

A web-based rights management system for developing trusted value networks

Víctor Torres
Universitat Pompeu Fabra
Carrer Roc Boronat 138
08018 Barcelona (Spain)
+34 935422586
victor.torres@upf.edu

Jaime Delgado, Xavier Maroñas, Silvia Llorente
Universitat Politècnica de Catalunya
Campus Nord. Carrer Jordi Girona, 1-3
08034 Barcelona (Spain)
+34 934011644, +34 934016783
jaime.delgado@ac.upc.edu,
xmaronas@ac.upc.edu, silviall@ac.upc.edu

Marc Gauvin
NetPortedItems S.L.
Calle Sol Naciente 10
03016 Alicante (Spain)
+34 96 515 0664
mgauvin@
digitalmediavalues.com

ABSTRACT

We present an innovative architecture that enables the digital representation of original works and derivatives while implementing Digital Rights Management (DRM) features. The architecture's main focus is on promoting trust within the multimedia content value networks rather than solely on content access and protection control. The system combines different features common in DRM systems such as licensing, content protection, authorization and reporting together with innovative concepts, such as the linkage of original and derived content and the definition of potential rights. The transmission of reporting requests across the content value network combined with the possibility for authors to preserve rights over derivative works enables the system to distribute income amongst all the actors involved in different steps of the creation and distribution chain. The implementation consists of a web application which interacts with different external services plus a desktop user application used to render protected content. It is currently publicly accessible for evaluation.

Categories and Subject Descriptors

H.3.4 [Information Storage and Retrieval]: Systems and Software - *Distributed systems*. H.3.5 [Information Storage and Retrieval]: Online Information Services - *Web-based services*. K.4.1 [Computers and Society]: Public Policy Issues - *Intellectual property rights, Privacy*. K.4.4 [Computers and Society]: Electronic Commerce - *Intellectual property, Security*.

General Terms

Algorithms, Management, Design, Security, Standardization, Legal Aspects.

Keywords

Content management, multimedia content protection, digital rights management, event reporting, user-generated content.

1. INTRODUCTION

The aim of this paper is to present a web-based system for the registration of original and derived digital content providing traditional Digital Rights Management (DRM) functionality as

well as some innovative features. The proposed system, called IPOS-DS (Intellectual Property Operations System - Digital Shadow) [1][2], is about managing user creations and the information they own and provides users the necessary technology for being able to easily spread user-generated content in a trusted and protected manner.

For this purpose, IPOS-DS has proposed and implemented in a single web-based platform a set of innovative features, which are not present in existing DRM systems, and which relies on the relationships and entities that are being standardized in the MPEG-21 Multimedia Value Chain Ontology (MVCO) [3].

2. IPOS-DS KEY CONCEPTS

IPOS-DS implements a set of relevant features and concepts, which are summarized next:

Content value network. This concept refers to the different steps of content creation, determining how the digital content evolves from representation of the creator's original work to become digital content representing other types of intellectual property entities that can be consumed by an end user.

Content Format, Lineage and Ownership. The content representation format adopted to represent objects is the Digital Media Project (DMP) Content Information (DCI) [4]. The fact that object representations are digitally signed provides a means to prove content ownership. On the other hand, the presence of a link from any derived object towards its ancestor enables the possibility to trace the whole content lineage, ensuring attribution.

Potential Rights. Potential rights correspond to those the object's author would be willing to grant to any user, including derived objects, along the content value chain.

Content Usage Monitoring. IPOS-DS follows the MPEG-21 Event Reporting [5] approach to embed event report requests in the registered objects, but enhancing it by transmitting the request along the whole content value network. In this way, all the involved actors are informed about its usage.

Benefit from the success of derivatives. IPOS-DS gives authors the possibility to benefit from the success of derived content by adding a new condition to determine the percentage of rights and incomes that the object's author preserves over any object derived from theirs.

Directed Rights. IPOS-DS enables the possibility to offer some rights for being acquired to some restricted set of users. This

feature is needed when the author wants only some selected users to be able to acquire the rights they are offering.

Really Simple Syndication. IPOS-DS provides a dynamic RSS 2.0 feed which contains information about the latest registered objects in the system so that they can be traced by any feed reader or aggregator.

3. ARCHITECTURE

IPOS-DS is a service-oriented architecture that consists of a main web application, accessible through a web browser, which interacts with different DRM components that are implemented as web services (see Figure 1). It also includes a desktop user application which renders protected content (see Figure 4). Next we summarize the main features it provides.

3.1 Applications

3.1.1 Web Application

From the web application the user can access almost all the system functionality. Figure 3 provides a simplified view of how the web application is divided into sections.

Registration of new Objects. In this section the user can register any kind of object. The web application provides a form (see Figure 3) where the user can fill the metadata fields, define the potential rights and attach a resource if needed.

Potential Rights Modification. This option is available for own objects and enables the user to modify rights that are offered for being acquired by the general public or specific users.

