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# Unique Features in the Oracle DIVArchive Solution

Benefits for the Broadcast and Media Industries

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## Introduction

IT-based solutions are becoming more and more popular in the broadcast and media industries, and questions are arising about the possibility of using an IT-based hierarchical storage manager (HSM) solution instead of a content storage management (CSM) solution. This white paper highlights the unique features provided by a CSM product, such as the Oracle DIVArchive solution, and shows how CSM solutions address all the requirements of the broadcast and media industries. It also highlights that an IT-based HSM solution only provides a subset of the functionalities provided by a CSM. This is why another application is required on top of an HSM product to provide a solution that can be compared with a CSM. Such an approach locks you into a single vendor and can limit capabilities and functionality.

## Oracle DIVArchive Solution Overview

With more than 500 installations worldwide, Oracle DIVArchive CSM software has been chosen by many companies and service providers in the broadcast and media industries because its unique set of features is designed especially for these industries. The Oracle DIVArchive solution uses standard IT products to provide a CSM solution with a fully distributed architecture that can easily scale in both storage capacity and throughput.

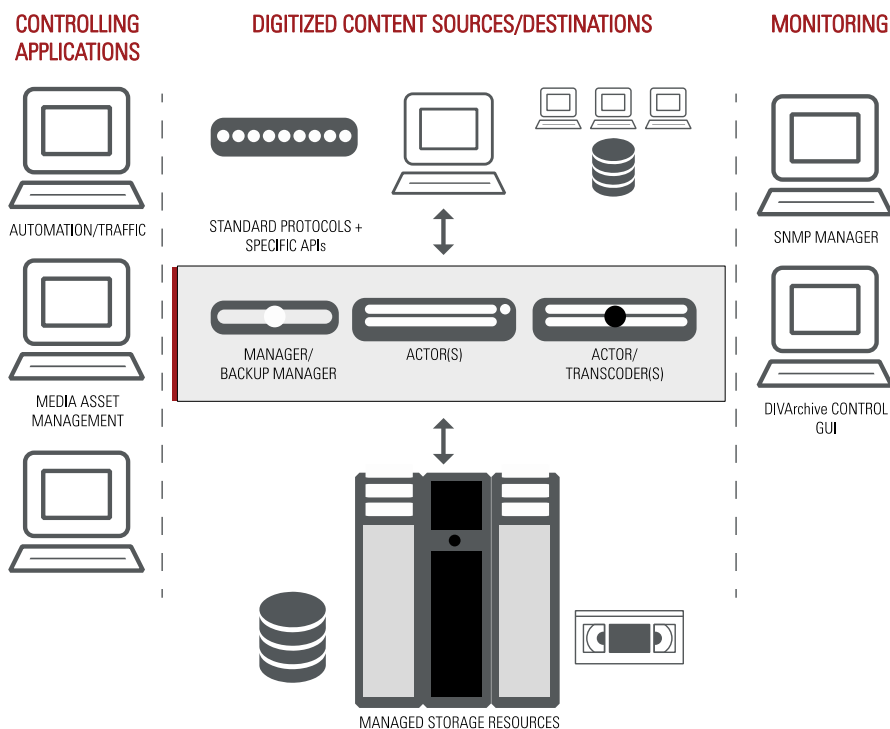


Figure 1. Oracle DIVArchive configuration example

**The Oracle DIVArchive solution includes the following products:**

Oracle DIVArchive Actor

Oracle DIVArchive Application Filtering

Oracle DIVArchive Archive Capacity

Oracle DIVArchive Avid Connectivity

Oracle DIVArchive Manager

Oracle DIVArchive Nearline Capacity

Oracle DIVArchive Partial File Restore

Oracle DIVArchive Storage Plan Manager

The Oracle DIVArchive solution has direct interfaces to all broadcast and postproduction devices, it knows how content is organized on the device, and it stores all the files belonging to this content as one object. It supports the storage and management of several instances of the same object—for example, it will store and track one instance on disk, one instance on tape within a robotic tape library, and one instance on a tape stored on an external shelf.

The Oracle DIVArchive solution can be controlled by multiple broadcast applications, such as automations, traffic systems, media asset management (MAM) systems, newsroom computer systems (NRCS), and postproduction nonlinear editing applications. The Oracle DIVArchive solution provides the broadest range of validated broadcast applications capable of controlling it.

