New Developments for
Electronic Document Management in University

Raluca Isopescu[1]*, Gheorghe Dinu[1], Valentin Pleşu[1], Petrica Iancu[1],
Marius Bercaru[1], Ionut Arsene[2]

[1]University Politehnica of Bucharest,Centre for Technology Transfer in Process
Industries,UPB-CCTIP, 1, Gh. Polizu Street, Bucharest, Romania
cttip@chim.upb.ro
[2]S.C. SIVECO S.A.

Document management in universities is of a major importance for the development of both education and research tasks that characterize the Romanian Higher Education Institutions. The electronic document management system implemented in University POLITEHNICA of Bucharest is continuously up-graded in order to provide an efficient tool for an efficient administration and control. The system is based on customized software created by the company SIVECO Romania, which is one of the major IT software companies in Romania. The system architecture is based on a J2EE platform (Java 2 Platform, Enterprise Edition). The system is ready for possible improvements and extensions made by integrating new modules based on standardized communication protocols and an API (Application Programming Interface). Two new directions were recently developed in the field of document and workflow management: the research departments and the Human Resources department. In order to develop the workflows, some configurations were necessary, for which SIVECO and UPB teams have joined the work. The Research Centre workflows are defined for project proposals, experimental and theoretical research activities, research equipment acquisition, reports elaboration and validation. Several complex workflows were also defined for the activity in the Human Resources department. While testing the developed system, the annotation mechanism was one of the main modules considered. Some examples of new workflow implementations and developed annotation mechanism are presented.

1. Introduction

Document management in universities is of a major importance for the development of both education and research tasks that characterize the Romanian Higher Education Institutions. In University POLITEHNICA of Bucharest, comprising twelve faculties and several administrative departments, an electronic document management system can provide the means for an efficient administration of the activity and good survey of the implied tasks. The document management platform in University POLITEHNICA of Bucharest is based on customized software created by the company SIVECO Romania, who already has an important expertise in this field and is one of the major IT

software companies in Romania. This software serves the specific needs of the document management system in a large university. The system is a modular (Figure 1), designed to allow future extensions and interconnection with other software running in the university. The physical extension of the system is possible and easy to realize by just adding new hardware units. The system architecture has clearly defined levels and consequently the application can be distributed on several application servers or database server clusters. The main core of the system is represented by the server cluster placed in the university Rectorate and that is the place where all data is stored and processed. The users can be connected to the system by means of an Internet browser from any location.

The user interface has a main menu that gives the possibility to navigate through main and secondary options. This interface is intuitive, stable and attractive. By the elementary definition of specific rights the system has the possibility to create a large variety of user profiles: large access rights or just visualization rights. An object defined as "role" is created and each user can be assigned to such an object that will grant the access to specified resources.

2. Technical Aspects

The application for document and workflow management in a university develops the following mechanisms (i) integration of the document and workflow management system with an optical character recognition type system, namely the KoFax Ascent Capture, (ii) integration of an advanced engine for reports generation, (iii) bulk import of documents facilities, (iv) integration of a workflow engine based on "Workflow Management Coalition- WfMC" standard.

The system architecture for the document and workflow management system is an open type services (Service Oriented Architecture). System functions will be offered to external systems through a set of well-defined services, and this encourages reuse of components and provides good integration and interoperability with external systems.
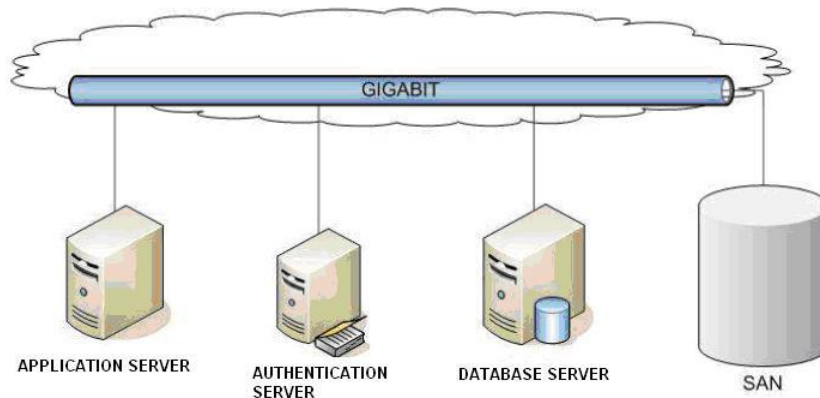

Figure 1: Hardware infrastructure of the electronic document management system

The system architecture is based on a J2EE platform (Java 2 Platform, Enterprise Edition). The system will be ready for possible improvements and extensions made by integrating new modules based on standardized communication protocols and an API (Application Programming Interface).

