

# Design and Implementation of Bibliography Registration System

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*Abstract: The paper presents open source Bibliography Registration System developed and implemented in Department of Computer Science and Informatics at Technical University at Košice. The system is designed with correspondence to specific requirements of department which comprises creation of bibliography reports according to different selection criteria, exporting to various format for exchanging bibliography information as well as statistic reports helping evaluating of a researcher. The system provides functionality for online presenting of published papers. The system has simple web based user interface and configurable access control management and it is implemented using Java programming language and Jakarta frameworks.*

*Keywords: bibliography registry system, publication, information system*

## 1 Introduction

The publication activity is one of the most important factors in research sphere determining the quality of a research department. It is very important to keep the database of the publications of authors from research department for evaluating particular researcher, research team or department, or to gain a grant from grant agency. On the other side it is necessary to publish the research results to the research community and public.

University with its departments is a research center with research labs. Nowadays universities use their own systems for publication activity registration. These complex systems are developed for the universities and are well connected with university libraries. However they usually do not fulfill the specific requirements of a user from research sphere or department manager and are not enough flexible. That is why departments design and implement their own systems fulfilling their requirements. Typical architecture of system for registering publication activity on university is as follows.

- **Main university bibliography registration system** - serves as a bibliography warehouse for all departments.
- **Information systems for concrete department or research lab** - serves as a bibliography information warehouse with department's specific functionality and user interface. The interconnectivity between the main university system and the system is certainly a crucial thing.

In our Department of Computer and Informatics at Technical University of Košice the Bibliography Registration System has been developed. The basic goal of the system design is high flexibility and user interface simplicity. This system provides functionality for basic operations such as adding, updating or listing publications, and comprehensive statistic outputs for quantitative and qualitative evaluation of a researcher or research team. Moreover, this system can be used to automatically publish the research publication activity of a researcher or a team on the web page.

## 2 Design

This section presents the Bibliography Registration System design. It is based on the analysis of the current state in the field of bibliography registration systems [8]. The main requirements to the system are as follows.

- Simple user interface
- Access control management
- Flexible output configuration
- Adaptive statistic generating
- Interconnectivity with other systems – bibliographic information exchange support defined by norms ISO 2709 [6] and ISO 23950 [7] and connectivity to university information system.
- Standardized publication record structure – formatted by MARC [3] or UNIMARC [5].
- Export to various formats – for example BibTeX, xml, rtf, html, txt, csv.

This system must also supports bibliographic categorization according to directive [1].

The core of the designed system is presented in UML diagrams [2], [9], [10]. Paper presents the conceptual use case model, simplified logical class diagram and statechart diagram for publication states. The conceptual use case model of the

system is shown in the Figure 1. The main use cases identified in the design process are:

- **Manage System** – basic system configuration setting. This management comprises definition of default templates for generating outputs and statistic reports, basic system behavior definition, publication categories definition.
- **Manage User** – system user management. This management comprises functions such as adding or removing the system user, updating information about registered user, changing the user login and password, group creation management based on organizational or logical units.
- **Manage Publication** – publication information management. It covers adding, updating and removing bibliography information, publication categorization, publication state monitoring – document workflow.
- **Manage Templates** – output and statistic templates management. It is used to define criteria for bibliography information selection, format for publication records presenting, grouping of selected records.
- **View Publications** – browsing publications. Publications are always presented according to applied template.
- **Login** – user authentication and access authorization.

There are three types of actors in the model with specific access and permissions.

- **Administrator** – actor with granted all permissions. He or she can manage publications, templates, users and system and browse the publications.
- **Authorized Author** – actor with limited access. He or she can manage only own publications, and templates, but can browse all publications in the system. Authorized author can create statistical reports based on defined criteria and select information for publishing to community.
- **Anonymous** – actor with restricted access. Anonymous user can only browse published information.