## Graphical User Interface

Two Java-based GUIs are available in the Oracle DIVArchive solution: the Configuration GUI for configuring the CSM system and the Control GUI for monitoring and controlling it. They can both be used remotely.

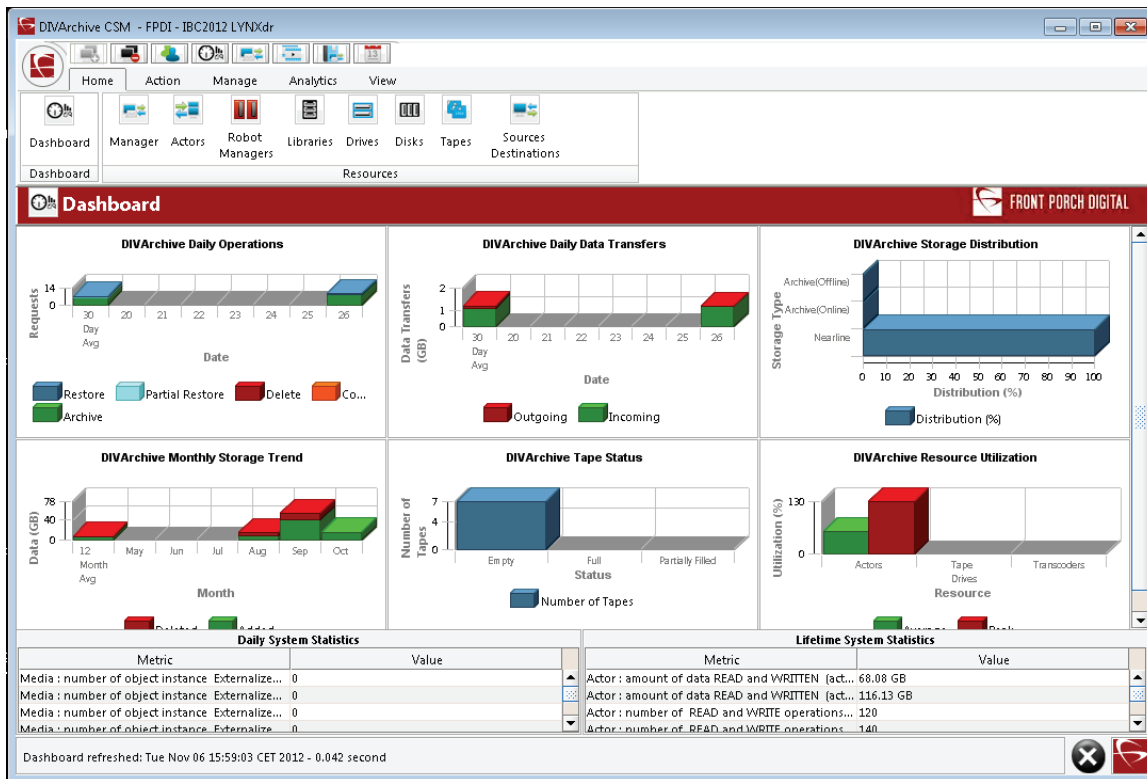



Figure 2. The Oracle DIVArchive solution's Control GUI



The distributed nature of the Oracle DIVArchive solution makes it very flexible. A configuration can be changed dynamically using the Configuration GUI. There is no need to stop and restart the CSM service, because any Oracle DIVArchive resource—whether robotic tape library, tape drive, disk volume, data mover, or transcoding engine—can be added or removed on the fly.

## Production Systems

A production system is a logical group within the Oracle DIVArchive software that associates Oracle DIVArchive Actors (data movers) to your broadcast equipment, including ingest servers, play-out servers, postproduction systems, and shared storage.

The production system enables Oracle DIVArchive resources to be split between different applications or to prioritize particular functions over others within the platform, by assigning more Oracle DIVArchive Actors to a particular production system.

For applications that require extremely high bandwidth, the production system concept also enables you to dedicate a resource to individual video-related equipment. For example, you might dedicate several Oracle DIVArchive Actors to the customer NRCS.