Search amongst own Objects. In this section the user can search by any of the metadata fields of the objects they registered.

Global Object retrieval and download. The user can perform a global search amongst all the objects registered in the system by any user. For the listed results (see Figure 2), several options are available, as e.g. view or download the object's XML, navigate towards the object's ancestor, if available, and acquire a license.

License acquisition. This option is accessible from the results obtained in the global object retrieval. When a user selects this option, they are redirected to a web page where they can select the rights and conditions amongst the different options the original author made available. Once the user selects the right and conditions they are interested in, a specific license is generated for that user, following the MPEG-21 Rights Expression Language (REL) [6].

View acquired objects. Once a user has acquired some licenses that enable them to exercise a right over an object, as reported in license acquisition, they can consult all of them in a specific section of the web application. This section also enables the user to register derived objects from those for which he owns a license that grants them the corresponding derivation right.

Search and view Reports. The user can search amongst all the reports that are directed to them.

Personal data management. The user is able to modify their personal data and default language for the web application.

User Groups and Contacts. The user can define their own contacts and contacts groups used for issuing directed rights.

3.1.2 Desktop User Application

The IPOS-DS desktop user application (see Figure 4) should be seen as a simple player devised to demonstrate how the resources can be rendered while ensuring the enforcement of the corresponding rights and conditions. The main functionalities in the player are:

Load Object. The player opens the object and displays the metadata to the user.

Download Content. Download the encrypted resource associated to the object. The player enables authenticated and authorized users to download the resource associated to the loaded object.

Decrypt and render the resource. It is done only if the user is authorized to. If authorized, the player will get the encryption key that can be used to decrypt the resource and render it.

3.2 Services

The IPOS-DS main web application interacts with different web services that implement the intelligence of the system, which are summarized next:

User Authentication and Registration Service. This component acts as a single-sign-on access point.

Content Registration Service. This component is responsible for registering the objects received after processing the registration form data in the main web application.

Content Service. It is an application that depends directly on the IPOS-DS web application used to transfer source files.

Objects Search Service. It provides a means for retrieving objects when searching amongst the objects' metadata.

License Service. It deals with the generation and archival of licenses, which convey user's usage rights and conditions.

Authorization Service. It enforces the fulfillment of the rights and conditions expressed in licenses.

Reporting Service. It collects the reports about content usage, while providing searching capabilities amongst the collected reports. Moreover, it determines the payment duties.

4. FUTURE WORK

IPOS-DS is currently accessible from [1] for evaluation. The goal for the next months is to promote its usage amongst different user communities that may be interested in using such a system for spreading their works and creations.

One of the potential groups where the system may be of interest could be the composer's collective, where different users with a trusted relationship use to collaborate to create, arrange and instantiate audio or audiovisual content.

Another goal is the adoption of the IPOS-DS platform by collecting societies in different countries. It could help to spread and ease the management of content generated by the millions of creators, adaptors and instantiators around the world generating content without any collective management or even digital object governance for that matter.

5. ACKNOWLEDGEMENTS

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6. REFERENCES

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7. SCREENSHOTS

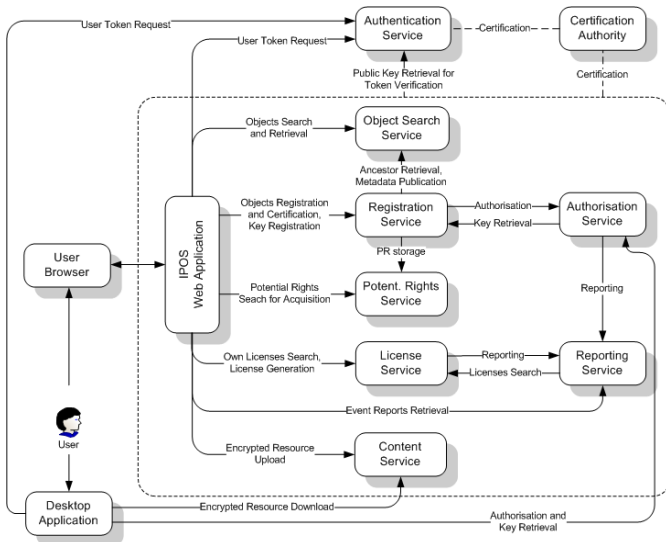


Figure 1. IPOS-DS overall architecture.

Author	Title	Date	Type	Options
Torres Padrosa, Victor	Baby turtles	14/10/2008 18:16:02	Work Manifestation Copy	🔍 📄 📁 📧 📧
Torres Padrosa, Victor	Baby turtles	14/10/2008 18:16:02	Work Manifestation	🔍 📄 📁 📧 📧
Torres Padrosa, Victor	Baby turtles	14/10/2008 18:16:02	Work	🔍 📄 📁 📧 📧

Figure 2. Result of a search by author.

Figure 3. IPOS-DS web application view excerpt.

Figure 4. Desktop IPOS-DS user application.