Towards Secure Electronic Workflows

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Abstract. Despite the introduction of information technologies in governmental administrations, most bureaucratic processes are still paper-based. In this paper we present a framework to transfer conventional, paper-based processes to electronic workflows. Thereby, the transformation to e-Government applications has two challenges. First, to find an equivalent description for the single activities and their interaction for defining the entire process. Second, to ensure the security of the process. We identified four types of activities that can be used as basic components for the workflows considered in our work. The security aspects of the electronic representation are ensured by further framework components, for example authentication or authorization. Finally, we present how this framework can be used for other scenarios and discuss some details of our prototype implementation.

Keywords: Workflow Security, Digitize Workflows, Workflow Engine, XPDL, XACML.

1 Introduction

Even though IT systems were introduced in most administrations, bureaucratic processes are still mainly paper-based. Many papers are moved from one desktop to another. Even if an electronic form is used, it will be printed to send it to other workflow participants. Another problem is security issues that appear if sensitive data is affected. There is a need for e-Government applications which are able to handle complete workflows from the initiation to the last workflow step without any media discontinuity.

1.1 Motivation

In our university the appointment of a new professorship is a traditional paper-based workflow. The purpose of this workflow is to initiate an invitation to tender, discuss the possible candidates, and finally negotiate on the contract conditions of the new professor. In this workflow many papers are moved among a lot of people. The creation, distribution, and management of those papers is a time and resource consuming task. With every new appointment the same

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steps must be performed. Therefore we choose to digitize this workflow. Security considerations exist in this case since personal information is involved. Security must be preserved and the goals to achieve are confidentiality, authentication, integrity, and non-repudiation.

In the federal state of Lower Saxony in Germany about 130 million of paper pages are used for purposes of state administration every year.[1] There is the need to digitize the administration processes in order to make them easier and reduce the amount of paper. They employ a PKI for achieving this. PKI is also used in the JobCard context.[2] This project deals with enabling the employees and employers to administrate their certification documents. All these workflows are in the digitization process. Therefore we need to address this fact as well as the security challenges that occur.

1.2 Contribution

This paper shows how to transfer the traditional university workflow to an electronic form. This workflow consists of a sequence of steps. We point out the security aspects since these are of great importance for the complete workflow. We develop a generic framework for e-Government applications, which supports the reuse of parts of the implementation.

The paper is organized as follows: Section 2 introduces the term workflow and discusses concrete aspects of how to transfer workflows to an electronic representation. Section 3 gives an overview of the basic components we isolated and their relevance in the context of security. Section 4 shows the implementation details of the framework and the workflow components. We explain in Section 5 how our components can be used for transferring other workflows. Section 6 draws a conclusion and describes the future work.

2 Transferring Workflows

This section gives an introduction to the terminology of the workflow context, to workflow engines and to the standard of internal representation used in our system.

The Workflow Management Coalition (WfMC) is an organization that introduced a standard for workflow descriptions. It defines workflows as follows:

> The automation of a business process, in whole or part, during which documents, information or tasks are passed from one participant to another for action, according to procedural rules. [1, Page 8]

Business processes are defined as linked procedures or activities. Each workflow consists of one or more processes. Processes consist of activities or workflow

[1] `http://www.izn.niedersachsen.de/master/C5252172_N5505837_L20_D0_I3654280.html` (date of access 06.04.2006).

[2] `http://www.itsg.de/download/BroschuereJobcard.pdf` (date of access 06.04.2006).