Within the same Oracle DIVArchive system, it is possible to define two independent production systems. The first system is used for on-air transmission and the second is for postproduction and offline editing. The production system concept enables service providers around the world to fine-tune their allocation of resources between their customers depending upon negotiated service-level agreements.

## Oracle DIVArchive Application Filtering


At a large broadcaster site or in a typical service provider environment with multiple end customers, an Oracle DIVArchive system is likely to be controlled concurrently by different applications. These could potentially be different automation systems, different media asset management (MAM) systems, or different news systems.

The Application Filtering module has the capability to apply access filters based on a connected application's identification. Filters specify which resources—such as object categories, media name, disk array, tape group, and video-related equipment—and which operations, including archive, restore, and delete, are available to the applications connected to and controlling the Oracle DIVArchive system.

The Application Filtering module acts as a manager proxy for the Oracle DIVArchive solution. All requests sent by each connected application are either delivered to the Manager feature of the solution or rejected if access constraints defined for that application do not permit delivery. Responses sent by the Manager to each controlling application are also filtered and edited according to access restrictions. For example, information not meant to be seen by a particular client application is removed by the Application Filtering module.

## Protect Feature for Resource Monitoring

The Protect feature in DIVArchive monitors and tracks all resources of the CSM infrastructure and presents the administrator with information regarding the performance history of any component belonging to the CSM. The monitored components include disk volume, tape, tape drive, data mover, content transcoder, and content analyzer. The Protect feature provides continuous monitoring of all Oracle DIVArchive resources—maintaining a complete history of their health and performance—and is targeted to provide proactive failure monitoring, enabling administrators to pre-emptively maintain their valuable file-based contents.



Protect enables DIVArchive administrators to specify metrics that will be elaborated and logged in the Oracle DIVArchive database. Metrics reports can be easily exported into Excel or other tools for detailed analysis and graphical reporting.

Protect offers significant benefits to service providers in the areas of customer billing and accounting functionality. It enables quick identification of resource bottlenecks and detects areas where action is needed to prevent a failure. It also permits detailed examination of resource utilization through customizable and detailed resource utilization reports.

## Oracle DIVAnet for Multiple Sites

Many broadcast networks now operate multiple content production and distribution sites around the globe. Moving content seamlessly between these sites increases efficiency, lowers operational costs, and enables disaster recovery strategies that support business continuity.

With the introduction of Oracle DIVAnet, broadcasters, media companies, and service providers can connect independent DIVArchive systems to form a content-sharing network.

Oracle DIVAnet takes content normally stored at one site and automatically replicates it to another Oracle DIVArchive site. This enables the second site to take over broadcast distribution in the event of a failure, natural disaster, or other catastrophe. Under DIVAnet, each DIVArchive site still operates independently with no dependency on other sites.

## Content-Aware Storage and Archive Service

The Oracle DIVArchive solution interfaces with most of the video servers and postproduction servers on the market; it can copy content to and from them. When a content resource is made up of several files—whether audio, video, or metadata—in a video server, the Oracle DIVArchive software will archive them as one object, so the application simply deals with the content or a clip and does not need to know about its implementation details.

For example, an editor can archive a complex sequence from an Avid editing tool. The Oracle DIVArchive solution will receive the list of OP-Atom files from Avid to be archived and will group them into a single object in the archive.

## Multiple Restore Feature

Especially useful when there are main and backup video servers for play-out, the Multiple Restore feature in the Oracle DIVArchive solution enables it to read the content only once from tape, then send the content to all the video servers, saving time and resources.

## Oracle DIVArchive Partial File Restore

There is no need to fully restore a two-hour movie when only a two-minute sequence is needed. Oracle DIVArchive Partial File Restore enables an application to ask Oracle DIVArchive Manager to read only the required sequence defined by timecode in (TCin) and timecode out (TCout), then transfer it to the destination device, once again saving time and resources.



## Complex Object Support

In the Oracle DIVArchive solution, a complex object—such as a Digital Picture Exchange (DPX) asset—has between 10,000 and 1 million files and a maximum of 10,000 folders. By providing support for a complex object, the solution can archive assets in DPX format where each frame of a video is stored in a file. Oracle DIVArchive Partial File Restore is available for DPX and files and folders.