Standard Access JDBC (Java Database Connectivity) on the persistence layer ensures connectivity to systems for database management (cross-DBMS) with a wide variety of SQL compatible databases. Also, it ensures access to other sources of data tabulated (Tabular Data sources), as well as spreadsheets or flat files (flat files), both in homogeneous medium as and heterogeneous. Also, it allows the formation of superstructures, and intercommunication and integration with external databases.

Using Web Services provide a high system interoperability, enabling collaboration with heterogeneous platforms and applications (non-Java) and Microsoft. NET. Server database allows centralized management for all items stored into the system, including versioning and archiving documents.

3. Implementation of New Features in the Electronic Document Management in University

Two new directions were recently developed in the field of document and workflow management. These are the research departments and the human resources department.

Research, which is a major component in academic life, is carried on in the laboratories of all departments and chairs, and also in research centers that are affiliated to the university. These research centers have their own structure but are coordinated by the Rectorate. In some previous works (Costoiu M. et al, 2009, Costoiu M. et al, 2008) the implementation of basic workflows designated to research activity supervision and control were presented. The complexity of research work, both from scientific and administrative point of view, increased due to a considerable extent of national research programs and European collaborative projects. Consequently the management tasks increase and the demand of well defined procedures and control facilities led to the creation of new features and workflows in the frame of the existing electronic document management system in University POLITEHNICA of Bucharest.

Workflow management makes it easier to track administrative and scientific performance by clearly defining the start and end state of a process and the tasks assigned to each employee (van Hee K. et al, 2009). By clearly defining the roles of every employee within the research or administration process, the Research Centre manager can more easily increase work effectiveness. The research centre workflows are defined for project proposals, experimental and theoretical research activities, research equipment acquisition, reports elaboration and validation, etc. In the frame of all these activities a large diversity of specific documents are elaborated and stored in the document management system. As an example, Figure 2 presents the workflow defined for the final approval of a research proposal to be included in the national research program. All documents elaborated by the technical and management staff must be approved by the general manager of the Research Centre and by the financial departments of the university and finally by the Rector of the university. In order to develop the workflows, some configurations were necessary, for which SIVECO and UPB teams have joined the work.
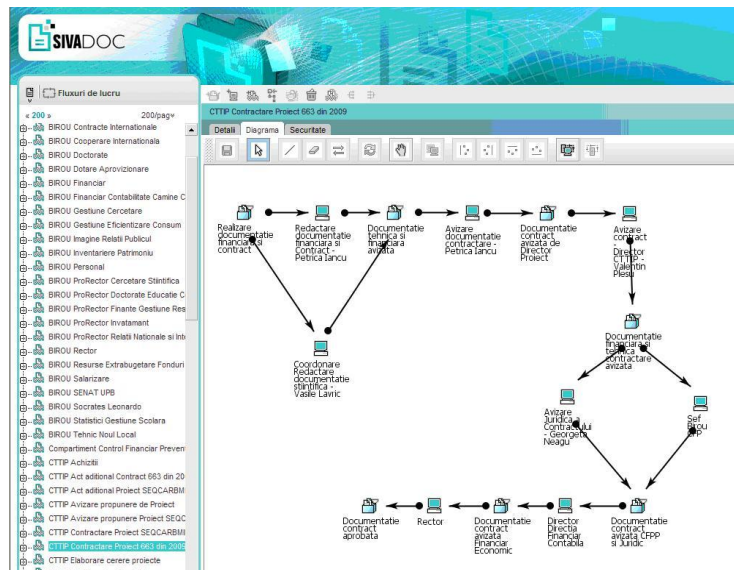
Figure 2: Project final approval workflow

As part of testing the developed model, it was chosen to verify the operation workflows for documents specific to Human Resources department.

Some 35 types of documents have been configured into the system, and for each of them some generic attributes were configured and grouped into the "General information" group (Figure 3). The group consists of the following attributes: Faculty, Chair, Name of the person, Phone, Email address. Only the administrator of the system is allowed to change the types of documents and the groups of attributes. Then, for each specific type of document some attributes have been configured.

Figure 3: Details of the "General information" group of attributes

For example, the attributes for the type of document "Decision" are: Number of the decision, Decision date, Order number, Order date, Process date, First name, Last name, Role, Department, Faculty, Compensation for management. While testing the developed system, the annotation mechanism was one of the main modules considered. The system has an option to create a new annotation, for which a normal user has access if he/she has the right to create objects. This option is selected in Figure 4. While the user creates updates and even deletes the annotations created, the system keeps a track of each action performed and presents it as a list of markups for that document. This feature is presented in Figure 5, where the list of markups is presented.