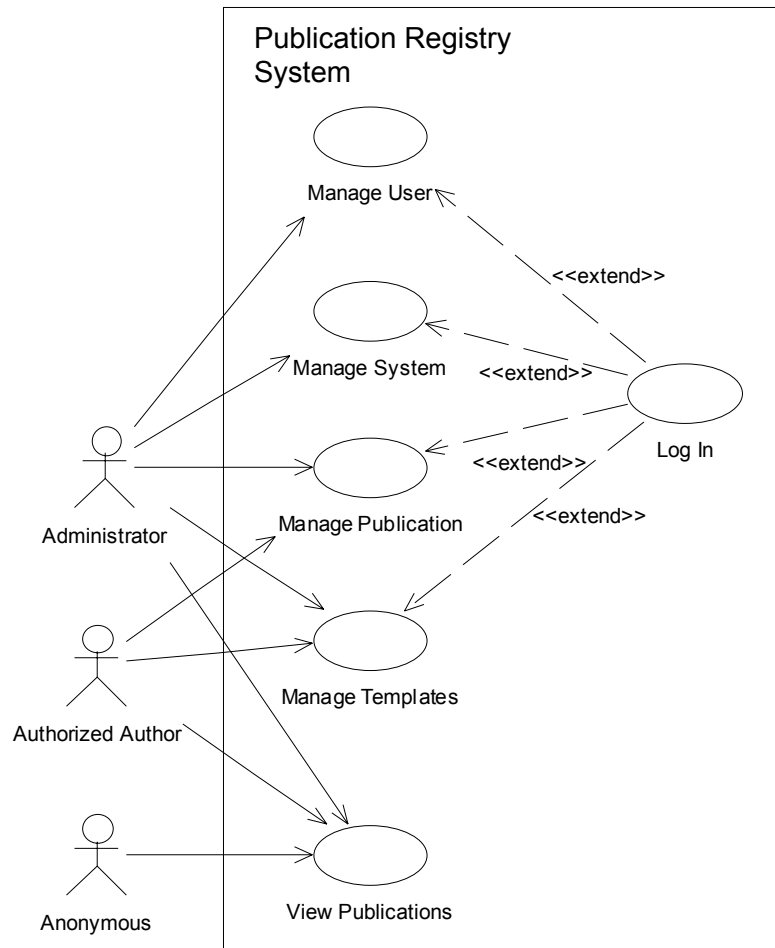


Figure 1  
Bibliography Registry System Use Case Diagram.

The simplified class diagram of Publication Registration System is presented in the Figure 2. It consists of five main entity classes. Class *Author* defines author entity. Class *Authorized Author* defines author, which is also user of a system. Class *Publication* represents publication. Publication has one or more authors with specified percentage participation of authors on it. Publications are categorized according to publication categories represented by class *Category*. Categories are

defined according to bibliographic categorization directive. Grouping of authors into teams, represented by class *Team*, can be also defined.

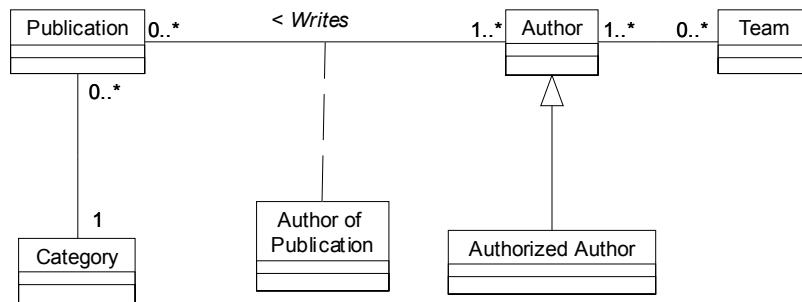


Figure 2  
Simplified Bibliography Registry System Class Diagram.

The publication statechart diagram presenting publication life cycle is shown in the Figure 3:

- **Draft** – publication are waiting for acceptance.
- **In Printing** – publication was accepted, reviewed and it is in printing.
- **Printed** – publication was printed out. Information about printed publication can be transferred to another bibliography registration systems.
- **Verified** – information about publication are verified by administrator authority.

