

# Using templates for presenting publication references in CRIS

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## Summary

One of the software requirements of the research information systems is creating different kinds of reports about published results. A part of the CRIS UNS system is a software component for reporting implemented using the FreeMarker package in which the reports are generated as the outputs of the appropriate templates. Adding new templates to the component does not require the recompilation of the source code. The component's input is the list of the references and a template, whereas the component's output is the HTML representation of the references. The paper gives illustrative examples for the different reference styles.

## 1 Introduction

The most important part of the scientific results is created in the scientific-research institution and is mostly published in the scientific journals and conference proceedings. The scientific-research institutions usually develop their own information systems for scientific activity known as institutional repositories. For the purpose of reaching better availability of scientific results the scientific-research information systems on national and regional level were developed. Furthermore, the European Union adopted the strategy for encouraging development of national systems based on CERIF (*the Common European Research Information Format*)<sup>1</sup> data model. These systems are known as CRIS (*Current Research Information System*). There are more CRIS systems based on the CERIF data model among which are: IST World<sup>2</sup>, HunCRIS<sup>3</sup>, SICRIS<sup>4</sup>, CRIS<sup>5</sup> Frida<sup>5</sup>, Pure<sup>6</sup>.

CRIS UNS is CERIF-compatible research information system developed for the University of Novi Sad. This system provides input of metadata about scientific results published as journal papers, conference papers, monographs, monograph papers, theses and dissertation. The data

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<sup>1</sup> <http://www.eurocris.org/cerif/introduction/>

<sup>2</sup> <http://www.ist-world.org/>

<sup>3</sup> [http://nkr.info.omikk.bme.hu/HunCRIS\\_eng.htm](http://nkr.info.omikk.bme.hu/HunCRIS_eng.htm)

<sup>4</sup> <http://sicris.izum.si/default.aspx?lang=eng>

<sup>5</sup> <http://www.cristin.no/>

<sup>6</sup> <http://www.atira.dk/en/pure/>

model used in CRIS UNS is based on MARC 21 library format and, at the same time, compatible with the CERIF data model (Ivanović, Surla, Konjović 2011; Ivanovic, Ivanovic, Surla 2012). The implementation of the CRIS UNS is described in the papers (Ivanović, Milosavljević, Milosavljević, Surla 2010; Milosavljević, Ivanović, Surla, Milosavljević 2011). The published results stored in this system are available on the Internet and were entered by the authors themselves who are not required the knowledge of the CERIF or MARC 21. In addition to supporting international standards, the CRUS UNS system meets the requirements related to the evaluation of the results prescribed by the Ministry of science and technology of the Republic of Serbia, for which the data model was extended (Ivanović, Surla, Racković 2011). The full version of the paper will provide the overview of the relevant literature related to reporting in the research information systems.

The motivation for this paper is the need of creating various reports about scientific results within CRIS UNS. The one type of the required reports includes various presentations of the references on the Internet. It is necessary to provide the presentation in various reference styles (Harvard, Chicago, MLA, Nature) that are sometimes connected to the certain scientific fields. The other type of the reports is one generated in the intranet for the needs of institution management. These are the reports about published scientific results of the employees grouped by the various criteria. Moreover, there are some types of the reports required by the Government. The third type of the reports includes those required by the researchers themselves and they are used for writing personal bibliographies, CVs, personal URL pages, grouping results by some criteria (time period, evaluation category, and so on).

The described problem of generating reports in CRIS UNS was solved by implementing separate software component whose input is the list of references that need to be presented at the report and the output is the HTML representation. The component was implemented using the FreeMarker, a free template engine<sup>7</sup>. FreeMarker is designed for the generation of *HTML Web pages*, with the idea of using the MVC pattern for dynamic Web pages for separation of the designers (HTML authors) from the programmers.

## 2 The architecture of the software component for reporting

**Data model.** The bibliographic references data model that is used in the component for generating reports is shown in Figure 1. The *Record* class is the frame for different elements of the bibliographic references including the publication itself. For every specific publication type there is the class that inherits the *Publication* class. The data that are common to all publication types are defined as the attributes of the *Publication* class and all data specific to the publication type are contained in the attributes of the specialised classes. For example, there are the attributes for the publication year, publication title and authors in the *Publication* class, whereas the attributes specific to the journal article are in the *PaperJournal* class, and these are volume, issue, starting and ending page of the article. In the full paper, we will give further details on this data model.

