Using Watermarks and Offline DRM to Protect Digital Images in DIAS

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Abstract. The Digital Image Archiving System (DIAS) is an image management system, the major functions of which are preserving valuable digital images and serving as an image provider for external metadata archiving systems.

To enhance the security of images, DIAS enables online adding of watermarks to an image to protect the content owner's copyright. We use the Flash format to add watermarks because it has a multi-layer architecture and it can handle multimedia content. The function allows us to set the watermark as a layer that overlaps the original image. DIAS also provides an offline DRM (Digital Rights Management) mechanism to protect downloaded images. We package an image and its authorized information in an execution file for downloading. Then, when a user executes the file, the program validates the authorized information before showing the image. Using the watermark and offline DRM improves the security of DIAS images.

Keywords: digital image, DRM, Flash, watermark.

Article

The Digital Image Archiving System (DIAS) [2] is an image management system developed by the National Digital Archives Program (NDAP) [5], Taiwan. Its major functions are to preserve valuable digital images and serve as an image provider for external metadata archiving systems. Apart from providing basic digital image management and processing functions, DIAS also allows users to browse huge images on the Web and add watermarks to images online. In the past five years, DIAS has serviced nine NDAP metadata archiving systems and preserved approximately 670,000 images with a storage capacity of 2.3TB; the number of images continues to increase.

To prevent illegal use of images, DIAS provides a function that adds watermarks for content owner to indicate copyright [3]. The method adds a watermark to a certain part of an image; however, the drawback is that the watermark might disappear when the image is being zoomed into or moved in the viewer. We use Flash techniques to solve the problem [6]. As Flash has a multi-layer architecture and it can handle multimedia content, we implement an image viewer based on Flash technology, which can also be used to load images and overlay watermarks. By setting a watermark as a layer so that it overlaps the image, we can change the position and

size of the watermark dynamically. Another feature is that, no matter how the image is zoomed into or moved in the viewer, the position and size of the watermark layer will not change and it will continue to overlap the image. In this way, the loaded image's data can be kept in the memory, instead of on a hard disk, which reduces the risk of the image being copied. Besides adding watermarks, we can easily add other layers, such as dialogue boxes or captions, to an image.

In the past, DIAS only used watermarks to protect stored images; it could not protect downloaded images. To resolve the problem, we use an offline digital rights management (DRM) mechanism to improve security [4]. The mechanism determines the authorized information about an image before downloading [1]. As shown in Figure 1, the information is divided into two parts: (1) identity information, which includes the hardware specification of the client PC, smart card information and user's ID/password to identify the user in the future; and (2) consent items, which include operations the image can be used for, and the days and times the image can be viewed. The image and its authorized information are then packaged in an execution file for downloading.

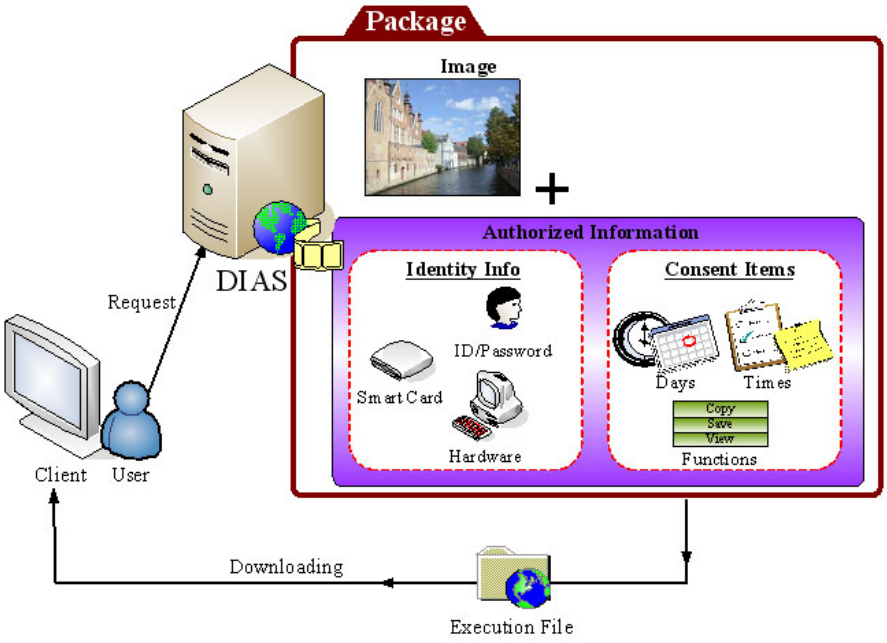

Figure 1. The offline DRM mechanism of DIAS

When a user executes the file, the program loads the authorized information of the image in the file first. If the downloaded file passes the authorized information check, it will open the client's default application program to show the image; otherwise, it will not open the image. Every time a file is opened, the program records certain

information in the client's PC, such as the time and date the image was viewed, which can be used to verify the authorized information the next time it is viewed.

We use the Flash format to improve the way watermarks are displayed so that images can be displayed more quickly. In addition, by using offline DRM to protect downloaded image files, we hope to enhance the security of DIAS so that it can provide complete protection for images.

Acknowledgements. This research was supported in part by the National Science Council of Taiwan under NSC Grants: NSC 95-2422-H-001-024, NSC 96-2422-H-001-001.

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