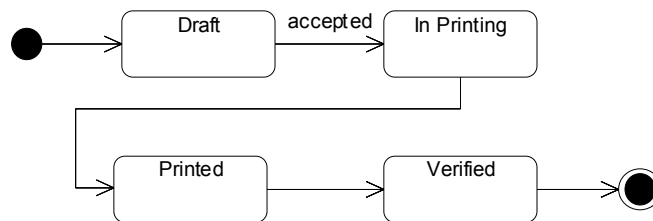


Figure 3  
Publication Statechart Diagram.

The section has been presented just basic ideas of design process. The design process goes much further. We have already defined class diagrams with control and boundary classes, and sequence diagrams for all activities.

### 3 Implementation

This section describes some implementation details of the publication registry system. This system is implemented for internet or intranet environment [9]. System implementation is based on free public licensed well documented widely accepted technologies such as PostgreSQL, Tomcat and Jakarta frameworks and utilities. System was implemented in Java programming language. Reports, selection and statistic templates are written in XML, transformation to output format is done using XSLT. On the server side the servlets and JSP [4] are used for dynamic content creation and management. Bibliographic data are stored in the relation database system. Bibliography registry system currently uses PostgreSQL database server, but implementation is database system independent.

Nowadays, web user interface is in implementation phase. Users of the system currently use simplified user interface. The sample prototype of a new user interface is shown on the Figure 4. Main window is divided into two regions. The top one is control panel, which consists of menu buttons. The bottom one is action panel with content specific to selected action, for example updating the publication or browsing the list of selected publications. The control panel consists of three main areas:

- **Information area** – in regard to selected menu item the status line and context help for selected action is shown. More detailed help for all actions can be shown using the help button.
- **Main menu** – represents groups of actions categorized by functionality. It consists of six categories for editing, selecting, formatting, viewing, sorting and exporting publication information.
- **Submenu items** – concrete set of actions for selected main menu category. Figure 4 show selected main menu item with its submenu items for publication editing.

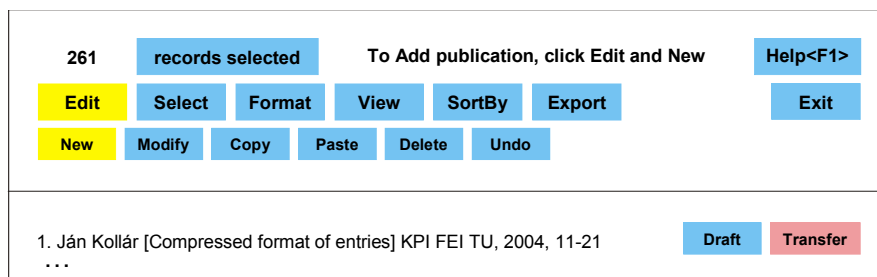


Figure 4  
User interface prototype.

The templates definition is necessary for representing various view form of required data. XSLT technology is used for templates definition. These templates

are used for transformation of publication information stored in XML form to required output form. System now support html, xml, txt, BibTeX output formats. Support for rtf and sxw is planned. It is quite easy to incorporate published publications list into researcher or team home page using the special tag with required templates for formatting and grouping. The publication listing on web page can also consists link to an abstract or full paper stored in the system.

### **Conclusions**

In this paper the Bibliography Registration System was presented. Specifying basic requirements, designing the system and selecting the best technologies for implementing the system are very important steps. Java technologies were selected as an implementation platform. XML and XSLT technologies were used for presenting publication record.

The views (use case, class and statechart diagram) present important parts of the system and model basic system characteristics. The detailed design is out of scope of this paper. The Bibliography Registration System Implemented system was tested and nowadays is used at the Department of Computer Science and Informatics at Technical Universtiy at Košice. Every member of the department has protected access to the system and is responsible for adding and updating publication records. Publication records are automatically transferred to university library and published on department's web pages. Outputs from the system can be seen on departments member webpages on address <http://hornad.fe.i.tuke.sk/kpi/>.

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