Several complex workflows were defined for the activity in the Human Resources department. These workflows describe the interconnections between employees in various activities as for instance the case of a job request problem when several documents are required and the final validation is granted by the rector of the University. The state of a document can be traced in any moment following the workflow. The traceability of such documents is presented in Figure 6.

Some other important activities and documents are focusing on organizing the data bases containing information referring to teaching or administrative personnel, master and doctoral programs.
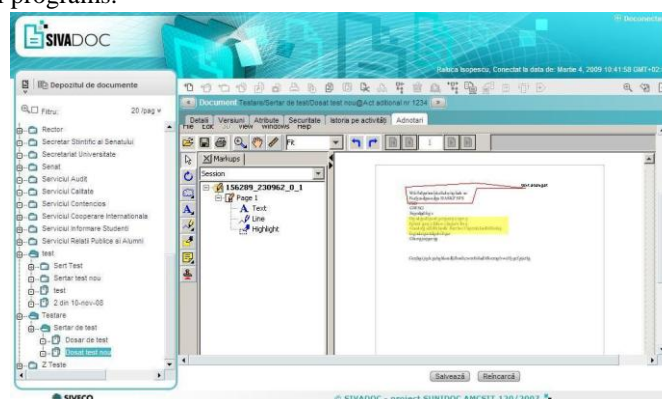

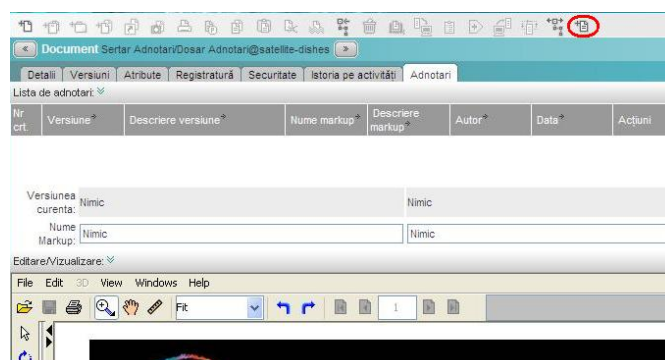*Figure 4: Create a new annotation into the system*
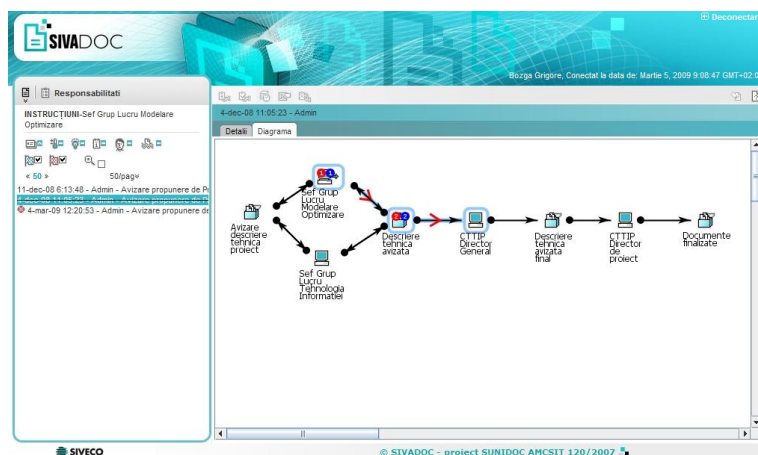

Figure 5: The list of markups for a document

Figure 6: The traceability of a document on a workflow

4. Conclusions

As University POLITEHNICA of Bucharest is the biggest technical higher education institution (twelve faculties which organize bachelor, master and doctoral studies), the diversity of employed personnel is large. The activity of Human Resources department was consequently one of the first beneficiaries of the document management system implemented. The research activities in faculties, chairs and research centers becomes more and more important in the frame of National Research Programs and European collaboration and need a reliable system for an efficient management.

The important benefits of a document management system in university are the reasons why this system is continuously improved and enlarged to encompass a great part of research, education and administrative problems.

|Acknowledgement

References

Costoiu, M., Isopescu, R., Arsene, I., Plesu, V., Alesincu, S. and Corocaescu, M., 2008, Document management application in Romanian universities, PRES 2008/CHISA 2008, Summaries 4, Praha, Czech Republic.

Costoiu, M., Isopescu, R., Plesu, V., Arsene, I., Alesincu, S. and Iancu, P., 2009, ,New developments for electronic document management in university Politehnica of Bucharest, Chemical Engineering Transactions 18, 309-314.

Van Hee, K., Hiders, J., Houben, G. J., Paredaens, J. and Thiran, P., 2009, On the relationship between workflow models and document types, Information Systems 34, 178-208.