized viewing schedules.

Real-time feed support allows service providers to provide each customer with a continuous, built-in VCR on every channel. Each viewer has independent control over any program stream. One viewer can pause a program while another rewinds the same program and still another fast-forwards to a different point. All these viewers can rejoin the broadcast in progress at any time.

In addition, each viewer can watch any programming their service provider has stored, exercising full VCR-style control over that programming, independent of what other viewers are watching.

BENEFITS OF DIGITAL VIDEO

Digital video is video stored digitally, translated into computer-readable form using 1s and 0s. With digital video, customers can see and control the feed immediately. To control viewing without real-time encoding support, viewers must wait until a tape is made and the tape is played directly or encoded onto disk and played from there.

With digital video, customers also can choose from a much wider variety of content. Only a small percentage of content is ever rebroadcast or put onto tape. Also, much of it (for example, news broadcasts) is of interest for a short time only.

Customers can access the content indefinitely. As long as the provider stores the content on the computer, customers can access and watch the content again, or wait to watch it at their leisure.

Digital video is easier for content creators and service providers to manipulate, store, and manage than analog tapes. Content is easier to find because it is unnecessary to sort through bulky tapes and read their labels. A computer can easily find the right content and deliver it with little or no human intervention. Finally, digital content can be transferred electronically, which is faster, easier, and less expensive than shipping tapes via courier.

By enhancing digital video with Oracle Video Server's real-time encoding support, service providers can provide their customers with personalized control that was simply not possible before—a compelling, value-added service.

HOW ORACLE REAL-TIME ENCODING SUPPORT WORKS

Without a real-time encoder, content must be encoded manually. An analog tape is inserted into a VCR that is attached to an encoder (alternatively, a live feed could go directly into the encoder). The encoder then produces a tape containing raw content encoded into digital, computer-readable form. The encoding process is time-consuming—requiring up to several times or even many times as long as the content itself, depending on the type of encoding.

The raw content on the encoded tape is then manually loaded onto a computer disk. This raw content is then tagged. (*Tagging* is a way of indexing a piece of raw content so viewers can rewind and fast-forward, or *seek*, through it.) This tagged file is then loaded into a video server such as Oracle Video Server.

Oracle Video Server performs this process automatically. There is no need for separate encoding or tagging steps. A real-time encoder attaches directly to the computer. The encoder encodes and tags the live feed (or VCR feed) in real-time, generating both a raw content file and its associated tag file simultaneously.

Through an API (Application Programming Interface), the encoder loads both the raw content file and the tag file into the video server. The content streams out to viewers as it arrives, with only a few seconds' delay. At the same time, the encoder can also deliver the live feed directly to viewers who don't want or need control over the feed. These viewers, too, can assume control over the feed at any time.

TYPES OF REAL-TIME ENCODING

Oracle Video Server supports two types of real-time encoding. The first is *continuous real-time feeds*. In a continuous real-time feed, the service provider decides how much of the feed they want to keep online (for example, a few minutes, 2 hours, or one week) and opens a content file of the appropriate size.

For example, assume the provider chooses to continuously store the past 10 hours of the feed online. After 10 hours, the new incoming feed begins overwriting the 10-hour-old portion of the content, which is then no longer available. The file is overwritten again and again, and there is always 10 hours of content available for viewers to watch. The viewers enjoy VCR-style control over any portion of these 10 hours of content.

Enhancement plans include enabling service providers to store portions of continuous real-time feeds in separate files for longer-term access.

The other type of real-time encoding is *one-step encoding*. One-step encoding is used when the service provider wants to keep the content file available for later viewing and knows the length of the content. For example, corporations might want to store video footage of executive speeches and annual shareholder meetings for future access by employees and investors.

In this case, the service provider opens a file to encode content for a specified length of time. After the time has elapsed, the service provider closes that content file and opens another one, if desired. Viewers have VCR-style control over the feed while the content file is being created—pausing, rewinding, and fast-forwarding to any point. After that content file is closed, viewers can still access the file and exercise VCR-style control.

ENHANCING REAL-TIME ENCODING SUPPORT WITH PARTNER SOLUTIONS

Oracle Video Server partner solutions can enhance Oracle's real-time encoding solutions even further. With partner solutions, service providers can even do real-time encoding of live video conferences.

THE VIDEO ENCODING STANDARD API

Like Oracle Video Server itself, the real-time encoding software is standards-based, implemented via a CORBA cartridge that usually runs remotely on the encoder platform. Alternatively, the real-time encoding software could run on the same machine as the server, assuming the video capture hardware exists there.

Real-time encoding works with any content format supported by Oracle Video Server, including:

- MPEG-1
- MPEG-2
- fractal compression
- AVI, WAV
- Intel Indeo

Support for other formats is planned.

Compliant encoders can encode into Oracle Video Server while Oracle Video Server is running on any supported platform. (This includes most major UNIX versions, WindowsNT and nCUBE.) It can play to any supported client including:

- web browsers
- television set-top boxes
- Network Computers™
- Windows95-compliant PCs
- WindowsNT-compliant PCs

Support for other client platforms is planned.

Working together with a number of encoding vendor partners, Oracle developed an open API called the Video Encoding Standard API, or VES API. Oracle has placed the API into the public domain. It is freely available, without license fees of any kind.

Through the VES API, any compliant encoder can write content directly and transparently to any compliant video server. There is essentially no difference

between encoding to a local disk and encoding to a VES-compliant video server. Customers are free to mix and match compliant encoders and video servers.

In addition, the VES API allows encoder vendors to write to a single API instead of custom-coding to a number of proprietary APIs, one for each video server. Likewise, the VES API allows video server vendors to support a number of encoders through a single API instead of writing custom code for every encoder they wish to support.

Oracle has developed a method by which encoder vendors can certify themselves as VES-compliant with Oracle Video Server. Please contact Oracle for details.

CONCLUSION

Real-time feeds allow service providers to stream content to viewers as it happens. With Oracle Video Server, individual viewers can exercise VCR-style control over real-time and stored video content.

Digital content also has the advantage of being easier to store and distribute than analog tapes. With Oracle Video Server, digital video can be encoded in real time and streamed to viewers within seconds. This single-step encoding process uses the VES API, an open interface standard for encoder and video server manufacturers.

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March 1998
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