**Generating reports.** The model of the component for generating reports in CRIS UNS system is shown as the class diagram in Figure 2. The central class is *TemplateRunner* which has the

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<sup>7</sup> <http://freemarker.sourceforge.net/>

operations that executes the report generation. The *TemplateHolder* represents the template container and has operations for adding new templates and selecting template for generating report. The *Template* class is the model of the template for one reference style and one publication type. In other words, an instance of the *Template* class defines the way of organizing data and formatting that is specific for one reference style and one publication type.

The process of generating reports starts with the operation *getRepresentation* (class *TemplateRunner*) with the parameters containing list of publications that needs to be included in the report and designation of the reference style. The reports are generated in the way that appropriate template is applied for individual publication from the list creating the HTML output, after which the individual outputs are organized in the report by some criteria (grouping by publication year, type of publication, and so on). Organizing individual outputs is done in the *organizeRecords* operation.

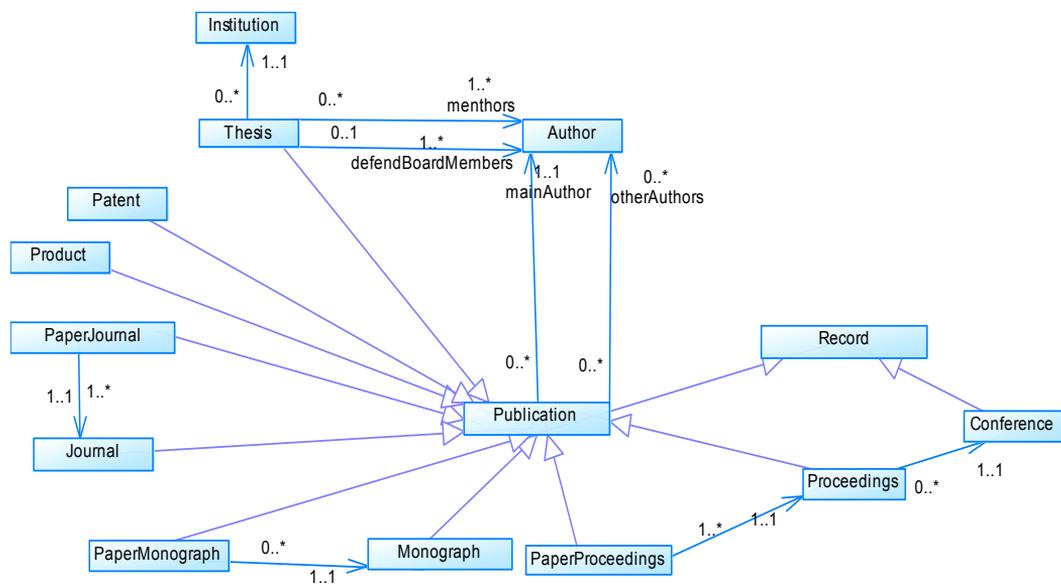


Figure 1 The data model of the component input

In order to create the output for the single publication we need to determine the publication type by calling the *getRecType* operation. Then, we use the obtained type and reference style to get the appropriate template by calling the operation *getTemplate* from the *TemplateHolder* class. The next step is to use the template in the operation *makeOne* in the *TemplateRunner* class to create the output for single publication using the given template.

Described component architecture is independent of the number of templates and adding new template to the component requires creating new instance of the *Template* class. As for CRIS UNS system, the implementation of these instances of the *Template* class is done in FreeMarker that does not require the recompilation of the source code.