## Transcoding

The Oracle DIVArchive solution can automatically transcode content when the content is archived or restored. When integrated into the overall content workflow, transcoding can

- » Generate a proxy version of each clip stored in the CSM workflow
- » Generate a new format or modify the existing file wrapper or video essence on demand
- » Restore a clip into a different format and hence send it to a different play-out server/distribution engine, if required

## Content-Aware Policies

Content-aware policies in the Oracle DIVArchive solution offer the possibility to automatically migrate archived content to different support over time and to automatically process the archived content for transcoding. With the Oracle DIVArchive solution, policies can be defined according to the media the content is stored to and the content category or name.

For example, content in a “Movie” category can be required to be copied to tape and stay on disk for three months before deletion, whereas content in a “News” category would stay only one month on disk. Storing “News” content could also trigger the automatic generation of a proxy video file that is sent to a proxy server. Storing “Movies” content could trigger an automatic quality check to verify it is acceptable for future play-out.

Content-aware policies enable better flexibility and better efficiency of the content workflow; they relieve applications from managing an overly detailed workflow.

## Dynamic Priorities

The capability to set priorities dynamically increases the flexibility of a CSM system. Because of the finite nature of CSM resources, requests sent to Oracle DIVArchive Manager are lined up, waiting to be processed. Each request is associated with a priority that can be set by default or explicitly set by the application or the operator. With priorities capable of being set dynamically, it is possible for the application or an operator to raise a priority for a faster processing when a request requires immediate processing.

## Media Repack

When delete operations are performed in a CSM system, the deleted content is removed from the Manager database, but the space it is using on the tape media is not immediately reusable. To free up this storage capacity, you must repack the tape, write the valid information on another tape, and clean the fragmented tape for future use.

Media repack can be done automatically by the Oracle DIVArchive solution. You use the GUI to specify the criteria to repack a tape and when the repack operation should take place. Repack can also be done manually at the administrator’s request via the GUI. Resources used for repack operation are also specified with the Configuration GUI feature in the Oracle DIVArchive solution; if needed, they can be dedicated to only do repack operations.

## Archive eXchange Format Standardization

Existing IT standards, such as Tape Archive, are not acceptable for a CSM environment, because they prevent more advanced functionality, such as partial restore. For this reason, the Society of Motion Picture and Television Engineers (SMPTE) created the 2034 Archive eXchange Format (AXF) Working Group.<sup>1</sup>

Oracle is leading the SMPTE 2034 AXF initiative for industry standardization of CSM storage format. As with any SMPTE committee, it involves other manufacturers and end users. The goals of this committee are to

- » Standardize optical and tape media storage in CSM systems, such as DIVArchive, for long-term protection and accessibility
- » Enable portability between CSM systems and data recovery by open source utilities

This SMPTE initiative is important to many customers because it will ensure the long-term accessibility to their data.

AXF is fundamentally a combination of XML-based descriptive metadata and block-based, highly accessible essence storage. It provides an open container format for generic files, which enables them to be stored, transported, and preserved on any type of operating system, file system, or storage media. The storage media includes data tape, spinning disk, flash, optical media, or any other storage technology now and into the future. For the preservationist community, AXF offers support for the core Open Archival Information System (OAIS) reference model, with built-in features such as fixity (per-file checksums and per-structure checksums), provenance, context, reference, open metadata encapsulation, and access control.

## Checksum

The Oracle DIVArchive solution offers true end-to-end checksum functionality for full in-path content certification and verification with support for multiple checksum types, including the MD5 message-digest algorithm and SHA1 cryptographic hash function.

The checksum is calculated during archive operations. It is stored in Oracle DIVArchive Manager's database and in the AXF container itself. It is possible to ask Oracle DIVArchive Manager to check the object integrity using this checksum information; in this case, Oracle DIVArchive Manager reads the object, calculates the checksum, and compares it with the stored information.

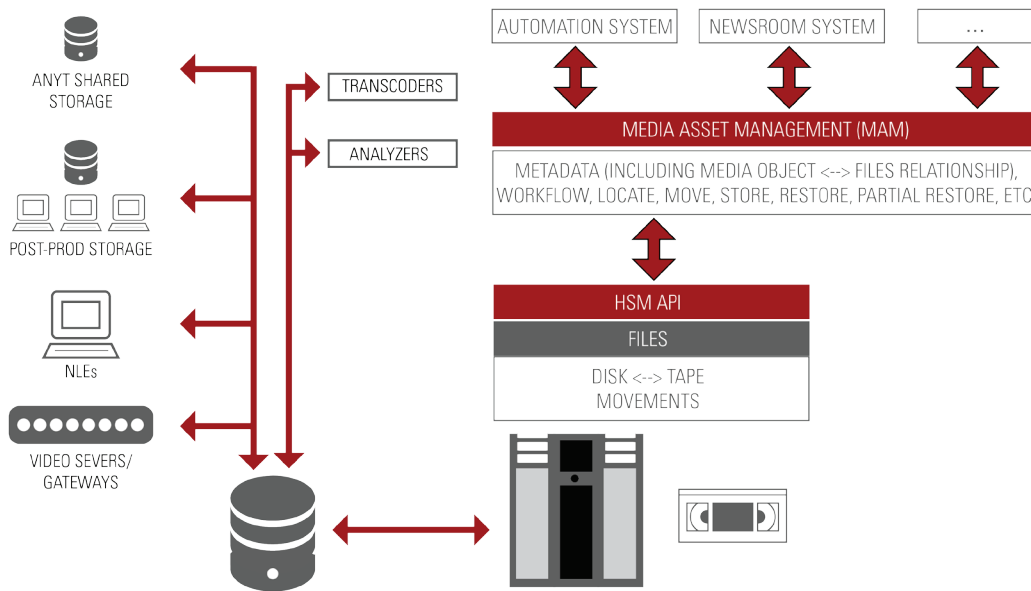
During restore operations, the Oracle DIVArchive solution also calculates and verifies the checksum of the restored content.

## Architecture Designed for the Media and Entertainment Industry

HSM systems are typically not media aware and do not implement concepts such as video and audio formats, media objects, and timecode. Those concepts are sometimes implemented at the MAM system level, but in that case, the MAM and the HSM disk subsystem become the bottlenecks of the overall system. Figure 3 illustrates how this bottleneck occurs.

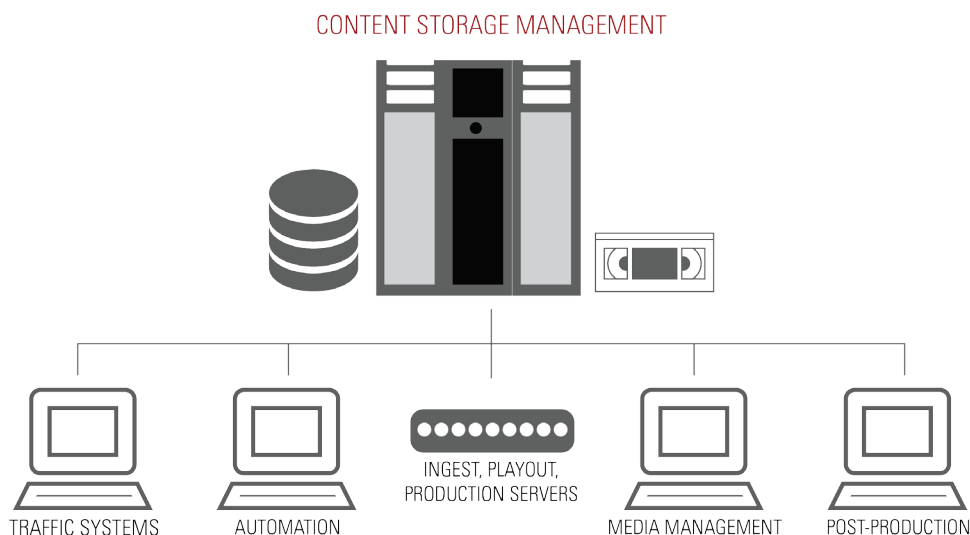
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<sup>1</sup> [www.smpte.org](http://www.smpte.org)



**Figure 3.** Common bottlenecks in HSM systems

A far better approach and architecture is a CSM system that provides content-aware services for any media application whether it be a MAM system, NRCS, traffic system, or automation system. The CSM moves content directly to and from equipment that consumes and produces media, including video servers, nonlinear editing, transcoding engines, analysis engines, and shared storage. Figure 4 illustrates the streamlined architecture behind a CSM system.



**Figure 4.** Typical, streamlined architecture of a CSM system









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