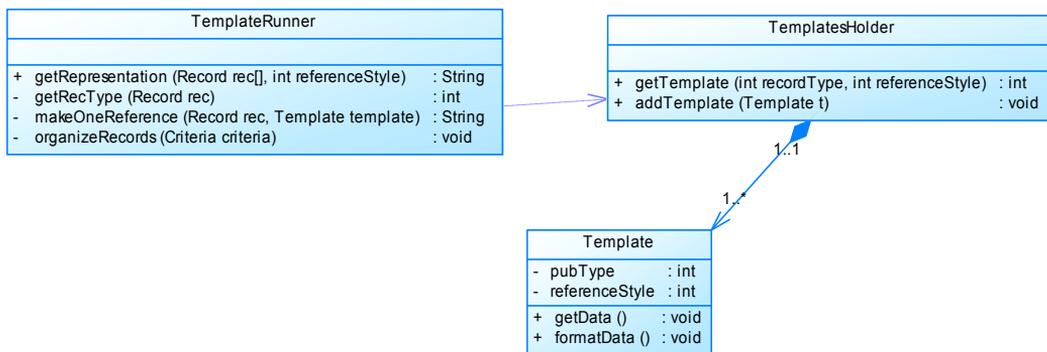


Figure 2 Architecture of the component

### 3 The example of the template

In this section, we present the two examples of the FreeMarker templates for specific publication type and that is journal article and two different reference styles. The first template uses the Harvard style (Listing 1) and second uses Chicago style (Listing 2). The detailed description of these templates will be given in the full paper.

Figures 3 and 4 show the outputs of the two templates for journal articles. Outputs differs in the presentation of the author's names, the volume and the pages.

### 4 Conclusion

The main contribution of this paper is the suggestion for the implementation of the software component for generating reports that can be integrated into various research information systems. The input data for the component are the list of references and the template, and the output is the appropriate report. This means that adding new reports to the component require writing new templates by the developers. However, it is possible to create the end-user interface for writing templates in a user friendly way and implementing the background rules for generating the FreeMarker templates. This will enable users to create various templates for their own needs, which is the plan for further developments of the reporting in CRIS UNS.

```

{mainAuthor.name.lastname},&nbsp;${mainAuthor.name.firstname?substring(0,1)}
<#list otherAuthors as author>
<#if author_has_next>,<#else> and </#if>
${author.name.lastname},&nbsp;${author.name.firstname?substring(0,1)}
</#list>
&nbsp;(${publicationYear?string("0")}),&nbsp;"${title.content}",<i>${journal.name.content}
</i>,&nbsp;Vol.${volume}&nbsp;No.${number},&nbsp;pp.${startPage}-${endPage}

```

Listing 1 Harvard style

```

${mainAuthor.name.firstname}&nbsp;${mainAuthor.name.lastname}
<#list otherAuthors as author>
<#if author_has_next>,&nbsp;<#else> and </#if>
${author.name.firstname}&nbsp;${author.name.lastname}
</#list>
,&nbsp;"${title.content}",<i>${journal.name.content}</i>&nbsp;${volume}&nbsp;(${publicat
ionYear?string("0")):${startPage}-${endPage}

```

Listing 2 Chicago style

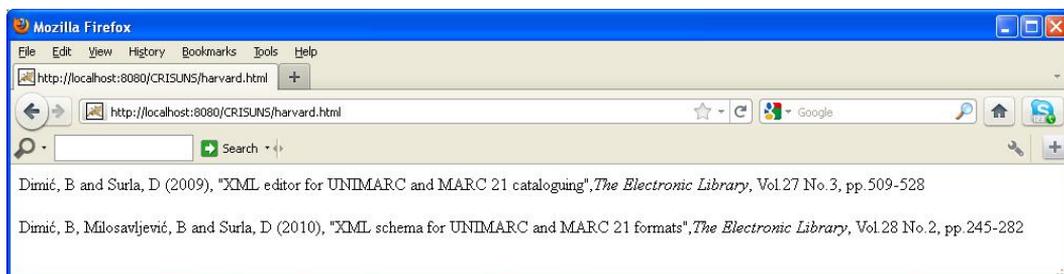


Figure 3. Harvard style output

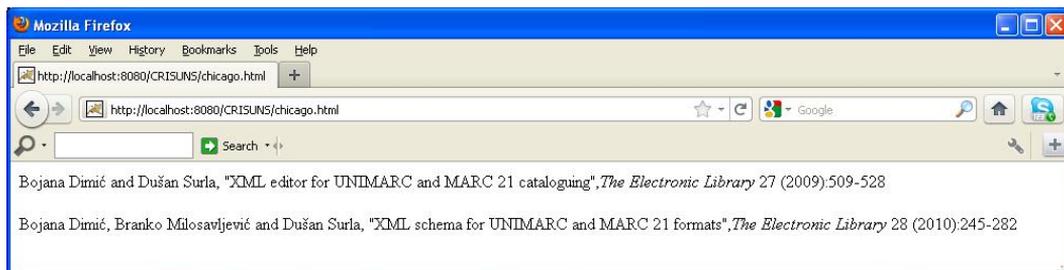


Figure 4 Chicago style output

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